2008

Digitally implemented interactive fiction: A systematic development and validation of Mole, P.I., a multimedia adventure for third grade readers

Denise Haunstetter
University of South Florida

Digitally Implemented Interactive Fiction: Systematic Development and Validation of "Mole, P.I.", a Multimedia Adventure for Third Grade Readers

by

Denise Haunstetter

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in Curriculum and Instruction
Department of Secondary Education
College of Education
University of South Florida

Major Professor: James A. White, Ph.D
Frank Breit, Ph.D
Jim King, Ph.D
Dana Zeidler, Ph.D

Date of Approval:
April 2, 2008

Keywords: digital text, multimedia design, hypermedia, instructional technology, computers in education, new literacies

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

DIGITALLY IMPLEMENTED INTERACTIVE FICTION: SYSTEMATIC DEVELOPMENT AND VALIDATION OF "MOLE, P.I.", A MULTIMEDIA ADVENTURE FOR THIRD GRADE READERS

Denise Haunstetter

ABSTRACT

"Interactive fiction" has been used to describe many of today's multimedia products. In reality, there is not a universal understanding of what interactive fiction is or what it should entail. The meaning of "interactive" is often interpreted in different ways. Many stories are considered to be interactive because they are placed on the computer. Meanwhile, such stories may lack most of the essential qualities for good literature. Interaction fiction should be upheld to the same standards as traditional texts. Following this belief, this research covers the underlying theories of interactive fiction, examples of misleading "interactive fiction" studies, and guidelines for design pulled from the fields of writing, children's literature and instructional technology. I have used these guidelines to develop a prototype of interactive fiction, which was be tested and revised in several cycles. First, I revised the prototype based upon reviews by several groups of experts from the areas of instructional technology and childhood education. The prototype was then pilot-tested by two participants from the target market. Based upon the pilot-test results, I revised the prototype. Finally, several participants read the prototype. In this

final stage, I observed the participants and conducted interviews with open-ended questions. Using the prototype that was developed according to proposed standards, I was able to gain insight into the target market's perception of interaction fiction. All details of the design and development of the prototype are included in effort to provide guidelines for building future interactive fiction. Additionally, several themes emerged when participants from the target market were observed and interviewed. Among the most prominent were the themes of storybook characters and identifying with those characters. Children in this study were able to identity themselves as the protagonist, making the main character's decisions throughout the story. Further, participants added their own elaborations of the story. In the end, the evidence of this research showed that participants were able to go beyond reading the story. The submersion into to story can be rooted in several existing literacy theories, which are discussed. Lastly, this research provides suggestions for future research, development and implementation of interactive fiction.

CHAPTER ONE: INTRODUCTION

According to Haunstetter and Kozdras (2006), "As more students use technology, the ways in which we read and write are transformed; impacting classroom instruction. Electronic texts provide scaffolds as well as challenges for the educational community." Students exposed to the technology such as the Internet encounter hypertext in which they must choose links or paths to follow or ignore. Some links may lead students astray, while other links may provide more rewarding experiences of in-depth resources. The very decision that a particular student makes at a specific link can vary in outcome, and students are inundated with such choices. Such is the situation with interactive fiction.

Interactive fiction has great potential, but first we all need to be "on the same page." Interactive fiction allows users to move around differently than in traditional text. Plot movement is based on the user's choices, providing empowerment. Interactive fiction allows for simulation and decision making with many options for input. This research studied how users move around and make choices. The target audience was able to voice their likes, dislikes, feelings toward characters, and how they related to the characters.

Purpose of the Study

The first goal of this research was to refine the definition of interactive fiction (IF) and what constitutes valid IF, entailing a synthesis of relevant literature on constructivism, post-modernism, and "new literacies." The second goal was to develop a

valid specific instantiation of IF using a generic development model for instructional design, the ADDIE model, and primarily qualitative methods of inquiry as follows:

- Analysis: The need for this research was established along with characteristics of the target audience.
- Design: The design was centered around and evaluated according to standards set forth by Alessi and Trollip (2001) and related story-writing guidelines that are covered in the literature review. Cognitive considerations were addressed.
- Development: The chosen means of development were explained. This section includes any programming languages and related advantages or disadvantages.
- Implementation: This phase explains how the prototype was validated and revised. Experts in instructional technology and children's literature reviewed the prototype. The prototype was then revised according to expert review-test feedback. The revised prototype was then be pilot-tested by two participants in the target market. Further revisions were made according to feedback on the pilot-test.
- Evaluation: This phase explains how data about the revised prototype was collected from the target audience.

The end product, after research was completed, provides a framework on how to develop interactive fiction with a thorough review of all applicable guidelines such as those in the areas of literacy, instructional technology, and design. A prototype of interactive fiction developed using this framework is included. Finally, the end product also reports and provides documentation of feedback about the prototype from the target audience of interactive fiction, having used these data to revise the prototype.

Statement of the problem

Currently, no consensus exists as to the exact nature of interactive fiction. Different programs have conflicting ideas of "interactive" elements, some of which may not be truly interactive at all. The area of IF is lacking in design guidelines, both from multimedia and literature standpoints. Based on Reeves' (2000) suggestion of pursuing development goals, this research explores interactive fiction as a creative approach to teaching and learning. Research results have implications for future research and design in the areas of critical thinking skills, higher order thinking skills, problem-solving, constructivism, postmodern text, and interactive fiction. A positive outcome of this research is to impact choices of reading instruction implementation as well as children's literature design.

Research Questions

1) What defines valid IF?
2) What defines high quality IF?
3) How can valid, high quality IF be developed with a rigorous, systematic process such as ADDIE?
    a. How does the ADDIE Analysis phase apply to the development of valid, high quality IF?
    b. How does the ADDIE Design phase apply to the development of valid, high quality IF?
    c. How does the ADDIE Development phase apply to the development of valid, high quality IF?

d. How does the ADDIE Implementation phase apply to the development of valid, high quality IF?

e. How does the ADDIE Evaluation phase apply to the development of valid, high quality IF?

CHAPTER TWO : LITERATURE REVIEW

This literature review covers the underlying theories behind interactive fiction. Several promising studies are mentioned. However, there are more erroneous studies that will be covered. Due to the absence of a definition or set of guidelines or principles, many research studies have fumbled over misconceptions of interactive fiction. In some cases, the goals of the studies do not correspond with what the researchers are looking for. It is important to include these studies as evidence of an unsettled area of interactive fiction. After reviewing current studies, this chapter explores several areas to place guidelines and principles that should lead to the development of good works of interactive fiction.

It is first necessary to define "interactive fiction" and distinguish IF from a similar, yet not interchangeable, term. According to Stewart (2006), the term "hypertext" was first coined by Ted Nelson in 1963. Nelson defined the term to mean that information is accessible by links and navigation is "non-linear" and dependent upon the user's choices. Hypertext refers to programs that have hyperlinks and is often used interchangeably with "hypermedia." Interactive fiction, as presented in this research, is a specific type of hypertext or hypermedia. Interactive fiction provides a fictitious world in which the learner will often assume the role of the protagonist. Similar types of hypertext may include games and simulations. Based upon a definition by Monfort (2000), interactive fiction contains the following attributes:

- "a potential narrative, that is, a system which produces narrative during interaction

- a simulation of an environment or world; and
- a structure of rules within which an outcome is sought, also known as a game" (p. 3).
- Additionally, I am adding that "interactive" refers to the necessity of action that is Judgment-based by the learner.

Monfort's original definition included the necessity of a computer. Although the focus of this research deals with the development of an interaction fiction prototype created for use on the computer, it is still possible to develop IF for use without a computer. Such an example would be the "choose your own ending" series of handheld books. As such, interactive fiction is not an entirely new construct. In order to maintain a definition that does not become limited with the future inventions of new media or adaptations of current mediums, I chose to remove Monfort's fourth point in his definition which states that IF must be on a computer. Further, it seems that no definition of IF has yet clarified the term "interactive." According to Hannafin, Hannafin, Hooper, Rieber and Kini (1996), "There is little consensus with regard to the design of human-computer interactions. Indeed, disagreement even exists about the meaning of the term *interactive* as applied to emerging technologies… Research on interactions methods may be among the most crucial"(p. 384).

Likewise, many of the problems in current IF studies seem to stem from inconsistent understandings of what constitute "interactive fiction." Many existing research projects that attempt to test aspects of IF are dealing with completely different "animals." There are many inconsistencies in existing research in "interactive fiction," which seem to stem foremost from the lack of understanding of what interactive fiction

should be. Many interactive fiction stories do not take advantage of the benefits of digital media. Validity errors in existing research include considering simple "page turners" to be interactive simply because the reader clicks a button to go to the next page, using well-known books that have been scanned into the computer, using poorly written stories, and forcing subjects to read out of sequence. Further according to Murray (1998), a professor of "interactive fiction" at MIT, no "organized curriculum" exists for training developers of interactive stories in structuring coherent plots. As this research establishes, a true work of interactive fiction should require the reader to make choices that will influence the text outcome. The reader should be immersed in an adventure in which he is unsure of the outcome, as it is yet to be determined by his own choices. Even through the reader's choices, any extensions of the story should still contain the quality and sense of any traditional text.

Underlying Theory

Interactive fiction is based upon several underlying theories including constructivism, transactional theory, and "new literacies". Transactional theory may be closely associated with reader-response theory. Further, interactive fiction can be seen as a type of postmodern text. Analysis of my interviews revealed that the story was not independent of the learner. There was evidence of greater interaction. My transcripts provide examples of the readers going beyond the story. According to Rieber (1994), "Constructivists usually define instructional technology as the generation of computer-based tools that provide rich and engaging environments for learners to explore" (p.13). Further, these environments generally situate the learner as a character and may include games, simulations, and microworlds (Rieber, 1994). Interactive fiction creates such a

situation, wherein the learner is placed into an environment in which he will actively make choices and receive feedback. The learner's choices and reactions to feedback construct the plot movement of the story.

John Dewey first formed the roots of constructivism. Dewey believed that children should not be taught by rote memorization. Rather he believed that children should participate in real-world or hands-on scenarios in which they could be active learners. Students should be given opportunities to think for themselves rather than regurgitate previous answers. According to Carvin (2006),

> "The important thing is that thinking is the method of an educative experience. The essentials of method are therefore identical with the essentials of reflection. They are first that the pupil have a genuine situation of experience -- that there be a continuous activity in which he is interested for its own sake; secondly, that a genuine problem develop within this situation as a stimulus to thought; third, that he possess the information and make the observations needed to deal with it; fourth, that suggested solutions occur to him which he shall be responsible for developing in an orderly way; fifth, that he have opportunity and occasion to test his ideas by application, to make their meaning clear and to discover for himself their validity" (p. 1).

Further, Rosenblatt (1978) credits John Dewey with the inception of "transaction- an ongoing process in which the elements or factors are, one might say, aspects of a total situation, each conditioned by and conditioning the other" (p. 17). In her book, "*The*

reader, the text, the poem," Rosenblatt (1978) developed the transactional theory to mean that text is meaningless without a reader. Rosenblatt presents the *transactional theory* in opposition to *new criticism*. *New criticism* (by the "*new critics*" and critical theorists) is based on the belief that text by itself is a complete entity. According to the *new critics*, text exists to be technically deciphered. It stands by itself and is not reflective of the environment, time, author, reader, etc. On the other hand, Rosenblatt believes that readers transact with text in a back and forth relationship. According to her *transactional theory*, text is part of the reader and vice versa. Therefore, text may take on new meaning through artistic interpretation every time it is read. The combination of the reader and the text results in the creation of the artistic and ever-changing poem (hence the name, *The Reader, The Text, The Poem*). Rather than stoic text, the text or "poem" is an event that is ever-changing. As the reader reads the text, he uses his own experience to decipher what he thinks it means. The physical printed text serves as symbols. When the reader sees a symbol, he reacts. Rosenblatt asserts "We cannot simply look at the text and predict the poem… Critical theory and practice both suffer from failure to recognize that the reader carries on a dynamic, personal, and unique activity" (p. 14-15). Rosenblatt contends that the reader is not just an empty tape going over text. The reader actively engages in self-corrective processes. For example, one may read the first line of text and then set a mental framework. Upon reading the fourth line, that reader may need to go back and adjust the original framework based upon his evaluation of new "symbols" in the text. The self-corrective process is done on an individual basis. Therefore, text requires individual readers to produce meaning. Rosenblatt refers to the readers' relationship with text as *transactional*. Rosenblatt does not believe that the text's

meaning should be derived from the reader's interpretation alone. The reader's interpretation must still be ground in the text. Again, the text and reader work back and forth with each other in a *transactional process*. Therefore Rosenblatt seeks a "middle ground" between total reader control and the beliefs of the above theorists.

Accordingly, works of interactive fiction serve as clear examples of text providing for the transactional process. One reader's story will likely conclude differently than another's. The text and text meaning are not dictated to the reader. The reader, who must make active choices within the path of text, interprets the text. As such, there is not merely one "authoritative" author. Readers construct their own meanings and stories. Yeaman, Hlynka, Anderson, Damarin and Muffoletto (1996) refer to the reader-text relationship as the "reader response theory" (p. 257). In describing the flow of information via text, they state

> "A key question revolves around the issue of where ultimate authority or truth lies. Traditionally, one assumes that the author of a work is the ultimate authority." … author is not always available… "As a result, authority of the author is replaced by authority of the text. 'Truth' now lies in the text itself, while the new task becomes one of interpretation… Contemporary literary theory takes another step forward. Perhaps the authority lies not only in the author who wrote it, or in the text that says it, but in each reader who reads it. After all, each reader is unique. Each reader brings to a text his or her own background, interests, needs, and understandings. Such a view would explain why one reader will select a

given text as important, while another reader will readily dismiss the same text as either useless, irrelevant, or even wrong" (p. 257)

Yeaman et al. (1996) continue, describing the "reader response theory" described above as being postmodern. "Probably authority lies somewhere in between the three: author, text and reader. Reader-response theory places a linear transmission model with an active constructivist model of information. Such a view is "postmodernist'" (p. 257). In a description that fits interactive fiction, the authors further describe all hypertext as being postmodern. With works containing hypertext, text links are connected to other text. Thus, one text always defers to another and the text is not linear. Yeaman et al. (1996) also assert the nature of postmodern text is that with an underlying constructivist theory. Postmodernism can be distinguished by the following qualities: "a belief in plurality, a critical questioning of the benefits of technology, and a questioning of 'progress' as always inevitable, leading to a serious claim that 'technological progress' may not be progress when examined by other yardsticks" (p. 255). This theory of postmodernism would include metanarratives, multiple interpretations, and multiple methods at arriving at those interpretations.

Postmodernism calls for a questioning of all that we had assumed to be true. In a postmodern environment, there is not one authority or one truth. This would be demonstrated in interactive stories that have more than one path. Rather than leading all learners down one universal path toward one ending, learners are free to choose paths and end up where they may without being incorrect. Postmodernism provides learners with evidence, which they are open to interpret, rather than providing rote facts. Yeaman et al

(1996) cites Baudrillard's (1991) postmodern theory of truth in relation to computer technologies as follows:

> "Baudrillard would focus our attention on simulation, or using his own preferred word, the simulacrum, and show that in fact it is difficult to know what is real, and what is imaginary. Indeed, Baudrillard would argue for the "precession of the simulacrum," in essence, a deconstruction in which reality itself is deconstructed as we enter a world of "virtual" reality in cyberspace, a world which can be constructed through the application of computer technologies" (p. 254).

Yeaman et al (1996) posits that an understanding of postmodernism would follow the distinction of the following two wide held beliefs of educational technology. There are two distinct beliefs regarding educational technology. The first belief holds that technology should be a means of transmission of information. The second belief, at odds with the former, holds that technology should aid in the construction of knowledge. Postmodernism would be matched with the second belief. There is not one authority figure sending one message that can only be interpreted in one way. Rather there are multiple forms of authority. There are no cloned receivers at the ends of transmission lines. Learners have several resources of authority. They use technology to gather information and form their own judgments. The receiver makes the meaning, not the sender.

IF, as suggested by Yeaman et al (1996), is postmodern text. They further report the following practices are founded upon postmodern principles:

- Forms of authority and knowledge - Multiple sources (as opposed to a single source) of authority are presented.
- Concerns for the individual - There is an allowance for individual differences rather than a focus on the "average" students.
- The material base - Focus of courses changes from "content" to "process" as it is accepted that information is never final.
- View of history - There is a consideration of diverse national histories.
- Place of community and tradition - There is an inclusion of a multinational community.

Postmodernism and Interactive Fiction

In the case of interactive fiction, the above points correlate as follows:

- Forms of authority and knowledge - Multiple sources presented by allowing readers to decide the paths. There is not one single authoritive path that leads to only one correct ending or understanding of story occurrences.
- Concerns for the individual - Individuals may choose different options so that the main character may take the direction chosen according to the reader's preference. The story is not a "one size fits all" story.
- The material base - The emphasis of interactive fiction rests in the particular choices that a reader makes. Hence, each reader may have a different sense of reason within choices rather than one shared set of times, places and names within the story.

- View of history and Place of community and tradition - Interactive fiction has the potential to show different viewpoints within one story. By including the reader as the main character, the reader may be placed within an environment in which he is not a passive onlooker.

Additionally, considerations within the postmodern principles include aesthetics and the following as further noted by Yeaman et al (1996):

Text Issues:

- Hypertext - Though most text is unstable, hypertext is founded in postmodernism as it is non-linear and non-sequential.
- Textbooks - Textbooks are not neutral and should not pretend to be so. Text that works is non-linear or interactive.
- Simultaneous versus sequential presentation - Postmodernists avoid sequential presentation.
- Multiple texts and messages – Books can make use of uncommon or hidden areas that make the receiver "go beyond the book."

Issues of realism:

- Realism – Avoid an ideology in which there is no understanding or appreciation of the individual.
- Symbolism – Reject "a truth" so that other realities may be created.
- Representation – (Receiver versus Reader) – The receiver leaves the sender empowered. The reader is empowered by forming meaning.

Of Yeaman's (1996) principles and considerations of postmodern text above, several mirror the ideology of New Literacies and are of foremost relevance to digital interactive

fiction. These include “forms of authority and knowledge” wherein multiple sources of authority are presented, “concerns for the individual” wherein there is a focus on the individual rather than the average student, and “the material base” wherein the focus of a subject is on the process rather than the content.

Lodge (1977) identified five characteristics of postmodern fiction, all of which relate to hypermedia. These characteristics and how they fit in with educational technology and interactive fiction are addressed below.

- Contradiction – Options are open ended. When there is not one single path, plural pathways may contradict each other.
- Discontinuity – Hypertext is based on discontinuity. Rather than follow one pathway completely through, the learner may choose where to stop and jump onto a different path.
- Randomness – Hypertext is based on the randomness created by discontinuity as explained above.
- Excess – Alternative paths and loops create excess of all elements.
- Short circuit – Choices of paths allow students to bypass areas.

As stated earlier by Yeaman et al (1996), the nature of postmodern text is that with an underlying constructivist theory. Constructivist theory states that the learner constructs learning in an active manner. Duffy (1996) cites the following fundamental principles of constructivism: “Learning is an active process of constructing rather than acquiring knowledge, and instruction is a process of supporting that construction rather than communicating knowledge” (p. 171). In essence, a constructivist environment allows the learner to find and process information rather than having that information

dictated to him. Likewise, interactive fiction places the learner into a story that he will unfold for himself.

Further, Moallem (2001) summarized instructional design concepts that are central to the constructivist framework. The five concepts include the following:

1. Learning is embedded within problem-solving environments
2. Contexts for learning are authentic rather than purely academic.
3. The learner is afforded control.
4. Mistakes are used to provide feedback and serve as learning opportunities.
5. Learning is based in a social context.

Key points

As the aforementioned section contains a rather extensive list pertaining to postmodern fiction, I will clarify the key points of Yeaman (1996) and Lodge (1977) that will be carried forward in this research. I have eliminated unrelated or redundant clauses. The key points of the above section are as follows:

- Interactive fiction is postmodern.
- Interactive fiction should be non-sequential and non-linear, including the following:
    - Plural paths
    - Reader may jump from one point to another at any time
    - Choice (including choices of where to go/ what to bypass)
- Choice empowers the individual
- Postmodern text/ Interactive fiction has underlying constructivist theories.

New Literacies

Rather than the traditional concept of reading "literacy," the New London Group's (1996) premise of "new literacies" requires further methods of being literate within today's society. The term "literacy" itself has long been under scrutiny by researchers. Brian Street, a well-known figure in literacy studies, has argued that multiple "literacies" in any given area are socially constructed. Street (1995) mentions "'literacies' rather than of a single, monolithic "Literacy'" (p. 19). The word "Literacy" with a capital "L" and single "y" denotes one autonomous understanding. However, "literacies" is plural and denotes the idea of multiple literacies. The lower case "l" establishes that literacy is not a proper noun with one sole meaning. Street argues that literacies are social experiences. Different societies require different literacies, and there are yet more differences within groups within a society. In a simplified example, residents of a small rural town will need to be able to understand and move around differently than residents of an urban city. A rural lifestyle might require the ability to handle instructions for heavy equipment and make measurements and decisions that will enable healthy animals and crops. On the other hand, residents of an urban city may need to know symbols for hailing taxis, understanding fares, and using crosswalks. Each lifestyle contains components of necessity to the given society, while these same components might never play into the other society. As such, the residents in each case would need to acquire very different functional "literacies." In each of the above examples, there is more than one "Literacy" of knowing how to read. Literacies include

knowing how to view your environment, take cues, act and react in order to make effective use within that lifestyle.

"New literacies" often refer to digitally mediated literacies and semiotic understandings required in addition to traditional literacy. The need for literate students in the realm of "new literacies" refers to the need for those who can independently think, adapt to innovative situations, and problem solve to move within such situations. According to Lankshear and Knobel (2003), "In such uses, 'literacy' connotes the idea of being able to find one's way around some kind of system, and to 'know its language' well-enough to be able to make sense of it" (p. 15). Further, these new literacies cannot be taught solely from books. They will best be acquired in authentic situations, such as constructivist environments. Gee (2003) has noted that many computer games involve situated environments, which help players to develop new literacy skills. Beavis (2002) provides additional evidence to link games and new literacies by stating the following:

> "In their out-of-school lives, even in the earliest years, children's experiences and expectations of literacy are no longer necessarily paper-based. The diverse range of texts and literacies with which they become familiar prior even to entering school has implications that challenge assumptions and expectations about early literacy curriculum. Socially, culturally and in the kinds of literacies they entail, games such as Pokemon, Magic Cards and War Hammer present young people in the early and middle primary grades with complex, highly developed mythologies and symbol systems. Children as young as five learn to read and negotiate multilayered narratives. These narratives include large casts

> of players on opposing sides, each with a range of skills, attributes and weaponry brought into play in different encounters in increasingly sophisticated ways" (p. 48).

In the same way that games are able to familiarize students with technology, interactive fiction also places learners into situations where they learn the ways of new environments, make choices within those environments, and move forward through the results of those choices. "Visual literacy," a type of "new literacy," is a predominant requirement in interactive fiction. Weeden (1987) discussed the importance of visual literacy, providing the following definition: "Being "visually literate" means more than having the ability to produce/encode and read/decode constructed visual experiences; it suggests that one is aware of one's self and representations, in both space and time, situated within a social, cultural, historical, and political framework" (p. 1). Several researchers have highlighted the importance of visual literacy, noting how technology (computers and the Internet) has heightened the need for image and symbol recognition. According to Abbott (2002),

> "In the ways described, whether in the form of a computer program enabling symbolic communication or via a freely available world-wide publishing medium like the Web, the use of ICTs is changing the literacy practices of people in many countries around the world... An obvious connection would be the increasing number of websites using symbols either in addition to, or in replacement of, written word-based texts. This development began in schools and centres where symbol-users could be found in large numbers."

The use of symbols may be considered helpful in surpassing cultural or other barriers of language and written text. As an example of being "user friendly, " brightly colored GUIs (graphical user interfaces) are the expected norm on today's computers. Symbols are widely available in many aspects of daily life. At the same time, there remains a type of literacy needed to decode symbol meanings.

Further, according to Kress (2003)

> "The world told is increasingly being replaced by the world shown – with all the social and cultural changes that this entails. It is no longer possible to think about literacy in isolation from a vast array of social, technological and economic factors. Two distinct yet related factors deserve to be particularly highlighted. These are, on the one hand, the broad move from the now centuries-long dominance of writing to the new dominance of the image and, on the other hand, the dominance of the medium of the book to the dominance of the medium of the screen" (p.1).

According to Haunstetter and Kozdras (2006), works of interactive fiction may place the reader in such a visually situated world. The reader of a text assumes the role of the main character. As such, the reader is often shown the main character's point of view. For example, some of the screens in *Mole P.I.* show the reader what they are seeing as the main character. The reader must look for clues within the pictures just as Mole P.I. would be doing in the story. At the same time, these situations may provide opportunity for semiotic scaffolding. For instance, extra clues might be thrown in to help

the less visually literate reader become more acquainted with such an environment. According to Gee (2003), "we build meanings for words or symbols 'on the spot,' or so to speak, so as to make them appropriate for the actual situation we are in, though we do so with due respect for the specific semiotic domain in which we are operating" (p. 24).

Haunstetter and Kozdras (2006) further add "Different visual encounters may result in opposite understandings of the same terms or symbols" (p. 94). This was exemplified in the version of Alice in Wonderland created by the authors in their research of Interactive Fiction. In a scene where Alice may choose to converse with either a bird or a mouse, Haunstetter and Kozdras (2006) explain that

> "If she (Alice) hears the bird say, 'I have a tale,' she will probably take that to mean that the bird has a 'story' simply because birds have feathers and no tails. Therefore, Alice might react in a manner to let the bird know that she is ready listen. If she hears the mouse say, 'I have a tail,' she will probably take that to mean that the mouse has a long appendage to his bottom. In this case, Alice may give the mouse an odd look and wonder why he is stating the obvious. Such a behavior, of course, would disgruntle the mouse" (p. 94).

As a further example of visual literacy in interactive fiction, Haunstetter and Kozdras (2006) included "Easter eggs" in their *Alice in Wonderland* story. An Easter Egg is often a hidden link or picture that provides something extra when clicked. In some screens of the *Alice in Wonderland story,* a small caterpillar is present as an Easter Egg. As such, this caterpillar may provide clues or advice if the reader clicks on him. According to Haunstetter and Kozdras (2006),

> "He appears in several screens—the visually literate individual would learn, through interacting with the story, how to comprehend his role. If the player happens to click the caterpillar's head, a screen will pop up with a clue. These small images are often present in video games. While the programmer never specifically points them out, players learn by experimentation that certain reappearing icons may provide hints, clues, bonus points, or secret passages. Finding these small visual icons are usually rewarding, and players are further encouraged to inspect all elements of the environment" (p. 94).

Wolf and Wolf (2002) describe an "Easter egg" as a "hidden feature or novelty that the programmers have put in their software. In general, it is any hidden, entertaining thing that a creator hides in their creation only for their own personal reasons. This can be anything from a hidden list of the developers, to hidden commands, to jokes, to funny animations" (p. 1). A good number of today's DVDs include Easter eggs. Users may discover Easter eggs in diverse ways such as searching areas where they found Easter eggs in past programs, checking the Internet for reports or hints of frequent Easter eggs, and "trial and error." According to Haunstetter and Kozdras (2006), "Users may randomly click elements of pictures to see if anything happens. In any instance, users are thinking beyond the obvious image" (p. 95).

The Easter Egg phenomenon serves as an example of the need for visually aware users. Readers must not only tend to text, but they must also evaluate and decode images. Whereas glancing over an image might have sufficed in the past, the idea that Easter Eggs might be in any given scene requires more thoughtful awareness of images.

Further, Shaffer and Gee (2005) refer to the phenomenon of virtual environments as "epistemic" learning whereas "epistemic games" are virtual situations that offer practice at new literacies. The authors define "a community's distinctive ways of doing, valuing, and knowing" as the community's "epistemic frame." Just as students have actual apprenticeships to learn epistemic frames, virtual environments can also create epistemic frames in which the learner can "practice." This is often seen in simulations, but could further apply to well-written games and works of interactive fiction. However, it is also important to that games and interactive fiction are two separate entities even though similar benefits may apply to both. These differences will be covered in more detail when Gee's (2003) principles of empowerment are discussed toward the end of this chapter.

In terms of making judgments, the advent of hypermedia requires literacies that differ from the literacies of reading a book or using the library. In recent years, the Internet has made information easily accessible to those with computers. At the same time, the opportunity to be a "writer" or "author" has flourished with the Internet. With more writers and less gatekeepers, readers suddenly need to know how to sort through a lot more information than in the past. They must be able to judge what is true and what is not. Lankshear and Knobel (2003) comment on the abundance of information but scarcity of attention as they state that "In recent years a growing number of writers have begun talking about an economics of attention. They see this operating in relation to information, and within the context of the burgeoning information revolution associated with digital technologies" (p. 109).

Within the struggle for attention, writers also need to know new things in order to be present in the world of the Internet. An example involving both readers and writers is Wikipedia, the free online encyclopedia. Anyone can contribute entries to Wikipedia. Any given topic within Wikipedia is often made up of multiple entries that were added by individual users. If an entry is posted without references, Wikipedia will leave a request for references. In turn, additional authors can add references or whatever additional information they choose. In this sense, Wikipedia is an example of fragmented writing. Johnson-Eilola (1998) talks about fragmented writing in terms of the internet. The author states that

> "In dealing with hypertext, writing is more of a social process in terms of "connection" rather than "production'… the configuration of fragments, I argue, is an important form of writing, a Lyotardian act of creativy that is more reflective of postmodernist theories of culture and value than that available in most versions of contemporary composition. Each of the fragments enters into a dialogue with the others in ways not available to the workds in their original, relatively isolated form (the book, the essay, the email message). Indeed, the individual fragments retain much different meanings that are read and rewritten as the reader-writer traverses different threads in the text." (p. 30).

The idea of fragmented writing means that readers/writers must always make choices during the various activities of reading and writing. In linking existing data, they must judge what is important, pertinent, and how items relate to each other. In the example of

Wikipedia, readers cannot assume that everything is true just because they read it in an "encyclopedia." This exemplifies the idea of different literacies for reading the Internet. Another real world example requiring new literacy skills is Ebay. Ebay requires buyers and sellers to have a certain amount of know-how to successfully maneuver within the community. This entails attaining good sales for the seller, buying at good prices for the buyer and maintaining positive peer ratings. According to Netgrrl and Chicoboy (2002), "Ebay's community feedback and ratings system is an illuminating microcosm of literacies and social practices at large. It can be used as a reference point from which to consider the dialects of production and consumption of official literacies of school" (p. 29). Netgrrl and Chicoboy (2002) further add the following:

> "Ebay calls for interesting new constellations or 'batteries' of ways of reading and writing to meet people's purposes as online buyers and/or sellers. For example, the Ebay facility has a mediating or brokerage role. Nobody at Ebay sees or handles what is being bought and sold. And there is nobody to tell people where to go to find what they are looking for (or might want to look for if they knew it might be available). Hence, it is not simply a matter of knowing how to read or write the text of the item descriptions. Participants also need to know how to navigate through or add to the website" (p. 17).

Because Ebay serves an international list of buyers and sellers, users should know and understand money and size conversions. While there is potential to fall prey to scams or deceptive practices on Ebay, there are also many tricks to finding bargains on Ebay. For instance, some item seekers purposely misspell the name of an item in hopes that it was

incorrectly listed. An incorrectly listed item would get less bids. Some sellers place low prices on items but add unreasonable shipping costs. For collectible purchases, buyers need to be able to determine authenticity by picture and description. Further, Ebay is based upon a ratings system. After each purchase/sale, buyers and sellers rate each other. Theses ratings are publically displayed on Ebay. An Ebayer with a poor rating may have trouble gaining the trust of other Ebayers. Likewise, buyers and sellers would likely be more comfortable dealing with an Ebayer with an extremely high rating. For example, some sellers state that they will not sell to a buyer with less than ten positive remarks. Some people may rate fairly, while others may have ulterior motives. Users must make choices as to how seriously they should accept the ratings left by others. Hence, Ebay users may run into any array of ethical decisions beyond purchase choices. Lankshear and Knobel (2003) add the following statement in regards to the Ebay rating system.

> "They are 'insinuating' into the system produced for them ways of 'dwelling' with which they are familiar, adept, or which they otherwise find satisfying or reinforcing – no matter how unpleasant we may find some of these. The 'silicon literacy' of ratings, then, can best be understood as endlessly complex and multiple. 'It' is flexed into myriad uses. 'It' is susceptible to policing and 'moralizing' on the part of producers and other consumers alike, just as much as and in parallel manners to the literacies of physical spaces like schools – where the 'players' involved are also inclined to invoke notions of fairness, propriety, and 'getting it right'" (p. 151).

The above quote and example of Ebay tie back to the ideas of Brian Street. In reference to Street's (1995) idea that literacy is socially constructed, the current need for "new literacies" has been prompted by the world of hypermedia. However the idea of society being inundated with too much information is not new, as illustrated by the historical happenings of Cobbett's Register in Britain. During the early 1800s, Britain had a "seditious libel" law. According to Lankshear and Lawler (1987), "This law legislated against public expressions of discontent with the established government" (p. 95). During the same time period, "registers" were an important commodity. According to Lankshear and Lawler (1987)

> "an increasingly popular (typically) weekly form known as political registers… While some had a literary and dramatic focus, most were political in content and anti-establishment in bias. They were usually published by a single individual and reflected that person's viewpoint. Whereas the newspapers sought to describe or record events, registers aimed explicitly to shape them. And whereas monthly reviews and magazines reviewed general policies, the registers reviewed and evaluated current events. They evolved as potent instruments of political and, often, religious critique. And they were subject to the Stamp Tax" (p. 96).

Many papers were not accessible to the working class because the imposed stamp act made papers too expensive. In 1802, William Cobbett founded Cobbett's Weekly Political Register. This paper represented and was aimed at the working class. The views expressed within the registry worried the government, as the lower class often presented the danger of rioting. Men would gather in groups to share Cobbett's Weekly

Political Registry, but owners of the meeting houses became wary of punishment. Cobbett found a way around the stamp tax by printing the paper on a single sheet. This made is affordable to the working class. Though riots were feared, this was not the result. Rioting actually ceased with the education provided by the register. Men gathered and began to work more systematically on reform.

Likewise, the Internet of today poses many similarities to the advantages and disadvantages that have historically arisen. Reminiscent of Cobbett's Registry, the Internet offers access in a way beyond past forms of media. This access requires readers to follow, discern and contribute text differently than in past mediums such as newspapers. In short, today's culture requires "new literacies." Landshear and Knobel (2003) relate the ideas of online communities, literacies and the rights of the readers as they state the following:

> "In the end, online community feedback and ratings systems are often an illuminating microcosm of literacy and social practice at large. We may, if we choose, use it as a reference point from which to consider the dialects of production and consumption of the official literacies of school. We might consider where we, personally, are positioned in these, and with what consequences for learners whose 'right' to consume is, precisely, and obligation in the way that the participation rights of Ebay members or Plastics users are not" (p. 151).

Interactive Fiction as New Literacy

Interactive fiction fits many of the multiple literacies as mentioned in the above section including being social, visual, fragmented, and requiring new ways to sift through information and move around.

- Interactive fiction can be social as the reader is placed into the story as a character interacting with others. In some cases, interactive fiction may be multi-player/reader
- Interactive fiction is visual. Stories often contain "Easter eggs" or some sort of problems solving that is based within images. Simple navigational requirements also require visual understanding.
- Interactive fiction is fragmented with story branches. In some cases, many fragments fit together. Readers must decide what information is pertinent to decisions. There is also potential for multi-authoring. At the very least, the reader chooses bit and pieces of the author's story at a time.
- Readers must be able to make use and get around the environment of the interactive fiction.

Need for this research

Future research should first concentrate on meeting guidelines before attempting to assess the impacts of IF. As such, there is an absence of developmental research in interactive fiction. This research establishes an operational definition of interactive fiction as well as components that make a true and successful interactive fiction. Beginning guidelines were based upon Alessi and Trollip's (2001) guidelines of

instructional technology principles as well as Hayes-Roth's (1998) desirable traits for interactive fiction. These traits will be discussed in further pages as they were applied to the interactive fiction prototype. This prototype is based upon the definition and guidelines established during the literature review. The interactive fiction prototype was tested with children, the target market, in a qualitative inquiry.

Several researchers have reported suggestions and/or advantages as to the use of interactive fiction with today's technology, including that technology integration should extend beyond simple computer usage. Labbo & Reinking (1999) distinguished between learning from the computer and learning with the computer. An example of "learning from the computer" might involve students passively reading an article or lesson. Conversely, "learning with the computer" would involve high-levels of thinking, where the computer responds to the learner and vice versa. In learning with the computer, students are challenged by the computer. Thus, they are motivated and empowered. Interactive fiction provides the opportunity for technology that works with the learner.

Further, there have been several studies with promising results in the area of interactive fiction. These include Frear and Hirschbul (1999), Desilets (1989) MecLellen (1992), Lefever-Davis & Pearman (2005), Coiro, (2003), Dobson (2000) and Luce-Kapler (2000). Frear & Hirschbuhl (1999) found that interactive multimedia significantly improves achievement and problem solving skills in science. Frear & Hirschbuhl's setup placed the student as a science official who must make decisions based on data collection. The authors cite a possible explanation for achievement in problem solving skills lies in the meaning developed by a learner during this interaction with course material. Desilets (1989) found that interactive fiction is often geared toward problem

solving and can be successful in engaging students' interest. Meanwhile, a qualitative study by MecLellen (1992) showed that children are able to adapt to interactive presentation. However according to Yeaman et al (1996), "whether children can understand all – or even some – of the subtleties is open for research" (p. 262). A study by Lefever-Davis & Pearman (2005) found that interactive fiction offered great opportunities for engaging interactivity and reading in early elementary school students. They studied the use of Interactive Storybooks with early grade school students and found many possibilities for engaging reading opportunities and interactive experiences.

While hypermedia may provide support to learners, it also presents many challenges. According to Coiro (2003), "the Internet, in particular, provides new text formats, new purposes for reading, and new ways to interact with information that can confuse and overwhelm people taught to extract meaning from only conventional print" (p. 1). Kamil, Intrator and Kim (2000) discussed research in the field of electronic texts and literacy and noted that the importance of these issues becoming mainstream in the field of literacy is vital in developing a knowledge base with understandings of cognitive strategies and engagement. If a research stance is not taken from within the education field, hypermedia will only be influenced by fields outside of education.

Findings from Hannafin et al. (1996) present that "Research on interaction methods may be among the most critical. There is a vast area of possibility, yet little research has been conducted thus far" (p. 384). The scarcity of research may be due to the lack of definition and theory associated with interactive fiction. Further according to Hannafin et al. (1996),

> "There is little consensus with regard to the design of human-computer interactions. Indeed, disagreement even exists about the meaning of the term *interactive* as applied to emerging technologies" (pp. 384-5).

Interaction should occur in meaningful ways that immerse readers into the situation and puts them in charge of their own destinies. While most current research results are positive in the direction of interactive fiction (IF), many do not meet the general idea of what IF should be. Page-turners should not be considered to be IF. Major weaknesses in current studies are due to obscured versions of IF. For this reason, this research outlines literature standards and IF principles and a definition from current authorities in the fields of children's literature and interactive fiction

Smith (2002) noted that many stories lack the human qualities of identity and character development involving knowledge, emotions, and relationships. These lapses result in the failure of many games. Further, many games have focused on the end product (a game) rather than the development (the hows and whys of how that product should work). As a result, many games lead players down paths that lead to nowhere. Graves (1998) added that while the reader should help with plot movement, they should not be left with the total responsibility. Developers should develop characters and plot lines, while leaving choices as to how they unfold to the readers.

Further according to Murray (1998), a professor of "interactive fiction" at MIT, no "organized curriculum" exists for training developers of interactive stories in structuring coherent plots. He states that interactive fiction worlds should resemble simulations and address the following questions:

> "What rules does this world obey? How do we shape participation rituals? How do we signal the interactor's location as he or she moves through the world? How do we shape choice points so that they offer a sense of dramatic agency? How do we communicate world boundaries, so that interactors know likely events? How do we entice the interactor into patterned activities that result in the active creation of belief in the imagined world?" (p. 19).

Future research should focus on developing and testing guidelines for interactive fiction. Before we can focus on the outcome of IF, we need to know what constitutes a good example. Based on Reeves' (2000) suggestion of pursuing development goals, this research was a qualitative developmental study to explore interactive fiction. Research results have implications for future research and design in the areas of critical thinking skills, higher order thinking skills, problem-solving, constructivism, postmodern text, and interactive fiction. The outcome of interactive fiction research may impact choices of reading instruction implementation as well as children's literature design. Specifically, IF may be promising in motivating reluctant readers and developing critical thinking and problem solving skills.

Review of Current Studies of "Interactive Books"

As stated earlier, there is no clear consensus of what "interactive fiction" is. This is a predominant problem in the existing research. Additionally, researchers seem unsure of what to do or measure with interactive fiction. The following studies are examples that illustrate current problems in IF research.

Chu (1995) led a descriptive study to observe behavior and literary response of young children to computer- based stories. This was a descriptive study with both quantitative and qualitative aspects. Each subject was given five electronic books to read throughout the course of the study. As subjects read, data was collected in two ways. Quantitatively, the amount of mouse clicking was recorded as a measure of excitement. Qualitatively, outward behavior and post-story discussion was video-taped.

The amount of mouse-clicking tapered off after the first book in all three cases, suggestive of a novelty effect. Assessments of the video-tape confirmed that subjects enjoyed the computer-based books. Chu clarified that subjects can indeed have a transactional experience with electronic text. In one case, the young male subject hugged the computer when he was finished.

Nostalgic concerns are hard to gather and report in numbers. However in this age of technology, many adults seem frightened that children will not have true bonding with "real" books. The strength of this article as a descriptive study was that it showed children can relate to electronic text at least as well as they relate to handheld books. There were also many weaknesses of this study. The setting was in a computer lab, which may have been a new experience in itself to the subjects. While the study purported to measure subject excitement while reading, the excitement may have been due to the special excuse from class to visit the lab. There were only three subjects in this study and they were all male. The small number of subjects decreases the reliability of the data. I believe that girls should have been included in this study, especially if it is to be generalized to "all" children. It is possible that girls may have reacted very differently in the circumstances.

A study by Mathew (1997) examined the effects of electronic text versus printed text on levels of reading comprehension in third graders. Two related experiments were covered in this study. One group read a story in print, while the other group read an electronic version of the text on the computer. The "print" group and "electronic" group were matched in terms of gender and reading-comprehension level. Subjects in the print group read paper-printed stories. Subjects in the electronic group read electronic versions of the same stories. After reading, subjects were asked to retell the stories (in writing) and answer ten open-ended questions. In Mathew's 1997 study, writings and answers were then scored according to completeness of the following elements:

1. "Setting (time, place, and characters).
2. Theme (opening event that sets up the character's problem or goal).
3. Plot episodes (events that describe the main character's attempts to solve the problem or reach the goal).
4. Resolution (solving of the problem or attainment of the goal).
5. Sequence" (p. 3).

The scoring of the *open-ended questions* showed no significant difference between the experimental group and the control group. However, the scoring of the *story retellings* showed significant difference between the two groups. Mathew offered the explanation that subjects were cued by the open-ended questions to the point where both groups could make adequate recollections. The story retellings directed subjects to use free recall. The author also suggested that subjects who read the electronic versions outperformed those who read the print versions because they were more interactive with the stories. However, she never defined what she meant by "interactive."

Rather than having used a separate print group and electronic group, experiment 2 tested the reading comprehension of the *same* group of students after reading printed text and then electronic text. Subjects read two print books and then wrote "retellings" of the stories. Subjects then read two different electronic books and retold those stories. The scores were higher on the retellings that resulted from the electronic text.

The first weakness in this study was the lack of definition of an "interactive story." The author claimed that subjects in the electronic group were more interactive with the story. No clarification was ever made. Did this interaction mean that the student could click a button to turn the page? Could the students highlight words? Was there more in-depth interaction such as decision-making? At the end of the article, the author mentioned that the electronic stories had narration features. Hence, subjects of the electronic group had the option of being read to by the computer. I believe that this was a huge problem. How can reading comprehension be tested when subjects did not read the text themselves? Simple computer narration seems to conflict with the author's earlier assertion that the electronic group was more "interactive." Further, there was no detail as to depth of thought that went into story retellings and answers to open-ended questions. This left me to believe that "comprehension" is assumption of recall. Can we assume that subjects comprehended the text if they are able to retell the story? Finally, the article did not contain enough information for another researcher to replicate study.

A qualitative study by Fernandez (1999) asked whether children in kindergarten could learn from stories on the computer. The stories used were *Little Monster at School* by Mercer Mayer (1979) and *The Berenstain Bears Get in a Fight* by Jan and Stan Berenstain (1982). A person read one of the stories to the children. Then children

received the other story via computer. After the stories, children were asked questions. Some of the questioning included story event pictures that the children were asked to circle in order. The children were also asked to retell the stories, tell if anything similar had ever happened to them, and tell which story they liked better.

It was found that boys responded more to the computer story (Fernandez does not clarify how this was measured). However, boys *preferred* the human read story. Fernandez further contends that more cannot be explained without further research. This study was extremely weak. There were no details provided in this research, which left many questions as to the data gathering process. Other "methods" issues include the following:

- How could we be sure children were choosing the preferred *delivery method* rather than their favorite story?
- Did the children already know the stories? (Both story choices were popular and well-known characters).
- What happened to the girls in the study?

Finally, this study really had nothing to do with *reading.* Rather, this study was based on *listening comprehension*. As such, a whole new set of problems opens up. This brings into question possible attention deficits of kindergarteners.

An exploratory study by Lancy et al. (1988) examined whether reluctant readers could be motivated by interactive fiction. Subjects were given interactive story programs and offered constant encouragement to work through them. If a program was completed, they moved to a harder program. The researcher observed the subjects throughout the time period of the study, noting motivation and reluctance by appearance. Findings were

concentrated on two subjects, Bill and Mark. Both subjects were said to be engrossed in the interactive fiction stories, but the two differed in behavior. Bill appeared to be more self-assured and willing to explore. He was also a good speller and able to type. His explorations, typing and spelling skills made him very skilled at working through the interactive fiction without much need for outside encouragement. Mark was not good at typing and was a poor speller. Mark was less self-assured than Bill and less willing to explore. Mark required much more encouragement. It was found that providing him with a list of vocabulary words was helpful. By the end of the observation, Mark was also intensely immersed into the interactive fiction. While Mark still did not attain the same skill level as Bill, he was independently engrossed in reading activity. The author concluded that students who are unmotivated in conventional literature classes might benefit from interactive fiction.

Major weaknesses of this study included the low number of subjects and the selection method. The eight subjects were not randomly chosen, but they enrolled in the summer computer workshop and paid to be there. By self-selection, these subjects were already interested in computers and learning. Also, the students were rated as "no more than an average interest in recreational reading," which could mean that they all had an average level of interest in reading. These do not sound like the "reluctant readers" stated in the article title. Out of eight subjects, the author wrote about the findings concerned with two of them.

While the study seemed weak, the article did provide a major strength. Unlike many "interactive fiction" studies, this study included definitive characteristics of what the researcher considers interactive fiction to be. These are the characteristics:

- The player must complete some type of quest.
- There are things that the player must keep track of, such as locations.
- There are problems specific to the story.
- There are procedures for interaction, such as clicking an area of the screen.

An exploratory study by Talley et al. (1997) observed the effects of CD-Rom storybooks on Head Start children. The authors admitted that the subjects were not typical of the Head Start population. The subjects were from a school in Utah, where the authors reported that much of the population was Mormon and more family-oriented than typical Head Starters. Whereas many Head Start children come from generational poverty, the families in this specific program were *temporarily* on a low-income while their parents attending college. Subjects were randomly drawn from the Head Start program and then tested and placed into a "well-read" group, experimental group or control group. The children were allowed to work through the CD-storybooks with some freedom.

The CD storybook program was called IBM's Stories and More. Subject progress was measured along three lines: print awareness, concepts about print, and picnic. (The "picnic" test is a wordless picture test in which points are attained by noticing what is going on in the picture). Results of the study showed that all three groups made significant progress throughout the course of the study. The well-read group still maintained the highest scores, but the experimental group was improving. As a result, the gap between the group scores lessened. The experimental group also scored higher than the control group. The authors suggest that these findings point to promise that CD-ROM storybooks can help bridge the gap between students who were read to from birth

and those who were not. The authors closed with the following two reminders: 1) This was not a typical Head Start population. 2) CD-ROMs in school are no replacement for books for at home.

While these results could not be at all representational for most Head Start students, the results are still promising. It sounds as if the population was more applicable to a regular preschool or kindergarten class. The children in this study had parents attending college. Therefore, they had a sense of education from home. Their parents were educated and from middle class families. These children did not have the generations of poverty behind them, negative home environments concerning education, and lack of nutrition that many typical Head Start populations may experience. Beyond the immediate parents, the children in this study probably had grandparents or other family members that were established and able to provide helpful interactive experiences. In fact, the authors mentioned that volunteer parents and grandparents participated in the running of this study. This was a sign of family involvement that is not typical of all Head Start programs. Also, the exact nature of the "volunteer" work was not mentioned. This leaves questionable room for bias. Finally, the authors did suggest that this study be replicated with a more "typical" population of Head Start. The article was thorough and seemed to provide enough information for a replication study.

A study by Trushnell (2001) posed the following question: Is plot lost when a story is read in an interactive manner via CD-ROM? This study observed the behaviors and recall performance of year 5 primary students upon reading an interactive storybook. Ability levels and gender were mixed. Observations included screen-by-screen progress, verbal recall of the story, and responses to multiple choice questions based on the story.

The interactive story was *Kiyedlo and the Lost Night* by LudiMedia and Ubi Soft (1995). The story contained animation and effects that were termed as "eye candy." In other words, the animations and effects were not necessary nor did they enhance the text. Additionally, readers could either progress through the screens in a linear or random order. For example, readers had the option of reading scene 8 before scene 2. Some readers were directed to read the second half before the first half.

Results of this study reported that even with the incidental "eye candy," readers more often clicked on images that were supplemental to the text. Many of the verbal recollections recorded by researchers were unable to be coded. This study found that students were often unable to identify the antagonists. The article summarized that readers recall of interactive fiction was often poor and plot is lost. Trushnell (2001) then recommended that "further studies be conducted – for instance with individual pupils comparing recall of an 'interactive storybook' with that of the equivalent conventional book – to extend knowledge of the effects of 'eye-candy' on pupils' comprehension" (p. 400). It seems that this would be completely ineffective and a waste of time. There is no benefit found in including "eye-candy." It has been established that incidental images are not useful. According to Lowe (2006), "Thoughtful educators realize that for animation to fulfill its potential as a tool for learning, its function needs to go beyond that of being appealing "eye-candy". What is also needed is the more educationally "nutritious" cognitive contribution that can come from animations specifically designed to enhance aspects of learning such as understanding, remembering and problem solving."

Further, the author idea of comparing text on a computer to text in a paper-bound book is merely suggesting a media-comparison study, which are not useful. According to

Thompson, Simonson and Hargrave (1996), most educational media studies are comparison studies. These look to see if one medium is more effective on learning than another. There have been many problems with these comparative studies, including faulty assumptions and the focus on media and not interactions. This is also the category to yield the infamous "no significant difference" (NSD) results. Media comparison studies often end with "NSD." A better use of study would focus on the delivery of the story. If the interactivity is to taken advantage of, an "interactive storybook" should not be an exact reproduction of the conventional book. Attempting to produce the same story both ways will inevitably limit the possibilities of the interactive form. Further, it seems to be a logical conclusion that a reader will be confused when reading scenes in a random order. I would argue that *interactive* does not mean that the story line should be completely unrestrained. There should be some logical progression. I would also question the inclusion of "eye candy" when instructional design principles have so clearly warned against it.

Literature Guidelines

As mentioned earlier, there are no definitions or set guidelines for interactive fiction. This makes the assessment of research difficult and often inadequate. Many "interactive fiction" stories do not require any constructive interaction. A story that requires the reader to push the space bar to turn the page is called "interactive." A story that has sound effects is also "interactive." Many of these stories contain bells and whistles that attract attention. However, there is seldom assessment of the actual story. Based upon these points, interactive fiction should first be held to the same storybook

guidelines of traditional print books. Following are key points to a well-written story as set forth by Lukens (2003), an authority in children's literature.

Key Points to a well-written story

Character:

- Characters should be well developed and interconnected with conflict.
- Events should affect the characters, but the events may also be caused by the character's very nature.
- Protagonists should not be flat or stereotyped. (By exception, romance, folk, and science fiction stories tend to contain flat or stereotyped characters).
- Stories with animal realism should portray characters that are true to the animals' nature.
- It is possible to fully develop characters even in the shortest of stories.

Art:

- A story may be distorted by poor illustrations.
- Pictures and words may play off of or substitute each other.
- Neither commonplace nor "show off" pictures add to the story.
- Pictures may tell more than the text.
- Pictures and text should work together in a "marriage."

Design elements contribute to the success of a book; these include color, space, tone, line width and picture placement.

Time:

- Time elements should fit the story;

- In Historical fiction, events occur in the past. Details should fit accordingly with the time and place.
- Time lapses for science fiction occur in the future or past.

Genres:

- Mystery stories are dependent upon suspense. Unexplained events should be resolved by "reasonable discoveries."
- Neither sports nor mystery stories need be formulaic.
- When reading of different cultures, readers should be able to discover values that are alike their own.

Other:

- Aside from character, stories also need action.
- Conflict should be well-developed and interconnected with character.
- Tension must exist to hold the reader's attention.
- Children are rarely attracted to nostalgic tones.
- Themes should not be preachy.

Many of the above traits exist in a well-known story that Hayes-Roth (1998) considers to be the "original" interactive fiction. Hayes-Roth (1998) uses the story *Alice in Wonderland* by Lewis Carroll to explain how Carroll created and manipulated a moment-to-moment story. Caroll's original creation was an oral story told to his student, Alice Liddell, and her two sisters on a daily basis. Each day, Caroll would alter the story according to Alice's behaviors and attitudes. Rather than being forced to sit still, the girls were encouraged to react throughout the story in order to stay involved and interested. The character of the white rabbit was added as a means of keeping the story on its central

path, or what Hayes-Roth (1998) refers to as the "adaptive story master". Not only does the rabbit first lead Alice down the hole to Wonderland, he then appears to pull her out of trouble at each turn.

Hayes-Roth's principles of interactive fiction

Hayes-Roth developed seven principles of interactive fiction, which she pinpointed within the original Alice in Wonderland. Lewis Carroll was able to talk directly to Alice and further the story according to her reactions, achieving the following principles:

1. The participant's experience should be in the first-person point of view. She should be immersed in an adventure from which she will not wish to be distracted. She should have direction over the character's behavior and directly interact with other characters within the story.
2. The story should be artfully designed to carry the participant along, such that the character is piecing together a puzzle as she moves throughout the plot. The plot has a directive arc as set by the author, yet the participant feels as though she is exploring and controlling the story.
3. In keeping the participant actively involved in the story, encounters should occur naturally and be meaningful.
4. The story world should be populated with many more autonomous characters than can be encountered in one visit. This will keep the participant wanting to come back, knowing that she will meet more and different characters than in the last "reading".

5. The participant should be autonomous to decide which characters she interacts with. At the same time, other characters should appear to be autonomous. Other characters may approach or react differently towards the participant.
6. The participant's choices should feed forward in shaping the story. A decision on one page or screen should be anticipatory of happenings on the next page or screen. The participant may suffer consequences or rewards of past actions. Characters from the past may return to haunt the participant.
7. An adaptive story teller should monitor and orchestrate the story so that the participant has a joyous experiences upon every visit.

Hayes-Roth's principles allow for Gee's (2003) principles of empowered learning: customize, by allowing the participant to choose character interactions; co-design, by allowing the participant to make choices that feed forward into the story; identity, by allowing the participant to be the protagonist in first-person; manipulated and distributed knowledge, by allowing the participant to see outcomes of her choices, have those choices and outcomes feed into the story, and providing an opportunity to come back and do things differently another time.

Gee, a noted sociolinguist, has spent recent years thoroughly studying the use of video games. While video games are not the same as interactive fiction, they do share many traits that lend their same implications to interactive fiction. Games and simulations, like interactive fiction, all fall under the umbrella term of "multimedia." According to Gee (2003), video games situate the learner in an environment where he is in charge of his own "plot movements." This can also be applied to IF. However, video games differ from IF in that they do not need to develop coherent plots, well-rounded

characters or any other elements of good literature. Both video games and interactive fiction have rules as to how the user should move about the new world. According to Gredler (1996), video games transport users to another world, an environment in which they have control. Games are competitive and usually consist of linear events. Conversely, IF is not linear and may not be competitive. Rather than "winning" in interactive fiction, users are simply presented with different sets of consequences based upon their choices.

Video games have multiple solutions. Interactive fiction also offers multiple solutions, encouraging readers to try different solutions. There are no real "wrong answers." Instead, there are merely choices that lead down different paths, resulting in different stories. Interactive fiction can be thought of as a maze with multiple endings and multiple ways out.

Both games and interactive fiction allow learners to embody the role of the character. One cannot read a true interactive fiction passively; participation is required. The learner does not need to be an expert in the arena of the game/book, but rather they learn to make sense of things as they move along. Gee (2003) has identified four main areas in which video games empower learners. I contend that these same areas apply to interactive fiction. These include "identity, customize, manipulated and distributed knowledge, and co-design."

According to Gee's "identity" principle, one has three identities when playing video games. These identities include the real, virtual, and projective. The real identity is the person playing the game (i.e. 12 year old Charlie Smith). The virtual identity is the role that the person is assuming (i.e. Pacman). The projective identity is who the person

really wants their character to be (i.e. an ingenious and powerful chomping head). As the real person assumes the virtual identity, he is heavily invested in making the virtual character into his projective character with all the dreamy traits. As opposed to reading a book in second-person, the player is assuming total responsibility as first-person. When something bad happens to a character in a book, the reader may feel bad for the character. However, this projective identification is much stronger in interactive fiction as the player is responsible for the anything bad that happens to the character. In interactive fiction, the player may feel bad and guilty for what happens to the protagonist. Likewise the player may be overjoyed and feel a sense of pride when something good happens to the protagonist.

According to Gee's "customize" principle, hypermedia allows users to manipulate settings or presentations. Interactive fiction offers many degrees of customization. In some cases, learners can choose their character and the character's attributes. At a minimum, the learner is able to create a custom story by making decisions on the protagonist's behalf. When the learner is given choices, he is able to express individuality. Based upon the allotment of choices, it is often unlikely that the story will end the same way every time. The learner is presented with a situation, and quickly learns how to best adapt that situation for him, thus maintaining constant levels of self-monitoring and challenge.

According to Gee's "manipulated and distributed knowledge" principle, players feel empowered when they are able to use the computer as a tool to manipulate objects or circumstances. Learners use the computer to control the protagonist's actions and plot movement. Some games allow learners to manipulate environments to even greater

degrees. The more power learners feel that they are exerting, the more invested they become in the game.

According to Gee's "co-design," principle, users share the design processes with programmers and authors by manipulating settings, making choices or taking other actions. By allowing learners to make choices, interactive fiction provides those learners with opportunities to "co-design" the story. In such situations, the learner becomes actively involved rather than being a passive observer. The learner makes a decision, the computer reacts and the learner is presented with consequences (good or bad) and forced to make another decision. There is not "one path" toward the end. Rather there are plural pathways. Gee noted that video games offer "amplification of input," which is highly motivating. In "amplification of input," learners choose actions for characters that have drastic effects (page 64). In "Alice in Wonderland," this is seen when Alice eats a piece of cake. In the real world, eating a piece of cake has little effect upon a person. In "Alice in Wonderland," eating a piece of cake causes her to shrink or grow drastically.

Further in discussing design, Stern (1998) discusses the essence of character creation in his design of "Virtual Petz." He first defines interactivity as the computer's "ability to listen, think, and react intelligently to the audience (or user)." He suggests beginning a story by defining the characters. It is most likely in IF that the user will interact by assuming the role of one of these characters. Further, it is not necessary that the character be truly alive as long as the character is believable. When programs respond to users, users have tendencies to believe that these programs are more intelligent than they are. This is known as the Eliza effect, which Stern claims is the most powerful piece for a creator of interactive fiction.

Kelso, Weyhrauch, and Bates (1992) developed the "Oz Project" at Carnegie Mellon University (CMU) as a computer system that would allow artists and authors to create interactive drama. "Interactive drama" refers to "the presentation by computers of rich, highly interactive worlds, inhabited by dynamic and complex characters, and shaped by aesthetically pleasing stories" (p. 1). These stories may appear graphically as animation or text. The Oz Project team's focal area is threefold including character development, presentation, and drama. Research literature that does relate to the Oz Project, as well as much of IF development, is focused solely upon the building of believable characters.

The Hero's Journey

A well-accepted story design that has been widely used in the development of well-known books to movies is that of the "Hero's Journey." The "Hero's Journey" describes the plight of the main character, creating an outline adapted by many storytellers. Vogler (1998) describes the "Hero's Journey" as follows:

The hero, or protagonist, of the story must first be shown in his "ordinary world." Showing the character in his everyday life is necessary to create the contrast once presented with a new set of ordeals. After establishing the character and his ordinary world, the hero receives a "call to adventure." The call to adventure may be anything from acquiring someone's love to saving a life. Often the hero will be reluctant to pursue the call to adventure, at which point a mentor may step in to offer encouragement. Eventually, the hero accepts the call to adventure, lest the story would not continue. Upon accepting the call to adventure, the hero crosses "the first threshold" by leaving his

ordinary world. The hero enters a special world and is met with "tests, allies, and enemies." After dealing with this first set of tests, allies, and enemies, the hero crosses a second threshold as he approaches "the inmost cave." Upon entering "the inmost cave," or the most dangerous place of the story, the hero takes finds the "reward" that he must bring back to the ordinary world. The trip back to the ordinary world is called the "the road back." During the road back, the hero crossed a third threshold and experiences "resurrection." Resurrection refers to the positive change that has taken place in the hero due to his conquest. Finally, the hero returns to his ordinary world in what is called the "return with the elixir," assuming the "reward" he brought back will benefit the ordinary world.

From story to design

Design guidelines in general hold that the designer should be able to give a reason for the element. Whether audio or graphics, something too showy may distract from the educational purpose. Therefore, only use what is required. It must be remembered that the purpose of each element is to improve information delivery. If used improperly, they could hinder. More is not necessarily better. Mayor & Moreno (2000) found that students learned better from animation and narration than from animation, narration, and text.

Graphics should pertain to objectives and not be overwhelming. They should convey the key points and have pertaining text wrapped or nearby. Placement of graphics should be consistent.

Audio should be complimentary and not distractive. Use text readers for visually impaired. Allow for user control of audio. Narration should read word for word from the screen unless teaching language skills. Audio is good for inflection and pronunciation feedback. Music should not be in the background without a reason. For example, music may be used to set moods or elicit emotions. Sound effects can make specific points clear. Narration can provide a very direct message. A study by Mayor & Moreno (2000) found that narration with concurrent images works better than text aside visualizations in some cases.

Text is harder to read on screen than on paper, but the optimal colors for readability are black text in at least a 12 point font and white background. If a different background color is used, use a font color that contrasts enough to be read. Blocks of text should be broken up into smaller blocks and chunked. There should be logical headlines to guide the reader. Headlines should be mixed with capital and lower case letters for readability. Lists should occur with bullets, not in paragraph form. Too many hyperlinks can lose the reader.

Color can be used to highlight, show contrast, or show emphasis. It should not be overused, and the same color combinations should be used on all pages for unity. Colors should be tested on more than one browser for consistency. More than 7 colors should never be used on a page. Designers should be culturally sensitive when choosing colors.

Interactive Fiction Design/ Multimedia Design Issues

While there are no established guidelines for interactive fiction, there are many well- established and accepted guidelines for instructional design. As both instructional

design and interactive fiction fall under the umbrella of "computer multimedia," it is fitting that interactive fiction should foremost follow the established guidelines of instructional design.

Instructional Design Guidelines

Every element in the design should contribute to the information delivery. As a rule of thumb, the designer should be able to state a reason for the placement of every element (sound, animation, etc.). If there is no reason, then it should not be there. Depending upon the audience, some graphics may increase motivation. However, some cute little twirly animation might just be distracting. Elements that just exist to be cute and do not have a purpose are termed "eye candy." A study by Mayer and Moreno (2000) examined learning effects in conjunction with different combinations of multimedia elements. From their findings, the developed the six principles that follow:

1. The split-attention principle applies to the concurrent usage of text and narration or animation. It was found that narration and text can work together in the same memory space with causing conflict to the user. However, text and animated graphics do not work in the same memory space. Requiring the user to read and simultaneously watch animation would require the brain to break the process into two separate tasks.
2. The modality principle deals with whether text or narration when presenting information. It was found that learners retained verbal information as auditory speech better than they retained on-screen text.

3. The redundancy principle applies to using the best combination of animation, narration and text. Learners faced with concurrent animation, narration and text were distracted by the text. Animation with concurrent narration works well together. Further, any necessary text can follow the concurrent animation and narration and the redundancy was found to help the learning process.
4. The spatial contiguity principle deals with screen layouts. Learners performed better when they had screens where text and graphics were placed close together. Screens that space text far away from graphics require learners to split their attention.
5. The temporal contiguity principle applies to the presentation of information in small bites versus large bites. It was found that small bites of information work better than large bites.
6. The coherence principle deals with the effects of adding additional material to presentations. In cases where music was played concurrently with the presentation, those students performed worse than those who had no music. When environmental sounds were added, there was no difference between the groups. As visual and auditory channels have limited capacity, the music was found to overload the auditory channel so that students could not absorb the narration. Music can be distractive during narration. User controls should also be included whenever there is audio. Pertaining to environmental sounds, it was found that sound effects such as thunder may clarify specific points and provide very direct messages. Narration should read the screen word for word unless language skills are being taught. In the case of language skills, narration can be

very helpful for feedback and aide pronunciation. Music should only be used when there is a reason for it. In some examples, music may serve to elicit emotions or set moods.

The following multimedia design issues were presented by noted multimedia researchers, Alessi & Trollip (2001).

Design guidelines for program interface

Displays

Aesthetic quality should be considered in screen design. As such, screens should be uncluttered and all matter should be relevant to the program's goals. The order of information should flow from the top left to the bottom right.

Presentation modes

All elements, including but not limited to text, graphics, video, audio, and color, should only be used when appropriate. Text should not be too long on any page as to control for excessive scrolling. Any video or audio should have accompanying controls so that the user may adjust or turn off sound or speed. It should be considered that video, audio and intense graphics tend to load slowly. Thus, the necessity of those elements should be weighed. Download times need to be acceptable.

Spacing

Conventional spacing rules should be used within text, and spacing should be consistent.

Subject matter

It should not be assumed that users are automatically familiar with a organization of a program's content structure. Diagrams or maps are helpful to show users where they are

or where they can go within the programs. Stereotypes and jargon should be avoided so that cultural bias may be prevented.

Auxiliary information

Some programs may require auxiliary information. This would include any documentation, directions, help or hints that pertain to the program.

Affective considerations

Intrinsic and extrinsic motivation should be considered. The designer should seek to maintain challenge, satisfaction, attention and confidence in order to provide for intrinsic motivation. Although motivation should be a goal of the program, it should be balanced with instructional features. Assessments and feedback should be designed to increase ease-of-use and lessen anxiety.

Navigation

Navigation, such as buttons or links, allows the user to move throughout the program. Navigation should be consistent from page to page. Navigational aids, such as maps and menus, should be included for very complex programs. Some programs may opt to have book-marking features or other restart points.

Cognitive capacity

Research has shown that only five to nine pieces of information can be stored in short memory at one time. Therefore, program information should be broken up and activities should be interspaced. "Page turners" and exceedingly long pages of text should be avoided and they are passive and may present too much information at a time.

User control and ease of use

The user should be able to control extraneous options of the program, especially if audio or video is present. Programs that require user response should allow the user time to think and process information. It should be clear to the user when the program requires a response. Further the user should be clear on how that response should be made (click a picture, write in a prompt box, etc.)

Feedback

Feedback should discriminate between right and wrong answers and it should be related to the user's input. The feedback should be presented so that it is clear, constructive, supportive and gains the user's attention. Small or single words tend to be disregarded by users. Slang or insulting remarks should not be used. Feedback should offer users a means to know when the have successfully completed the program.

Robustness

Robustness means that the computer program will not fail. As such, programs should be tested from the user's point of view. The program should further be tested under various conditions and on various operating systems and Internet browsers.

Cognitive considerations

The cognitive learning theory is concerned with the mental processes of the mind such as coding, retrieval, or how new knowledge is built upon existing knowledge. Cognitive learning differs from the behaviorists' repetitive drilling. Researchers of Cognitive learning look at how new knowledge fits into the learner's existing scheme and builds from there. Learners learn by doing and by being motivated. Intrinsic motivators that should be tempted include challenge, curiosity, control, fantasy and individual

differences. Metacognitive processing and reflection are stressed. Active learning is important and learners should be able to choose their own paths, not be directed on a page-turner.

Therefore, CBI should be designed using varied electronic mind tools, simulations, learning games, and interactivity that will engage learners and get them to think. Learners may be more motivated with audio or video. It is important that learners are able to choose their own paths. Programs should be modular not linear and active rather than passive. The order in which elements appear has also been influenced by cognitive theory. Materials should have meaningful separations or chunking and should move from simple to complex. Evidence in CBI includes advanced organizers, mnemonic devices and metaphors. Further Malone and Lepper (1987) recommended maintaining an appropriate level of challenge to maintain motivation. Keller and Suzuki (1988) recommend maintaining attention by using visuals and providing feedback.

Summary

This literature review has proposed a definition for interactive fiction and covered the underlying theories of constructivism, transactional theory, postmodernism and "new literacies." Interactive fiction should be non-sequential and non-linear including plural paths and the ability for the reader to jump from one point to another at any time and choice. Further, choice empowers the individual. The ideas of new literacies were carried forward into the prototype design, especially those mirrored by Yeaman's (1996) principles and considerations of postmodern text. Of such principles and considerations, several mirror the ideology of New Literacies and are of foremost relevance to digital interactive fiction. These include "forms of authority and knowledge" wherein multiple

sources of authority are presented, “concerns for the individual” wherein there is a focus on the individual rather than the average student, and “the material base” wherein the focus of a subject is on the process rather than the content. While other underlying theories were mentioned in the preceding section, each theory served to support one another and lay the groundwork for this research. Several promising studies included those by Frear and Hirschbul (1999), Desilets (1989) MecLellen (1992), Lefever-Davis & Pearman (2005), Coiro, (2003), Dobson (2000) and Luce-Kapler (2000). Further studies that lacked a unified understanding of interactive fiction were also covered, illustrating the need for this research. After the review of current studies, I presented guidelines for children’s literature based on the writing of Lukens (2003). These guidelines were applied to my prototype development, as described further in the third chapter. Further, experts in childhood reading assessed that the prototype met Lukens’ guidelines in an expert-review test. Principles of interactive fiction based on research by Haye’s Roth (1998) followed, with an explanation of how such principles allow for Gee’s (2003) principles of empowerment. “The Hero’s Journey” by Vogler (1998) was covered as a popular model for writers and screenwriters. I used the “Hero’s Journey” as a starting point in constructing the storyline of the prototype. The use of “The Hero’s Journey” and application of Hayes-Roth’s principles will be further explained as they are used in the “Methods” chapter. In the following chapter, I will describe how each of the Hayes-Roth’s principles has been met. These principles allow for Gee’s principles of empowerment, which again mirror postmodern and “new literacies” principles. The latter were tested in a pilot test and final evaluation of software as an assurance that a

quality IF was delivered. The final prototype evaluation recorded the target market's experience with this interactive fiction prototype.

Following the literature guidelines, this chapter included instructional design and multimedia guidelines. I included general graphic design principles, results of a multimedia study by Mayor and Moreno (2000), and design guidelines for program interface by Alessi and Trollip (2001). The multimedia guidelines set forth by Alessi and Trollip have already been well established in the field of instructional technology. These multimedia guidelines were applied to my prototype development. Further, experts in the field of instructional technology assessed that the prototype met Alessi and Trollip's guidelines in an expert review test. This chapter has explored several areas of gathered guidelines and principles that should lead to the development of good works of interactive fiction. In the next section, I discuss the above guidelines and principles as they were used to develop a prototype of interactive fiction. The prototype was tested in several cycles, and the instruments for expert review and pilot testing were based upon the above guidelines and principles.

CHAPTER THREE: METHOD

Introduction

Because I was ultimately interested in developing a step-by-step approach for the creation of interactive fiction, I tested my own prototype on a selected target group. Much of the design of this research was qualitative due to the developmental nature. It is important to reiterate that my research was directed toward the development of a prototype of interactive fiction. I used the prototype to obtain general feedback about interactive fiction from children. I did not specifically test literacy or reading comprehension.

This research inquired into the target market's perception of interactive fiction in hopes of offering new insights. The interactive fiction development followed the established definition and principles of IF as set forth in the literature review. The design tool was a computer-based interactive fiction story. Each reader assumed the role of the protagonist going through the story. At different points in the story, the reader was faced with choices. Resulting decisions led the readers down different paths. There were ten alternate endings. Readers made choices such as when to use limited money, what tools to use in certain situations, which direction to go, etc. These judgments determined what happened with the action of the protagonist. The fictional story was on CD-Rom for economical purposes. The goal was to conduct a small-scale, qualitative investigation.

This was a developmental research study in which the development of an interactive fiction prototype was guided by the generic ADDIE design model. The steps of the ADDIE design model that were followed include the following: Analyze, Design, Develop, Implement, Evaluate.

Analysis of the Target Market

As established in the literature review, there is a great need for this research. To reiterate, this research tested a prototype of interactive fiction that has been designed along literature and instructional technology guidelines. The target audience consisted of students with a minimum third grade reading level. The text contents of the first 18 introductory web pages were analyzed for reading level according to the Flesch-Kincaid Grade Level model at http://literacynews.com/readability/readability_analyses.php. The grade level score was 3.9, indicating that the text would be understood by third grade students. The pool of participants included both male and female. The age level of the students was between eight and eleven years of age. There was no specific academic subject being taught by the interactive fiction. Therefore, prior subject matter knowledge by students was not an issue. However, students had a minimum third grade reading level. A third grade reading level was established so that participants would be able to read the story for understanding rather than concentrating on decoding the words. A third grade reading level was also required according to the results of the Flesch-Kincaid Grade Level analysis. The interactive fiction was meant to provide a postmodern and constructivist learning environment in which participants could practice "new literacy" skills.

Background: Sunshine State Standards for Third Grade

As participants in this research completed 3rd grade in Florida's public school system, the list of "Sunshine State Standards" for the 3rd grade language arts curriculum was taken into consideration. Listed below is an abbreviated version of the curriculum

skills that should have been relevant to this research. In terms of writing and literature the third grade curriculum in Florida calls for students to be able to do the following:

- make predictions
- prepare organized ideas for writing
- focus on main ideas
- provide or recognize supportive information
- use creative writing strategies
- use technology to write
- create stories focused on single topics
- provide story lines that are easy to follow
- organize story in logical terms of beginning middle and end
- understand plot and how story conflicts are resolved
- infer or conclude about story elements such as traits/motives of characters
- see cause-and-effect and in relation to his or her own life
- use information from literature to defend his or her interpretation of that literature

Prototype Design

The design was centered around and evaluated according to standards set forth by Lukens (2003), Alessi and Trollip (2001), the seven principles of interactive fiction by Hayes-Roth (1998), and the guidelines of "The Hero's Journey" by Vogler (1998). I designed the actual story for this prototype according to a model first developed along Vogler's (1998) concepts of the "Hero's Journey." The "Hero's Journey" was chosen as a beginning model because it is considered to be a "classic" among many writers. Further, Vogler's (1998) model has been used by screenwriters to develop successful films. According to Harris (2003),

> "While the story of the Journey first manifested itself in the ancient myths and legends, it is still around us today. It is the basis for almost all of the books and plays we read. We see it in television programs such as "Dr. Quinn, Medicine Woman", "The Adventures of Lois and Clark", and

(believe it or not) in "The Simpsons." Even the movies we enjoy -- Forrest, Gump, Groundhog Day, Labyrinth, Field of Dreams, Matrix, The Lion King -- are fictional depiction's of the Hero's Journey" (p. 12).

I then checked the story to make sure that it met Hayes-Roth's (1998) principles of interactive fiction. Evidence of the Hayes-Roth principles are explained in a following section. The illustrations were being drawn while the story was being created. As I was both the author and illustrator, I was able to develop the characters by writing descriptions and creating visualizations. The design of the screens, images and overall prototype navigation was foremost designed according the standards developed by Alessi and Trollip (2000). Evidence of this design was presented after expert reviews of the story were checked against evaluation forms in the expert review testing phase. The multimedia/instructional design evaluation form was created by Alessi and Trollip (2000). The literature guideline evaluation form was based on guidelines for children's books by Lukens (2003), an authority in children's literature.

The title of this interactive fiction prototype is "Mole, P.I." Mole P.I. (Mole, Private Investigator) focuses around the main character, Mole. I called most of the characters by their animal names for simplicity sake. Mole lives in the town of Moleberry. His best friend is Squirrel, who lives in the tree above him. When the acorns from their tree are stolen, Mole sets out to find the acorns and the acorn thief. There is a map of Moleberry on the screen at all times to show where Mole is and where he can go. Moleberry is a very small place, so there are only a few areas to explore. There are 10 different endings, dependent upon Mole's (the user's) choices and actions. Some of the endings are very similar to each other, while some are very different. Within the story,

Mole will meet different characters. It is not possible to meet all the characters in one reading, as different characters are set along different paths. Mole does not need to meet every single character because there is not one "correct" ending that is dependent upon every character coming together. Rather, there are various endings. As postmodern theory suggests, different endings give different perspectives of the secondary characters. The following is a run-down of the secondary characters and their purposes:

- Rabbits – The rabbits are very friendly and helpful to others. The only way that Mole can meet the rabbits is by accidentally digging into their burrow. The rabbits provide carrots to Mole. Mole can munch on the carrots rather than bite his nails when he is nervous. The carrots also help his eyesight.
- Girl Mole – Not much is revealed about the girl mole's character. She was placed to make Mole reconsider what he knows. Until running into the girl mole, Mole thinks that he is the only Mole in Moleberry. He discovers another mole and it raises questions. Are there more moles? Obviously moles are sneaky. Can this other mole be trusted? Do other characters know about the other mole?
- Turtle – Turtle appears to be old and grumpy. Mole needs the turtle to get across the pond, but the turtle is not very willing to help. The turtle says that he wants to be left alone. In one ending, Turtle's true feelings are revealed. When he was a young turtle, he had many friends that played with him in the pond. As the turtles grew up, they moved away and went to other ponds. This turtle stayed in his old and familiar pond but has been lonely ever since. He does not want to make new friends because he is afraid that they will just leave one day.

- Duck – The duck is the acorn thief. Several endings are similar, with the duck being discovered as the acorn thief. However, the duck can not be caught in all endings. Also, the acorns cannot be recovered in all endings. For the most part, the duck is cast as an annoying acorn thief. There is one ending that reveals a different side of the duck. She is a mother with baby ducks to feed. At that point, Mole needs to question his initial thoughts of himself, the duck and squirrel. Is the duck really that bad? Is she just trying to find things for her babies? Shouldn't Mole and Squirrel be sharing their acorns in the first place?
- Toad – Mole may run into Toad early in the story, at which point he decides whether or not to take Toad along with him. The choice results in either a happy toad or a very sad toad. Later in the story, Toad shows up when Mole is in need of money. Based upon how Toad was treated earlier in the story, he reacts to Mole at the later meeting.
- Weasels – The weasels and their castle serve as a central location to the story. In every path, the weasel castle will be crossed at least once. The weasel castle is a place to be wary of, as the weasels have a prison cell within their castle. They are very suspicious creatures. Prisoners are made to wash the weasels' dirty laundry, which is mostly made up of socks. There is one instance in which the Mole may find out more about the weasels. If Mole happens to make it to a certain screen, he may find out that the weasels have their own secrets and insecurities. Mainly, the weasels think that their feet are ugly. They never leave their castle (probably because of their feet), so they do not see the other creatures in Moleberry. They

keep themselves inside the castle, wearing socks, and perpetuating the problem. This could lead to greater speculation of why the weasels are suspicious of others.

- Monkey Troll - In order for Mole to go into the main area of Moleberry, he must get past the monkey troll. He can pass the monkey-troll by paying a gold coin or answering a riddle. Not much is known about the monkey-troll. He only guards the one main bridge between Mole's home and the rest of Moleberry. The monkey- troll only interacts with Mole if he is taking money or asking a riddle. In one of the ten endings, Mole has the option to find out more about the monkey-troll and why he guards the bridge. The monkey-troll is half monkey and half troll. He was dropped off in Moleberry as a baby. There are no other monkey-trolls that he knows of. He does hope that one day a monkey or a troll will return to Moleberry. Monkeys are very easy to identify. Trolls, however, can come in different forms. The monkey-troll wants to be sure to meet a troll if one does come through Moleberry. He has heard that trolls like bridges, so he always stands by the main bridge. Trolls are not good at riddles nor do they give away gold coins. If one should pay the monkey-troll with a gold coin or answer one of his riddles, that one can be eliminated as a possible troll. Once the monkey-troll is sure that one is not a troll, he unblocks the bridge.

Graphic Design Considerations

Graphic design issues were covered in the multimedia section of the literature review. In this prototype of "Mole, P.I.," I used dark and somber colors to denote an atmosphere of mystery. The text color was chosen to exist in high contrast against the background for readability. As the designer, I did not feel that animated graphics would

serve any additional purpose over the use of static images. While dynamic pictures did not seem necessary, I also felt that they might be distracting. The static images exist in equal balance with the text. Further, these static images and text exist together so that the participant may read text and examine the accompanying pictures in equilibrium without distraction.

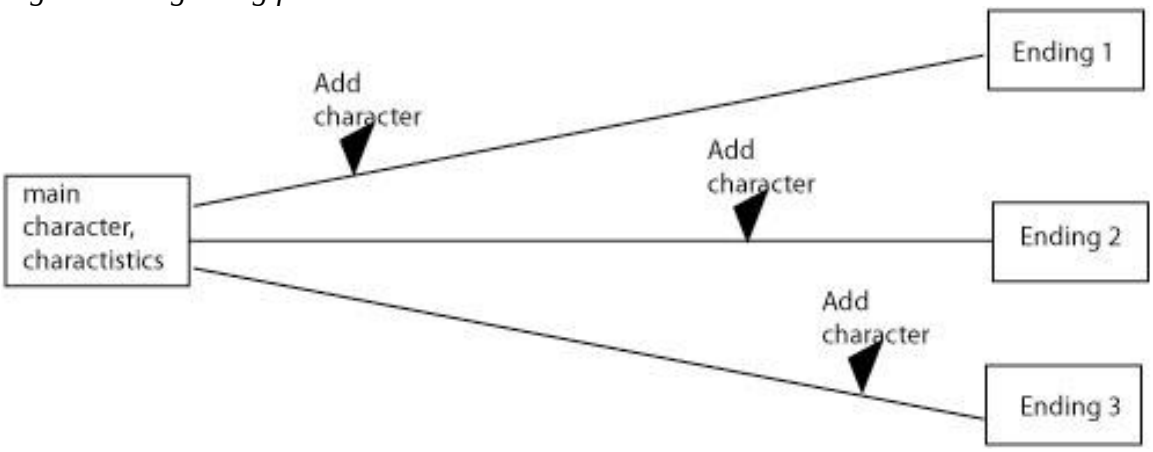
Creating Characters

As I initially followed the Hero's Journey to set up the shell of the story, I created a main character that was flawed yet adaptable throughout the story. The main character, Mole, is small, worrisome, and has poor eyesight. Because there would be numerous endings to this story, it was important that every ending offered a good cohesive story. As such, Mole would need to experience personal growth by the end of any chosen ending. In some endings, he solves the case. In other endings, he learns something for the future.

To begin the process of creating multiple endings, I initially created three separate endings. One was my preferred ending, the second was the opposite of what I preferred, and the third was something in the middle. I then wrote down Mole's characteristics at the beginning of the story. Next, I wrote down what Mole would be like at each of the three endings, keeping in mind that all endings should be fulfilling to the reader.

I plotted three lines from the main character to each ending. Depending upon each ending, I began to plot my secondary characters. I decided what needed to happen to get Mole to each ending and how each secondary character could contribute to what Mole needed. As such, Mole needed to be a versatile character. I developed the settings of each character around that character's traits.

Figure 1. Beginning flowchart



As the flowchart began to fill in, I focused on more specific areas at a time. As I developed the choices that Mole could make around different characters and settings, even more options arose. Eventually, each area continued to branch out with choices. What began with three optional endings developed into a story with ten optional endings. The initial ending that I favored in the beginning was the dullest and most obvious by the end. The structure of the story can be seen in the four pages of the flowchart that follows:

Figure 2. Page 1 flowchart

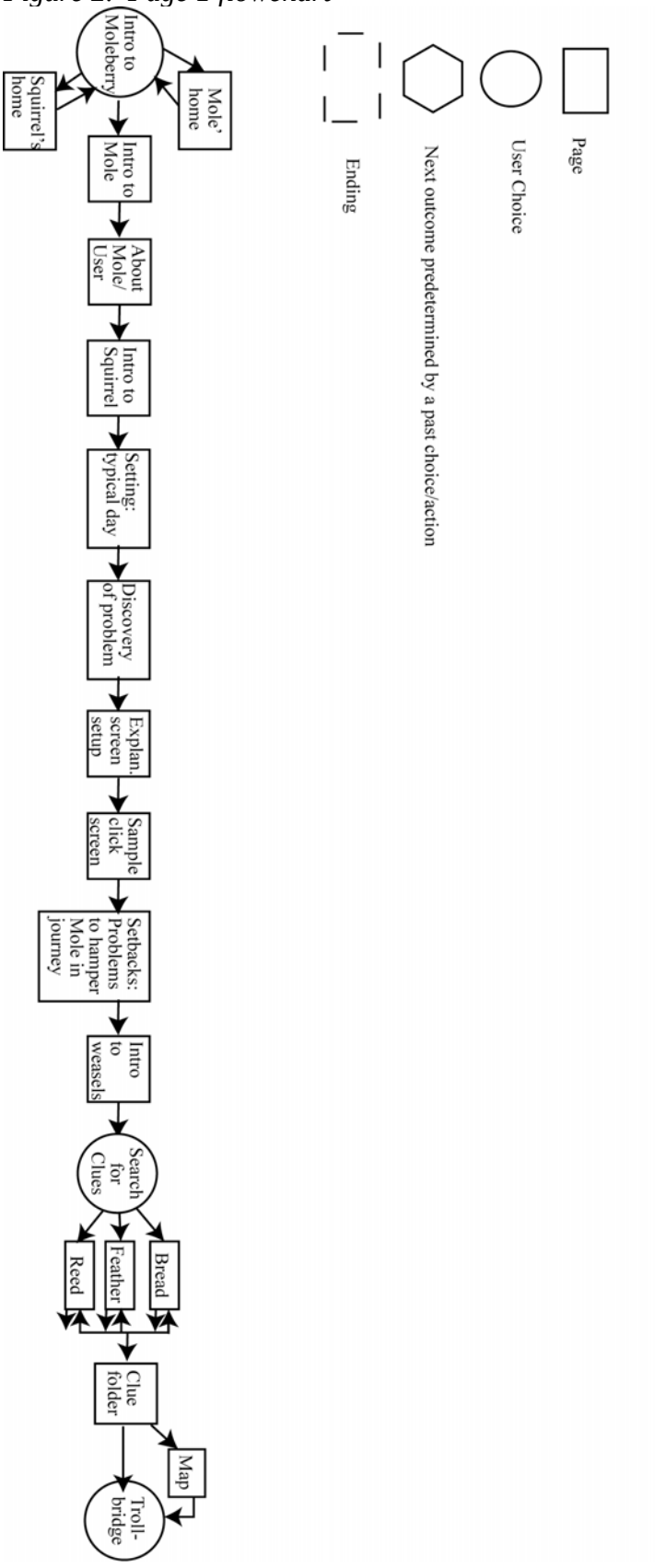


Figure 3. Page 2 flowchart

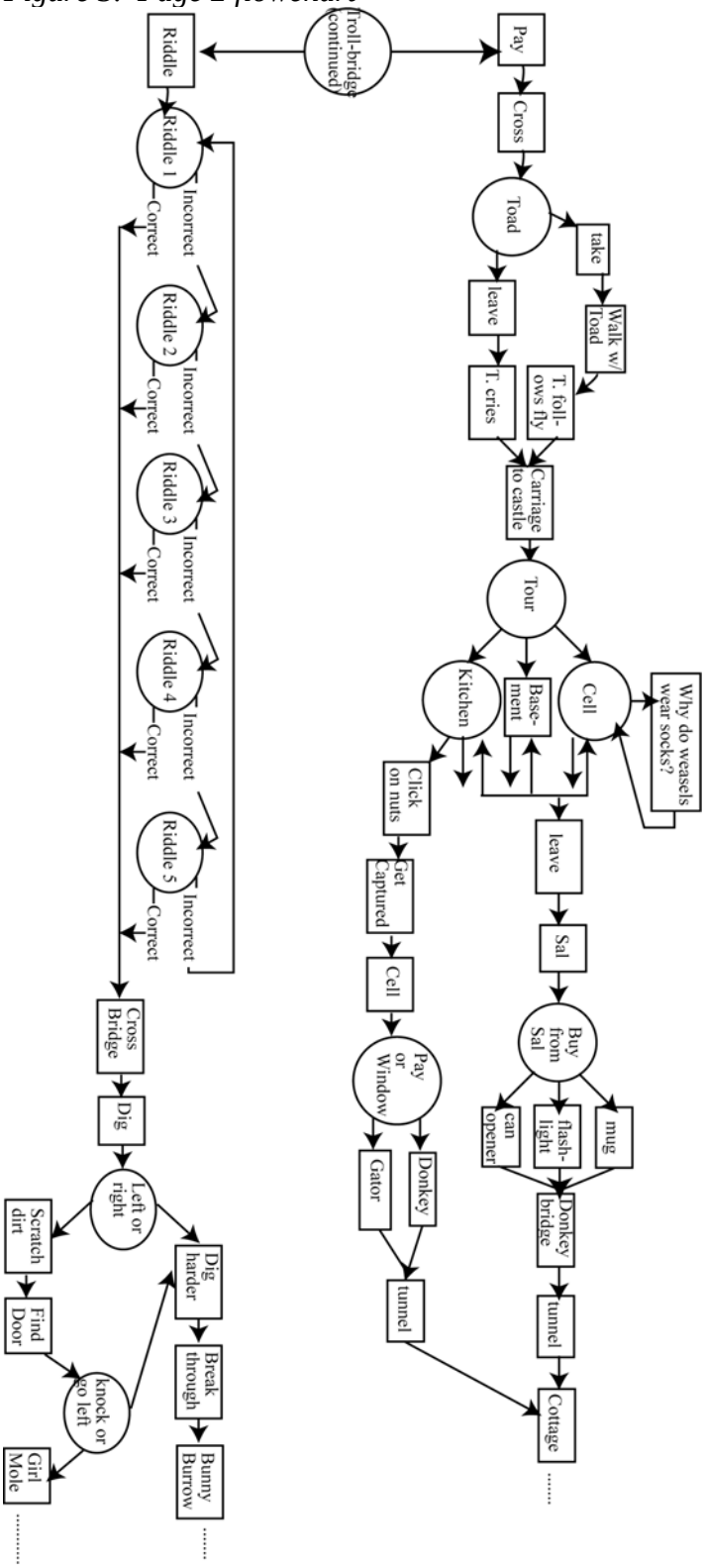


Figure 4. Page 3 flowchart

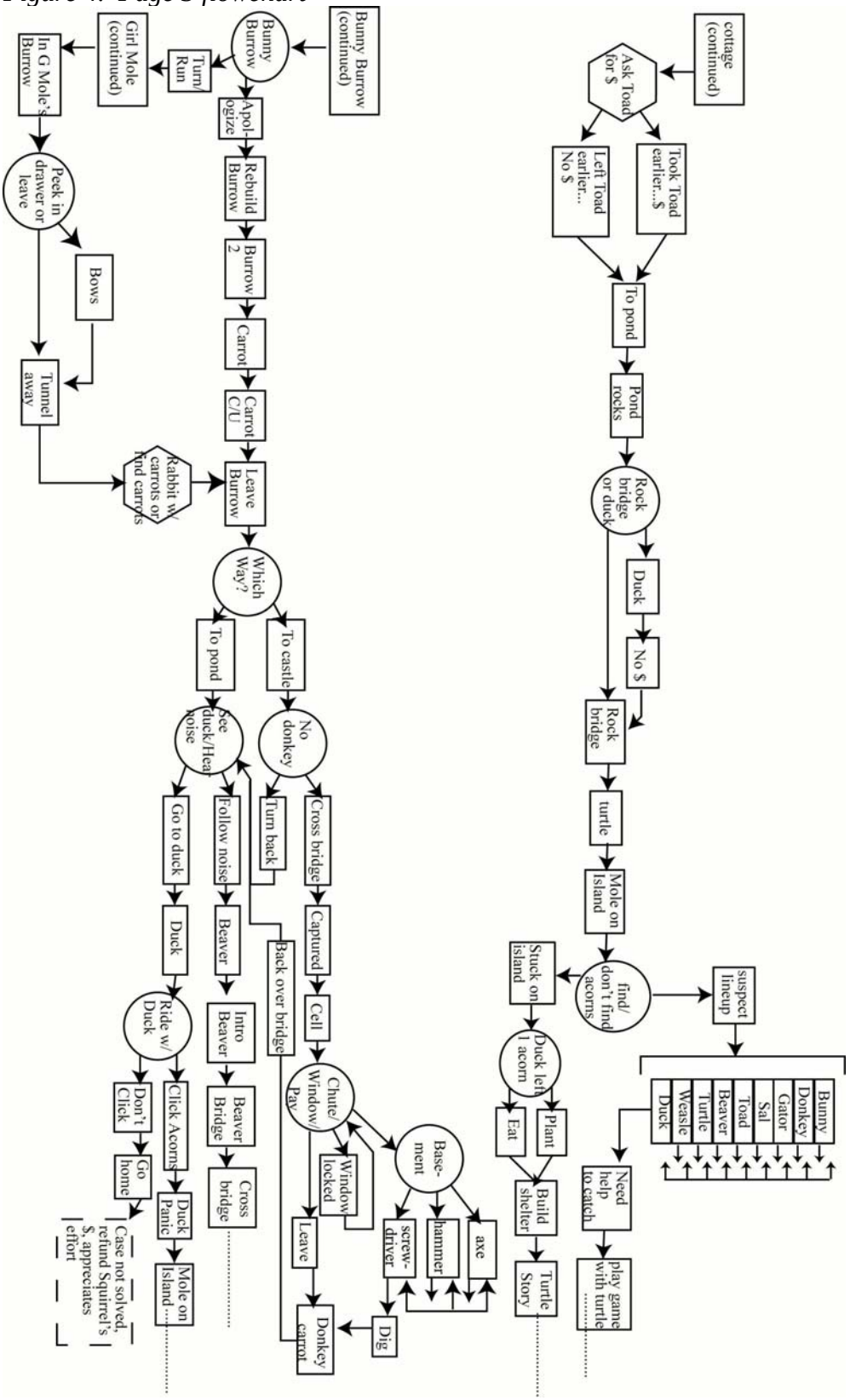
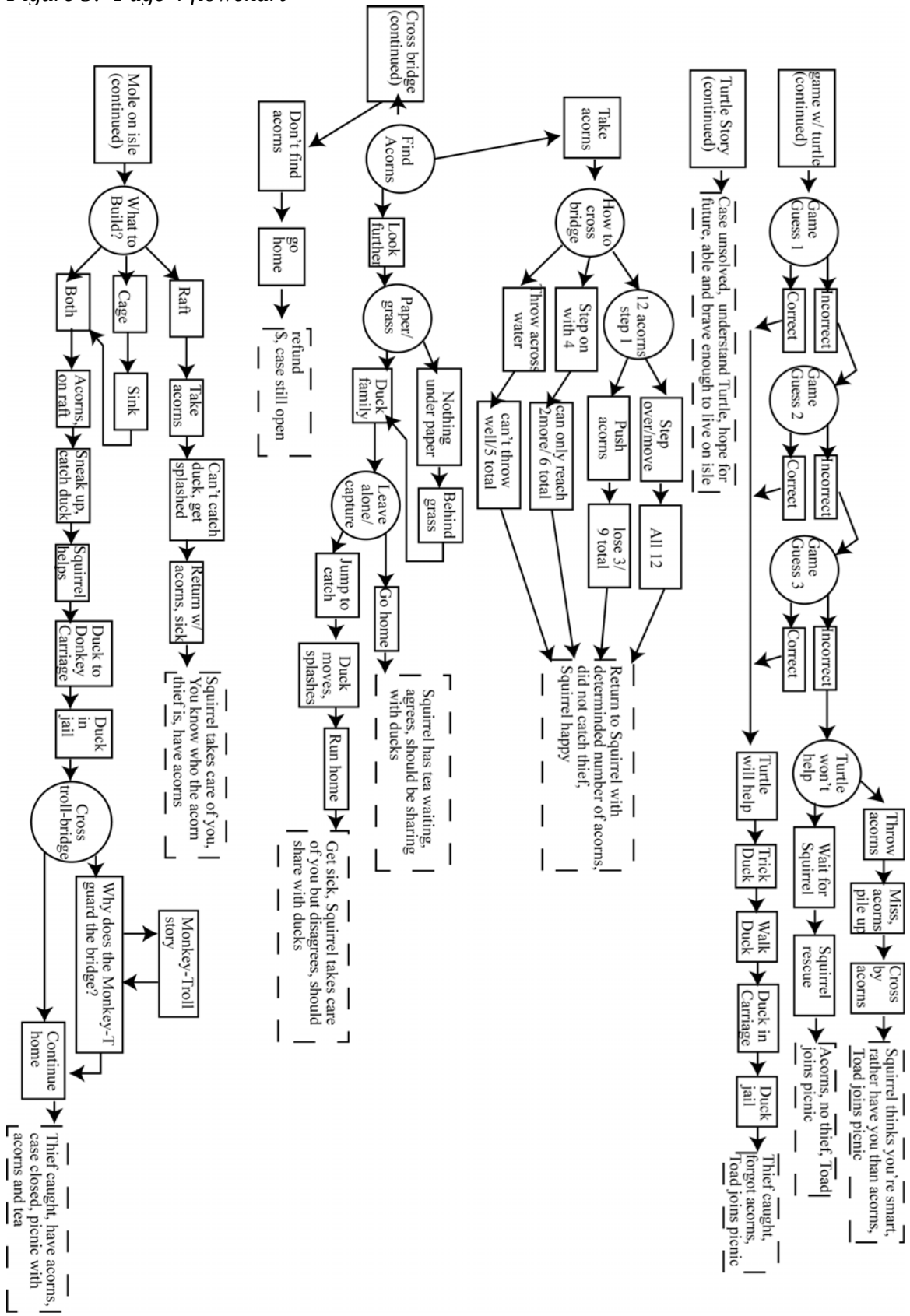


Figure 5: Page 4 flowchart



Visual Literacy Components

This interactive fiction also makes use of visual literacy components. Some links also stem from "hotspots" or links that were placed within the images on screen. In order to find the acorns, the reader must click the acorns in the image when they first appear. Early on, the reader is directed to click on anything that might appear to be acorns. As such, there are screens that contain items that look like nuts. In actuality, the "nuts" may turn out to be anything from walnuts to earrings. Clicking any of the false nuts will provide an extra screen or a new path. Some of the false nuts are of little consequence but may be entertaining. The icons of little consequence lead the reader into "loops." A loop may provide an extra scene or two within the story, but it will bring the back to the same track as before the icon was clicked. The real acorns must be clicked on in order to solve the case. If the acorns are not clicked within the picture, the story will continue to an ending in which the case was unsolved. Thus, the real acorns lead the readers down "branches" of the story and actually contribute to the plot (as opposed to loops). Several screens remind the reader to click inside the picture if they see something. As a result, the reader cannot be dependent upon the words of the story alone. The reader must also be aware of visual elements within other areas of the screen. The above elements allow for concepts of visual literacy and new literacy. Some choices will lead readers into "loops" of little or no consequence but for entertainment. Other choice will lead readers down "branches" that actually affect the story plot.

The following five steps outline the development of Mole, P.I. with the "Hero's Journey:"

1. The hero, or protagonist, of the story must first be shown in his "ordinary world." Showing the character in his everyday life is necessary to create the contrast once presented with a new set of ordeals.

- Mole is shown gathering acorns with Squirrel, as he does every weekend.

2. After establishing the character and his ordinary world, the hero receives a "call to adventure." The call to adventure may be anything from acquiring someone's love to saving a life.

- The acorns are stolen. Mole is asked to find the acorns and the thief.

3. Often the hero will be reluctant to pursue the call to adventure, at which point a mentor may step in to offer encouragement. Eventually, the hero accepts the call to adventure, lest the story would not continue.

- Mole is presented with a series of problems that he will contend with along his journey. Squirrel (the mentor) is Mole's closest friend. He wants Mole to find his acorns.

4. Upon accepting the call to adventure, the hero crosses "the first threshold" by leaving his ordinary world. The hero enters a special world and is met with "tests, allies, and enemies." After dealing with this first set of tests, allies, and enemies, the hero crosses a second threshold as he approaches "the inmost cave."

- Mole crosses the bridge guarded by the three-toed monkey-troll either by paying him or answering a riddle. He is then in the main area of Moleberry and open to exploration.

5. Upon entering "the inmost cave," or the most dangerous place of the story, the hero takes finds the "reward" that he must bring back to the ordinary world. The

trip back to the ordinary world is called the "the road back." During the road back, the hero crossed a third threshold and experiences "resurrection." Resurrection refers to the positive change that has taken place in the hero due to his conquest. Finally, the hero returns to his ordinary world in what is called the "return with the elixir," assuming the "reward" he brought back will benefit the ordinary world.

- Mole may or may not find the acorns. He may return home alone, or Squirrel may come to his aid. The reward may be anything from the acorns to new knowledge or friendship. In some endings, he does not return home but acquires a new sense of bravery.

The following are the seven principles of interactive fiction by Hayes-Roth (1998) with a brief explanation of how Mole, P.I. meets each of these principles:

1. The participant's experience should be in the first-person point of view, should be immersed in an adventure from which he or she will not wish to be distracted, should have direction over the character's behavior and directly interact with other characters within the story.

- The reader assumes the role of Mole, P.I. Throughout the story, "Mole" is worded as "you." For example, a line might read that "You are presented with two choices" rather than "Mole is presented with two choices." There are many different characters plotted along the different paths. In many cases, the reader is in control of which characters Mole approaches.

2. The story should be artfully designed to carry the participant along, such that the character is piecing together a puzzle as she moves throughout the

plot. The plot has a directive arc as set by the author, yet the participant feels as though she is exploring and controlling the story.

- The quest to find the acorns is the overall plot of the story. Each screen shows a map of where Mole is and where Mole can go. The latter two examples create a cohesive atmosphere. The reader is unaware of how many paths there are or where the paths may end up, so that he or she is free to explore and make the choices that will determine what happens next.

3. In keeping the participant actively involved in the story, encounters should occur naturally and be meaningful.

- All incidences make sense within the story and are presented in step with the reader's choices.

4. The story world should be populated with many more autonomous characters than can be encountered in one visit. This will keep the participant wanting to come back, knowing that she will meet more and different characters than in the last "reading".

- Different characters were plotted along different paths in the story. Each has a unique contribution. It is impossible to meet all of the characters in one reading because there are too many paths to cover at once.

5. The participant should be autonomous to decide which characters he or she interacts with. At the same time, other characters should appear to be autonomous. Other characters may approach or react differently towards the participant.

- Mole is presented with many characters with whom he may interact or walk away. There are some central characters with which Mole does not have that choice. The characters are not dependant upon Mole, as they each have their own personalities and quirks.

    6. The participant's choices should feed forward in shaping the story. A decision on one page or screen should be anticipatory of happenings on the next page or screen. The participant may suffer consequences or rewards of past actions. Characters from the past may return to haunt the participant.

- Each screen stems off of the screen before it. In some instances, consequences of actions will not show up until later in the story. The toad is a character that returns to "haunt" Mole.

    7. An adaptive storyteller should monitor and orchestrate the story so that the participant has a joyous experience upon every visit.

- I believe this is accomplished by having met the prior principles.

Prototype Development

The story was developed using html and javascript. The final IF piece(s) was available on CD to ensure quick openings of all pages. As this prototype was developed for children, it was heavily loaded with illustrations. Javascript can write complicated programs that run on a majority of web browsers. There's no large capital investment. The only resource needed is a text-only web page. There is no compiler to buy or learn as in some other languages, and arrays can be used to store large amounts of data. JavaScript is an object-based programming language that is interpreted by the client

browser so there is no delay with codes and responses. JavaScript can be used to perform many functions. It can be used to provide instantaneous feedback, autograde and data validation. It can be used to create forms, gather data, provide responses to and store that data. JavaScript can also be used to create interactive learning exercises. It comes with built-in-functions called methods, which are called upon by event handlers. JavaScript can have loops and statements can affect how the program interacts with the user. Usually, the code can be viewed by right-clicking so that can be a disadvantage in some projects. However, code can also be hidden. The risk of participants viewing the javascript code was not of great concern in this case. Viewing the code would not provide any extra information that would be detrimental to the outcome.

Implementation

The design of this research was qualitative due to the developmental nature. During implementation, the interactive fiction was reviewed by experts to ensure that instructional technology and multimedia guidelines were properly followed. This expert evaluation used the evaluation table developed by Alessi and Trollip (1996) as a tool. This table is available in the appendix as the design validation table (See Table 11). The experts in children's literature evaluated the prototype by using the table that I developed based on Lukens' (2003) guidelines. This table is available in the appendix as the content validation table (See Table 6). Experts also reviewed the prototype according to the principles of interactive fiction as established by Hayes-Roth (1998). This table is available in the appendix as the construct validation table (See Table 1). The prototype was pilot-tested by two children in the target market. The children's review used the same interview questions as was used in the final review after all revisions were made.

Revisions were made to the prototype after the expert review-testing and again after the pilot-testing. These testing and revision cycles are further described in the following evaluation section.

Evaluation

Expert review test

The first data collection method included three sets of expert evaluations in the forms of construct validation, content validation and design validation. Each validation process included two participants per set. The construct validation experts assessed the prototype along the grounds of interactive fiction principles. Additionally, one set of expert evaluations dealt with the instructional technology component of the prototype, while the other set of expert evaluations dealt with the literature guidelines of the prototype. In all three cases, the experts read through "Mole, P.I." and completed respective checklists.

Construct Validation

Construct Validation - To what degree is Mole PI a valid instance of Interactive Fiction? The original sampling plan for the construct validation included contacting Barbara Hayes-Roth, the original creator of the seven principles of interactive fiction. However, Dr. Hayes-Roth did not have the time available to devote to participation in this research. She was also unable to make recommendations as far as obtaining another expert, and she suggested that I find a local expert from my own area. Thus, attempts to secure an internationally-recognized expert participation in validation procedures were met with no success. However, I did enlist experts locally from the university. The participants are published in the area of interactive fiction, have authored work in peer reviewed journals and conferences, are familiar with Hayes-Roth and are generally interested in interactive

fiction and contributing to the field. The instrument used for the evaluation procedure was the "principles of interactive fiction by Hayes-Roth (1998)" chart. This chart is available in the appendix (See table 1). Each selection was marked as either "excellent, good, serviceable, weak" or "poor." Selections that were marked "excellent, good" or "serviceable" were interpreted as meeting those interactive fiction principles. Selections that were marked "weak" or "poor" were interpreted as not meeting those interactive fiction principles. Therefore, items with the latter markings were reworked in the prototype.

Content Validation

Content Validation (to what degree does Mole PI embody a good story)? The content validation was performed by reading experts that were willing to participate. The participants are published in the area of childhood literacy and are generally interested in childhood literacy and contributing to the field. For the purposes of this study, doctoral students who have completed at least one year of course work in reading education and have real world experience qualified as story experts. The instrument used for the evaluation procedure was the "Literature Guidelines Instrument" chart. The chart in checklist format was used to gather data as to the literature guidelines of the prototype story. The checklist was based upon guidelines for children's books by Lukens (2003), an authority in children's literature. This table is available in the appendix. (See table 6). Each selection was marked as either "excellent, good, serviceable, weak" or "poor." Selections that were marked "excellent, good" or "serviceable" were interpreted as meeting those literature guidelines. Selections that were marked "weak" or "poor" were

interpreted as not meeting those literature guidelines. Therefore, items with the latter markings were reworked in the prototype.

Design Validation

Design Validation (to what degree is Mole PI well-designed software)? The content validation was performed by instructional design experts that were willing to participate. The participants were Ph.D. candidates and have finished all course work in the area of instructional technology. As doctoral students in the field, the participants were interested in instructional technology and contributing to the field. The instrument used for the evaluation procedure was the "Multimedia Design Instrument" chart as developed by Alessi and Trollip (2001). This chart is available in the appendix. (See table 11). In reference to this chart, Alessi and Trollip (2001) state that

> "A tool we have found very useful for focusing attention on project quality is the evaluation form. This document brings together the team's expectations about quality and can be used to evaluate your own projects as well as other off-the-shelf products" (p.414).

The evaluation form assessed the following categories: subject matter, auxiliary information, affective considerations, interface, navigation, pedagogy, invisible features, robustness and supplementary materials. The original version contained "acceptable" and "not acceptable" check mark columns. I have expanded those categories to include "excellent, good, serviceable, weak" and "poor." I have further altered the checklist to include a "Not Applicable" column. Some of the original items were not be applicable to "interactive fiction" design. I left all of the original items on the checklist and added the "N/A" column so that experts experienced with multimedia and the Alessi and Trollip

criteria can make those judgments themselves. It is also key to note that this checklist required expert application and could not be applied validly by laypersons.

Each selection was marked as either "excellent, good, serviceable, weak" or "poor." Selections that were marked "excellent, good" or "serviceable" were interpreted as meeting those instructional design components. Selections that were marked "weak" or "poor" were interpreted as not meeting those instructional design components. Therefore, items with the latter markings were reworked in the prototype.

Norming Process

Before experts evaluated the prototype, they went through a norming process. During the norming process, evaluators practiced the process in order to establish a better shared understanding of what is meant in each category and how to apply it. Experts from each of the three areas (construct validation, content validation, and design validation) used the criteria checklist on an unrelated interactive fiction story. Going by the previously mentioned guidelines, ratings of "excellent, good" and "serviceable" were used to indicate sections that the corresponding criteria met to a usable degree. "Weak" or "poor" indicated that the corresponding sections did not meet the criteria to a high enough degree.

Experts completed the norming process with a basic piece of interactive fiction by the American Dental Association named "Visit the Dentist with Marty." The story was chosen because it is a short interactive story that is available on the Internet. It was not chosen as a "model" story. It was simply a short and readily available story for experts to use during the inter-rater reliability assessment. Experts went through "Visit the Dentist with Marty" just as they went through "Mole, P.I." Experts completed either the

instrument for multimedia design, the instrument for literature guidelines or the checklist for interactive fiction principles according to their areas of expertise.

Revision based on expert review

In response to each checklist from the expert review-testing phase, the prototype was revised in the areas that received marks falling below the "serviceable" rating.

Pilot test

The pilot test used the same interview tools and techniques as in the final interview stage of the target market. The questions and techniques employed in the pilot-test and final evaluation sought evidence that a quality interactive fiction had been delivered. As such, questions were judgment based. Recall that the definition of IF from the literature review calls for judgment-based action. The definition follows:

- "a potential narrative, that is, a system which produces narrative during interaction
- a simulation of an environment or world; and
- a structure of rules within which an outcome is sought, also known as a game" (p. 3).
- Additionally, I am adding that "interactive" refers to the necessity of action that is Judgment-based by the learner.

Further, I have stated many interactive fiction criteria in the literature review. Quality IF should meet Luken's (2003) components, multimedia principles and Hayes-Roth's (1998) principles. The expert reviews have answered any questions as to the provisions of Luken's (2003) components and multimedia principles. I have explained

earlier in the design section how Hayes-Roth's (1998) principles have been used. Further, it follows that if Hayes-Roth's (1998) principles are in place, Gee's (2003) principles will follow. My line of questioning and observation was based upon looking for judgment and the principles of empowerment as set forth by Gee. Therefore, I was first looking for evidence that choices are based on judgment. I was then hoping to gather information as to the "whys" of judgment in which I would also look for patterns or themes.

My role was to serve as an interviewer and observer during the data collection. Interviews with highly-structured questions were tape recorded and transcribed. In order to prevent researcher bias, I had a second person to help transcribe and review data. This second person was familiar with the scope of this research yet not heavily vested in this particular research itself.

According to Rossman and Rallis (1998),

> "Qualitative researchers seek answers to their questions in the real world. They gather what they see, hear, and read from people and places and from events and activities. They do their research in natural settings rather than in laboratories or through written surveys. Their purpose is to learn about some aspect of the social world and to generate new understandings that can be used by that social world. As qualitative researchers, they become part of the process, continually making choices, testing assumptions, and reshaping their questions" (p.5).

Rossman and Rallis (1998) point out two distinct features of qualitative research. These are: (1) the study is conducted through the researcher as an instrument and (2) the

purpose of the research is to learn about some social aspect of the world. Rossman and Rallis (1998) further posit that a qualitative research is lead by guiding questions rather than a hypothesis. In this research, my guiding questions were as follows: What makes a quality interactive fiction (How is quality interactive fiction created)? How do readers make choices in interactive fiction? The above guiding questions are supported by Denzin's (1978) assertion that the researcher should ask "how" rather than "why." Denzin (1978) states that

> "It is much more effective, if one wants to learn the sequence of events leading to some pattern of deviant activity, to ask how the thing happened. "When id you first do X?" "How did you happen to do that?" "Then what happened?" "How did that work out?" Questions that probe for the concrete details of events and their sequence produce answers that are less idealogical and mythological and more useful for the reconstruction of past events and experiences. Such an interrogation can and should include questions on the subjective aspects of events: "What did you think when that happened?" "How did you feel about that?" (p. 92).

It follows that my line of questioning sought understandings of why readers made choices, how they arrived at those choices and other general thought-based feedback.

Interview Process

The prototype was pilot-tested by two participants from the target market, as explained in the above "target market analysis section." This phase used the same questionnaire as in the final evaluation. This phase was to consist of a "protocol analysis" and "stimulated recall" mix. I planned to start with protocol analysis, in which

I questioned participants as they made choices through the story. For example, I might have said "Tell me about that choice you just made." This would provide insight into the judgment employed by the participant. Protocol analysis may have been too invasive for some participants. Therefore, my intention was to balance the protocol analysis with "stimulated recall." Stimulated recall occurred after the participant was done going through the program. I referred to my notes and reminded the participant of a particular option that he/she chose. I then asked the same type of question that I would have during protocol analysis. The call between switching out the two techniques was made on the spot according to the participant's behavior and reactions.

Protocol Analysis

As stated above, I would make "on the spot" decisions as whether or not to use the protocol analysis approach. I had intended that some children would be more open to this approach than others. I did not plan on using protocol analysis on those participants with whom it would seem intrusive to the point of interfering with their reading flow or ability to be comfortable within the setting. Upon being acquainted with the participants, the protocol analysis did not seem appropriate for use with any of the children. A few of the participants were more vocal than others. In these cases, they volunteered information, which I did not need to ask for. I then noted such information.

Observation notes for Stimulated Recall

In choosing stimuli for the stimulated recall, I noted any actions that were beyond reading and clicking. This included verbalizations, actions such as stretching, posture movements, and navigational choices that were outside the path of clicking an available

choice (such as using the internet back button). I noted screens on which participants spent extra time or appeared to look more closely. For example, participants sometimes leaned in toward the screen. In other cases, they moved the mouse along the pictures. I noted exactly what they did at those points in the story. I then used my observation notes to remind participants of what they did at certain points in the story. These reminders served as stimuli. I have noted my stimuli-related questions in the appendix listing of the transcripts by marking such transcribed quotes with the symbol "(S*)." Specifically, a description of this process follows below.

Examples of stimulated recall stimuli

At one point, Alicia and Dee encountered a screen with carrots laying on the ground. The carrots were not interactive or "clickable." Alicia asked Dee, "Why didn't you take the carrots?" Dee answered, "It wouldn't let me." I noted this so that I would be able to ask them during the interview if they were used to clicking on items like that. I did see them looking around a lot in the pictures and wondered if there should be more in the pictures. The following interview question resulted from this observation.

> PI: I noticed you guys were looking around in the pictures a lot. Do you like it when there is a lot to click on in the pictures?
> Alicia: Yea

I observed Alicia and Dee struggling to pronounce many of the words within the text.

> PI: I noticed… Part of me doing this and you guys are being a big help… I'm going to be able to pick out some parts that are too long. I noticed there were a lot of words that were probably longer than what you guys were used to.
> Dee: Yea
> Alicia: (head nod yes)

Alicia began to stretch and put her head down.

PI to Alicia: I saw you were stretching and moving around a little.
Alicia: Sometimes I get sleepy. I get nervous

When the Alicia and Dee read the page that introduced the beaver character, they giggled. They began to mimic his way of speaking and they spoke some extra "sss"s themselves.

PI: What about the beaver?
Dee: He was kind, friendly and nice.
Alicia: funny
Dee: He was kind to make the mole a bridge to cross over the pond.
Alicia: He was funny with the extras "s"s.
Dee: sssssssss

I noted that they routinely checked the map whenever they entered new pages. They also randomly moved the mouse over the map even though the map was not clickable.

PI: And I noticed you used the map a few times. Did you like having the map there?
Dee: It was a little easier so we didn't have to be like "where are we?"
PI: I also noticed in the beginning you tried to click on the map. Are you used to having that in other stories… where you click and it takes you somewhere?
Dee: Cause when we click on it and it gets bigger and it tells you about the island…cause if we want to know what the island's about

With Jay, I just noted some of his choices. I was tempted to ask him about his choices while he was reading the story, but I felt that the interruption would take him out of the "here and now" of the story that he seemed to be in.

PI: What about when you picked the pond over the castle? Why did you pick that?
Jay: I didn't want to go to jail.
PI: What about when you went to the other mole's house?
Jay: First I went the other way but went straight into the house.
PI: That's right because you went to the bunny's house?
Jay: (head nod yes)

Carol spent a long time on the story. When she got to the end, she went straight to the internet toolbar and backed up through the story to do it again. This was not a response that I had anticipated, so I noted the action.

PI: Well, you went through and did it again. How'd you do it the second time?
Carol: So didn't pick the same ones

Marge struck me as being extra vigilant in looking at all of the pictures. She spent a lot more time on each page than other participants had. She was clearly leaning in toward the screen and looking carefully at the pictures. She moved her mouse over the entire image of every screen.

PI: I noticed that you looked around on all the pictures. Are you used to doing that in other stories?
Marge: No
PI: You found some hidden secrets in the pictures. How did you know to look and click in the pictures?
Marge: I just put the mouse all around the pictures until I see the arrow turn into a hand. It gave clues.

Gass and Mackey (2000) state that stimulated recall is a method of introspection, and it may allow participants to reveal cognitive processes that the researcher could not ascertain by observation alone. Stimulated recall has successfully been used in many types of research including interaction research, experimental research, qualitative research. Stimulated recall has additionally been employed to examine communication problems, research reading and vocabulary, writing research, writer's block, and writing composition. According to Gass and Mackey (2000),

> "Stimulated recall methodology can be used to prompt participants to recall thoughts they had while performing a task or participating in an event. It is assumed that some tangible (perhaps visual or aural) reminder

> of an event will stimulate recall of the mental processes in operation during the event itself" (p.17).

In this case, I took notes as I observed participants going through the prototype. I then reminded them of certain actions they took. The reminders served as the stimulus. Stimulated recall was originally used by Bloom (1954). Bloom used stimulated recall in the classroom. He videotaped teachers, then played back the video and asked them what they were thinking at certain points. Bloom found that subjects should be interviewed with the stimulated recall method within 48 hours of the activity. Within this time frame, recall is 95% accurate. After 48 hours, accuracy declines. Further according to Gass and Mackey (2000),

> "The recall method itself is valid for the procurement of information about one's thoughts during an event. It has an advantage over a simple post hoc interview in that the latter relies heavily on memory without any prompts and it has an advantage over think-aloud protocols in that for think-alouds, the researcher needs to train participants, and even after training, not all participants are capable of carrying out a task and simultaneously talking about doing the task" (p. 18).

Procedural structure

This research made use of prefigured techniques. Prefigured interview techniques specify the questions as opposed to open-ended techniques, which focus on areas of content but do not use the same predetermined questions with each participant. As noted by Rossman and Rollis (1998), prefigured and standardized instruments help to control

researcher bias. These may include observation protocol and predetermined interview questions. Rossman and Rollis (1998) state that

> "Standardized open-ended interviews are tightly prefigured, having fixed questions that are asked of all participants in a particular order. Because of the nature of the questions, however, participants respond freely… The most important aspect of the interviewer's approach concerns conveying an attitude of acceptance and respect – that the participant's views are valuable and useful" (p. 125).

Gas and Mackey (2000) categorized instruments for collecting information during the stimulated recall process based upon an earlier categorization model by Faerch and Kasper (1987). The scale of categories runs from low to high-structured instruments. Instruments such as multiple-choice questionnaires are considered to be highly structured. Open interviews without predetermined questions by the researcher would be categorized on the low-structure side of the scale. Low-structure allows the participant to decide when they talk, what they talk about, and how much they say. Gass and Mackey (2000) offered the following recommendations:

Data Collection Timing:

- Data should be gathered soon after the event itself.
- As time goes by, there becomes a greater likelihood that the participant will not be able to focus on specific memories. As such, the participant is more likely to answer what he/she thinks the researcher wants to hear.

Strength:

- The stimulus must be strong.

Training:

- Participation should require minimal training. The participant "should not be cued into experimental goals or unnecessary information." Simple instructions work best if instructions are needed at all. With the inclusion of a question-and-answer interview, instructions are not necessary.

Structure:

- The amount of structure correlates with the research question. Questions should not be leading, so that participant recall will be less prone to interference by the researcher.

Instructions:

- Standardization is essential. Therefore, instructions should be presented in a pre-written, read-aloud, or recorded format.

Interrater reliability:

- Objective raters who are not part of the research team should be included for checks when possible.
- "Carefully construct analytical categories, checking subsets of the data with other researchers before coding all data to avoid carrying out large amounts of high inference coding that cannot be replicated. Decide on nature, content, and order/presentation of data for intercoder checks, paying attention to the potential effects of the stimulus along with recalled comments that need to be rated." (p.68)

Time Allotment:

- Instruments should be piloted so that timing estimates are precise.

- All participants should be allotted equal amounts of time, taking into account that some participants will be more or less long-winded.
- Questions should focus on the "timeframe in question."

Pilot test

In response to the questionnaire from the pilot-testing phase, the prototype was revised in the areas where participants showed difficulty. A pilot test was done in order to assess potential problems with the research or interview structure, strengthen potential by possibly exposing previously unrealized areas, serve as a practice for transcription and coding in which I could detect inter-rater reliability with the second transcriber as mentioned above. The pilot test used the same interview tools and techniques as in the final interview stage of the target market.

Sample size

The sample size consisted of 8 children. A low sample number was selected due to the observational complexities and time involved in qualitative research. The children were at least 9 years of age so that reading skills were already established. The participants were from a local summer program to which I had access. The program consisted of an African American population from the surrounding low-income area. Children attended the program as a means of summer-time daycare, tutoring and opportunities for various activities. The population and participants are further described in the "results" section.

Qualitative provisions

According to Rossman and Rallis (1998), there are two criteria that determine the trustworthiness of a qualitative research. "First, does the study conform to standards for

acceptable and competent practice? Second, has it been ethically conducted with sensitivity to the politics of the topic and setting?" (p. 43). Further, Rossman and Rallis (1998) maintain that the purpose of the research should add to an understanding of actions which will improve conditions. For the study to be useful, prospective users need to be able to believe and trust in the integrity of the research. Further, Rossman and Rallis (1998) supply several suggestions in order to establish the truthfulness of a qualitative research, all of which will be applied to this research. One suggestion is to share the researcher's information with participants in what is called "member checking." In effort to "member check," I returned the transcribed interview data back to the church program for approval. Another suggestion is to design the research as an action research, which was done in this case. Further Rossman and Rollis (1998) suggest triangulation, using more than one data source, method, theory or investigator. I did keep a log during the implementation stage of this research as suggested by Rossman and Rollis (1998) in the following:

> "One strategy to help ensure that your qualititative study is rigorously conducted is to make your position clear… Another is to rely on multiple methods for gathering data, thereby enhancing the complexity of what you learn in the field. A third is to document assiduously the process of gathering, analyzing, and interpreting the data… Keep a log or journal. Write interim analytic memos. These all serve to document the intellectual odyssey of your study and help you establish its rigor to readers and potential users" (p. 47).

According to Lincoln and Guba (1985), details of procedures should be included for credibility. Therefore, I have left an audit trail. While the research may contain general summaries of interviews, details of the actual interviews are available in an appendix. Quotes are included to support the data. The selection and interview processes include rich description. Conversations were recorded and transcribed. Further, all observations will be described. These transcripts and written descriptions serve as artifacts. Details of the interviews were made available in this article so that the roles of the researchers and participants are made clear. According to Rossman and Rollis (1998), "Interview records may be either direct transcripts of tape-recorded conversations or detailed, hand-written notes of the dialogue… Notes added to interview transcripts and field notes include your comments about methodology choices, difficulties or surprises encountered, impressions, and analytic and interpretive possibilities" (p. 122). Rossman and Rollis (1998) further recommend that the note taking data be written up as soon as possible once the fieldwork is completed. The write-up process should include entering handwritten notes into the computer, eliminating inadequate data, and adding researcher comments. Rossman and Rollis (1998) state that,

> "Usually, if the fieldwork was done quite recently, what we have said in our notes sparks our memories for details; if our memories are blank, we recognize a hole and try to seek further information later. This is the stage when you write "thick descriptions'" (p. 138).

"Thick descriptions" may include anything about the social surroundings, emotions, and details of the situation. According to Denzin (1978), "Triangulation forces the observer to combine multiple data sources, research methods, and theoretical schemes in the

inspection and analysis of behavioral specimens" (p. 21). Denzin (1978) argues that it is imperative that sociological researchers move beyond single-method studies. The use of multi-methods is a standard of triangulation that increases confidence in the findings. "The combination of multiple methods, data types, observers, and theories in the same investigation is termed multiple triangulation" (p. 340).

Interviews

During the interviews, I asked the participants about their feelings towards the interactive story that they had just read. I asked about their decisions, concepts of the character(s), what they based decisions on, what they would like to see, what they did or did not like about the story. Questions were highly-structured yet open ended. There were no checklists in effort to remain open and unbiased during this stage. Hence students could add whatever they wanted to say. The interview tool is available in the appendix (See table 16).

Observation

I depended highly upon observation of the participant. Observation allowed me to see if the participant had trouble with the program. In effort to avoid embarrassment, I did not want to ask a participant if he/she was stuck or confused. I watched instead, then asked an indirect question when needed. Observation also allowed me to note where the participant spent more time, appeared bored, excited or any array of options along those lines. I noted observations for use in the stimulated recall. According to Rossman and Rallis (1998), "In the early stages of a study, qualitative researchers often enter the setting with broad areas of interest but without predetermined categories or strict

observational checklists… The researcher is thus able to discover the recurring patterns of events and relationships. After such patterns are identified and described through early analysis of field notes, checklists or protocols become more appropriate and context sensitive. Focused observation may then be used at later stages of the study" (p.136).

Additionally, Rossman and Rallis (1998) state that field notes should contain "running records" as well as "observer comments." The running records are written, detailed descriptions of the setting and actions within that setting. The observer comments include my reactions or interpretations of the activities and interactions that I observed. These comments also include questions or ideas for changing any part of the research design as they arose. These notes were added to the transcripts of the actual interviews. While participants read the story, I observed the following: backtracking, time spent making choices, any peculiar actions that were not anticipated (anything other than just reading through the story and clicking on choices. For example, did they write anything down, draw anything out, etc.). Aside from the above, I was open to observe and note whatever I saw. I did not sit or stand directly by or over the participants. However, I stayed close enough to the participants to observe their actions. I did not hover over them nor make a big deal that I was observing them. Guiding questions were determined based upon the prior observations and interviews. Some conversations led in new directions once subjects began talking, such as when character focus became prominent after Marge began talking about a story she wrote in school. According to Lincoln and Guba 1986, multiple and socially constructed realities when known more fully, tend to produce diverging inquiry. Further according to Rubin and Rubin 1995, adjusting design/questions as you go is normal in qualitative research.

As far as gaining access, I collected data at a center that I knew was open and excited about participating in research studies. My role of the researcher was clearly defined as observing and interviewing. As such, I was not able to help the participants make any decisions during their readings of the prototype. I did receive permission from the gatekeeper, the program director. Upon IRB approval, I also obtained written consent from parents by sending a permission slip home to be signed.

Coding the Data

Data was coded according to categories. Categories reflect the original research questions. Upon the collection and preliminary coding of data into several areas, further categories were established as the opportunity arose. As such, data was initially sorted as follows:

- Characteristics of IF (what happened) to answer "What defines valid IF?"
- Quality IF (what they liked/disliked/why/empowerment/etc.) to answer "What defines high quality IF?"
- Of the characteristics above, which were set during the following stages of the ADDIE process?
    - How does the ADDIE Analysis phase apply to the development of valid, high quality IF?
    - How does the ADDIE Design phase apply to the development of valid, high quality IF?
    - How does the ADDIE Development phase apply to the development of valid, high quality IF?

- How does the ADDIE Implementation phase apply to the development of valid, high quality IF?
- How does the ADDIE Evaluation phase apply to the development of valid, high quality IF?

Time length to collect data: 3 days

Day 1: I observed and became familiar with the culture so that the novelty of my being there would wear off. This also accomplished Lincoln and Guba's suggestion of prolonged engagement.

Days 2 and 3: Subjects tested out the interactive fiction while I observed. I then interviewed each child. On average, each child took up to one hour between reading the story and being interviewed.

The setting was a computer lab familiar to the participants. As far as the credibility and transferability, qualitative studies (naturalistic inquiries) are generally more reality based than non-qualitative studies because the research is mostly gathered in natural environments.

The write up addresses fundamentals that Lincoln and Guba (1985) consider necessary including an explanation of why the study was done, a comprehensive description of the setting and transactions, and dialogue about the elements that were deemed important and deeply studied. The findings remained qualitatively based when written up. In effort to maintain rich data, including human thoughts and behaviors, I did not attempt to quantify such data. The goal was not to get an overall consensus to a "yes" or "no" question, but to gather data into thought processes, reasons behind what kids thought, and ideas for improvement.

Further, I did not attempt to generalize or transfer the results. Rather this is left up to the reader or future researcher. According to Lincoln and Guba (1985), one cannot generalize because everything is specific to time and place. Further "It is the responsibility of the inquirer to provide a sufficient base to permit a person contemplating application in another receiving setting to make the needed comparisons of similarity" (pp. 359-360). One may then decide how much a particular situation has in common with this specific study. Rich documentation of the study and description of the setting, methods, and participants are provided to cover credibility and transferability issues. An adequate list of references is provided as well as narrative vignettes, interpretive commentaries or theoretical discussions of the findings. Additionally, the literature review has provided a strong theoretical background and established a clear need for the study. The purpose of the study is defined and supported by past research. I have also included a definition of IF based on previous work and my own additions, establishing a link with past research. According to Lincoln & Guba (1989), dependability (also known as reliability) is the ability to dependably document these changes and shifts in such a way that they can be reconstructed by a research auditor who can "explore the process, judge the decisions that were made, and understand what salient factors in the context led the evaluator to the decisions and interpretations made" (p. 242). Therefore, I have included thick descriptions and an audit trail for future confirmations.

Product or Deliverable

The end product, after research was completed, provides a framework on how to develop interactive fiction with a thorough review of all applicable guidelines such as

those in the areas of literacy, instructional technology, and design. A prototype of interactive fiction developed using this framework is included. The end product also reports and provides documentation of feedback about the prototype from the target audience of interactive fiction, as these data were used to revise the prototype.

CHAPTER 4: RESULTS

Expert Review Test Results

Norming Process

The first section of expert review testing involved the "norming process," where the evaluators practiced the process in order to establish a shared understanding of category meanings and applications. During the norming process, experts from each of the three areas (construct validation, content validation, and design validation) used the criteria checklist on an unrelated interactive fiction story. Going by the previously mentioned guidelines, ratings of "excellent, good" and "serviceable" were used to indicate sections that met the corresponding criteria to a usable degree. "Weak" or "poor" indicated that the corresponding sections did not meet the criteria to a high enough degree.

Construct Validation

The "construct validation" process was intended to assess to what degree Mole P.I. was a valid instance of interactive fiction. As such, the process was based upon the seven principles of interactive fiction as set forth by Hayes-Roth, a noted authority in interactive fiction. During the norming process, the "construct validation" experts agreed on 5 out of 7 principles. The two principles on which they did not agree were one to two categories apart.

The following list provides a summary of the construct validation findings during the norming process:

1 The experts agreed that "*Marty Visits the Dentist*" did *not* meet Hayes-Roth's first principle of IF, indicating that the experts have a shared understanding of Hayes-Roth's principle of first-person point of view.

2 The experts disagreed on whether "*Marty Visits the Dentist*" met Hayes-Roth's second principle of IF. One expert rated this principle at "serviceable" while the other expert rated the principle at "poor." The two category ratings were still close together, indicating that the experts have some degree of shared understanding about the story being artfully designed and set by the author to carry the participant along.

3 The experts agreed that "*Marty Visits the Dentist*" did meet Hayes-Roth's third principle of IF, signifying that the experts have a shared understanding that encounters should occur meaningfully and naturally.

4 The experts agreed that "*Marty Visits the Dentist*" did meet Hayes-Roth's fourth principle of IF. This suggests that the experts have a shared understanding that the story world should be populated with more autonomous character than can be encountered in one visit.

5 The experts agreed that "*Marty Visits the Dentist*" did *not* meet Hayes-Roth's fifth principle of IF, indicating that the experts have a shared understanding that the participant should be autonomous in deciding with whom to interact.

6 The experts agreed that "*Marty Visits the Dentist*" did *not* meet Hayes-Roth's sixth principle of IF. This signifies that the experts have a shared understanding that the participant's choices should feed forward in shaping the story.

7 The experts disagreed on whether "*Marty Visits the Dentist*" met Hayes-Roth's seventh principle of IF. One expert rated this principle at "serviceable" while the other expert rated the principle at "weak." The two category ratings were still close together, suggesting that the experts have some degree of shared understanding that the participant should have a joyous experience.

Construct Validation From Norming to Prototype

The norming process during the construct evaluation phase was intended to provide expert reviewers with experiences comparable to the prototype evaluations in assessing Mole P.I. as a valid instance of interactive fiction. As such, this process served as a pre-evaluation so that the two experts could consistently apply feedback within the evaluation of the prototype itself. Upon completion of the norming process for the construct validation, it was found that the two experts rated in a similar manner. As stated above, the experts answers fell into the same categories for five of seven principles. Ratings were similar in the two remaining principles on which the categorical assignment differed. Based on the data collected during the norming process, the experts' responses should correlate in the evaluation construct validation of the prototype.

Construct Validation of Prototype

After the norming process, experts in all three areas evaluated the "Mole, P.I." prototype using the same criteria. The "construct validation" experts both found the prototype to meet all seven principles of interactive fiction as set forth by Barbara Hayes-Roth at or above a serviceable level.

Content Validation

The "content validation" was based upon the literature guidelines written by Rebecca Lukens, an authority in children's literature. The criteria list is broken down into five sections (character, art, time, genres, and other). During the norming process, the "content validation" experts agreed on all areas except for a few of the categories within the "art" section.

The following list provides a summary of the content validation findings during the norming process:

- Character – The experts agreed that "*Marty Visits the Dentist*" did meet the standards for the listings within the "character" section at or above the serviceable level.
    - This signifies experts had a shared understanding about characters in children's literature as noted in the following: Characters should be well developed and interconnected with conflict. Events should affect the characters, but the events may also be caused by the character's very nature. Protagonists should not be flat or stereotyped with the exception of certain genres. Stories with animal realism should portray characters that are true to the animals' nature. It is possible to fully develop characters even in the shortest of stories.
- Art – The experts mostly agreed that "*Marty Visits the Dentist*" either met the standards for the listings within the "art" section at or above the serviceable level. There were two listings in which the experts did not agree. "A story may be

distorted by poor illustrations" was rated as "weak" by one expert and "non applicable" by the other. "Design elements contribute to the success of a book; these include color, space, tone, line width and picture" was rated as "good" by one expert and "weak" by the other.

  - This implies experts had a shared understanding about art in children's literature as noted in the following: A story may be distorted by poor illustrations. Pictures and words may play off of or substitute each other. Neither commonplace nor "show off" pictures add to the story. Pictures may tell more than the text. Pictures and text should work together in a "marriage." Design elements contribute to the success of a book; these include color, space, tone, line width and picture placement.

- Time – The experts agreed that "*Marty Visits the Dentist*" either met the standards for the listings within the "time" section at or above the serviceable level or the listing was "not applicable."
  - This implies experts had a shared understanding about characters in children's literature as noted in the following: Time elements should fit the story. In Historical fiction, events occur in the past. Details should fit accordingly with the time and place. Time lapses for science fiction occur in the future or past.
- Genres - The experts agreed that the listings in the "genre" section were "not applicable" to "*Marty Visits the Dentist.*"
  - This indicates experts had a shared understanding about genres in children's literature as noted in the following: Mystery stories are

dependent upon suspense. Unexplained events should be resolved by "reasonable discoveries." Neither sports nor mystery stories need be formulaic. When reading of different cultures, readers should be able to discover values that are alike their own.

- Other - The experts agreed that "*Marty Visits the Dentist*" was "serviceable" as far as having action in the story. The experts further concurred that the other listings either did not meet the standards at the serviceable level or the listing was "not applicable."
    - This suggests experts had a shared understanding about certain miscellaneous matters in children's literature. Miscellaneous matters include guidelines that (1) Stories need action aside from character (2) Conflict should be well-developed and interconnected with character (3) Tension must exist to hold the reader's attention (4) Children are rarely attracted to nostalgic tones and (5) Themes should not be preachy.

Content Validation From Norming to Prototype

The norming process during the content evaluation phase was intended to provide expert reviewers with experiences comparable to the evaluations of the prototype in assessing to what degree Mole PI embodies a good story. As such, this process served as a pre-evaluation so that the two experts could consistently apply feedback within the evaluation of the prototype itself. Upon completion of the norming process for the content validation, it was found that the two experts rated in a similar manner. As stated above, the experts agreed or mostly agreed in all areas. Based on the data collected during the

norming process, the experts' responses should correlate in the evaluation content validation of the prototype.

Content Validation of Prototype

The "content validation" experts both found the prototype to meet all five criteria of the literature guidelines as set forth by Rebecca Lukens at or above serviceable levels. One of the "content validation" experts left the following comment:

> "Excellent illustrations… On some pages you may not need as many words because the picture tells the story. The pictures add to the story well. Some pages may have too many words for the grade level of students. However, the images are incredible and tell a lot about the story. I really liked the red herrings you threw in. It would have been fun to collect a few more false nuts." – Quote from content validation expert

Design Validation

The "design validation" was based upon the Alessi & Trollip checklist. The criteria list is broken down into twelve sections (subject matter, auxiliary, affective, interface, navigation, pedagogy, cognitive capacity, user control, feedback, invisible features, robustness and supplementary material). During the norming process, the "design validation" experts agreed on ten of the twelve areas. The following list provides a summary of the content validation findings during the norming process:

- Subject Matter – The "design validation" experts agreed that "Marty Visits the Dentist" met the standards for the listings within the "subject matter" section at or above the serviceable level. This agreement by the experts indicates that they had a shared understanding of subject matter as it related to the interactive fiction story. Under the subject matter guidelines, it should not be assumed that users are automatically familiar with an organization of a program's content structure. Diagrams or maps are helpful to show users where they are or where they can go within the programs. Stereotypes and jargon should be avoided so that cultural bias may be prevented. The content should match the goal of the program while striving for structure and accuracy. This section would also account for language, style, grammar, reading level, regard to cultural bias, reference, technical items and jargon, spelling, grammar, punctuation and glossary or "hot word" options.
- Auxiliary - The "design validation" experts agreed that "*Marty Visits the Dentist*" met the standards for the listings within the "auxiliary" section at or above the serviceable level, representing a shared understanding of auxiliary content as it related to the interactive fiction story. Some programs may require auxiliary information. This would include any documentation, directions, help or hints that pertain to the program.
- Affective Considerations - The "design validation" experts did not agree that "*Marty Visits the Dentist*" met the standards for the listings within the "affective considerations" section at or above the serviceable level. One expert rated this section at "serviceable," while the other expert rated it at "weak." While experts

did not technically "agree," the responses were in similar categories. These responses were suggestive that experts had a shared understanding of affective consideration as it related to the interactive fiction story. Intrinsic and extrinsic motivation would be considered in this area. The designer should seek to maintain challenge, satisfaction, attention and confidence in order to provide for intrinsic motivation. Although motivation should be a goal of the program, it should be balanced with instructional features. Assessments and feedback should be designed to increase ease-of-use and lessen anxiety.

- Interface - The "design validation" experts mostly agreed that "*Marty Visits the Dentist*" met the standards for the listings within the "interface" section at or above the serviceable level. However, one expert rated the underlying "animation and graphics" listing as "weak." The overall agreement and near agreements are indicative that experts had a shared understanding of interface as it related to the interactive fiction story. This would include aspects of display, presentation mode, animation, graphics, audio, video and spacing. Aesthetic quality should be considered in screen design. As such, screens should be uncluttered and all matter should be relevant to the program's goals. The order of information should flow from the top left to the bottom right. All elements, including but not limited to text, graphics, video, audio, and color, should only be used when appropriate. Text should not be too long on any page as to control for excessive scrolling. Any video or audio should have accompanying controls so that the user may adjust or turn off sound or speed. It should be considered that video, audio and intense graphics tend to load slowly. Thus, the necessity of those elements should

be weighed. Download times need to be acceptable. Conventional spacing rules should be used within text, and spacing should be consistent.

- Navigation - The "design validation" experts agreed that "*Marty Visits the Dentist*" met the standards for the listings within the "navigation" section at or above the serviceable level suggesting a shared understanding of subject matter as it related to the interactive fiction story. Navigation allows the user to move throughout the program and should be consistent from page to page. Navigational aids, such as maps and menus, should be included for very complex programs. Some programs may opt to have bookmarking features or other restart points.
- Pedagogy and Cognitive Capacity - The "design validation" experts agreed that "*Marty Visits the Dentist*" met the standards for the listings within the "pedagogy" section at or above the serviceable level. The "design validation" experts agreed that "*Marty Visits the Dentist*" met the standards for the listings within the "cognitive capacity" section at or above the serviceable level, representing a shared understanding of pedagogy and cognitive capacity as it related to the interactive fiction story. Research has shown that only five to nine pieces of information can be stored in short memory at one time. Therefore, program information should be separated into sections and activities should be interspaced. "Page turners" and exceedingly long pages of text should be avoided as they are passive and may present too much information at a time.
- User Control - The "design validation" experts agreed that "*Marty Visits the Dentist*" met the standards for the listings within the "user control" section at or above the serviceable level, signifying a shared understanding of subject matter as

it related to the interactive fiction story. User control guidelines hold that the user should be able to control extraneous options of the program, especially if audio or video is present. Programs that require user response should allow the user time to think and process information. It should be clear to the user when the program requires a response. Further the user should be clear on how that response should be made (click a picture, write in a prompt box, etc.).

- Feedback - The "design validation" experts agreed that "*Marty Visits the Dentist*" met the standards for the listings within the "feedback" section at or above the serviceable level, suggesting a shared understanding of subject matter as it related to the interactive fiction story. Feedback should discriminate between right and wrong answers and it should be related to the user's input. The feedback should be presented so that it is clear, constructive, supportive and gains the user's attention. Small or single words tend to be disregarded by users. Slang or insulting remarks should not be used. Feedback should offer users a means to know when they have successfully completed the program.
- Invisible Features - The "design validation" experts agreed that "*Marty Visits the Dentist*" met the standards for the listings within the "invisible features" section at or above the serviceable level, signifying that experts had a shared understanding of subject matter as it related to the interactive fiction story. This included invisible features such as records, data security and accessibility.
- Robustness - The "design validation" experts agreed that "*Marty Visits the Dentist*" met the standards for the listings within the "robustness" section at or above the serviceable level, indicating that the experts had a shared understanding

of robustness as it related to the interactive fiction story. Robustness means that the computer program will not fail. As such, programs should be tested from the user's point of view. The program should further be tested under various conditions and on various operating systems and Internet browsers.

- Supplementary Material - The "design validation" experts agreed that "*Marty Visits the Dentist*" was "not applicable in the "supplementary material" criteria section. This agreement signifies that experts had a shared understanding of supplementary materials in relation to the interactive fiction story. The area of supplementary materials included aspects relates to user manuals, program operation manuals, and auxiliary materials.

Design Validation From Norming to Prototype

The norming process during the design evaluation phase was intended to provide expert reviewers with experiences comparable to the evaluations of the prototype in assessing to what degree Mole PI is a well-designed piece of software. As such, this process served as a pre-evaluation so that the two experts could consistently apply feedback within the evaluation of the prototype itself. Upon completion of the norming process for the design validation, it was found that the two experts rated in a similar manner. As stated above, the experts agreed in ten of the twelve areas. Ratings were similar in the two remaining areas on which the categorical assignment differed. Based on the data collected during the norming process, the experts' responses should correlate in the evaluation design validation of the prototype.

Design Validation of Prototype

The "design validation" experts both found that the prototype met most of the criteria set forth by Alessi and Trollip at or above a serviceable level. One expert rated two of the areas, "introduction" and "restarting," as "weak." Comments left by the expert further added that the introductory pages were long and wordy before the point of the story was made. Both experts also found a spelling error. Comments by the "design validation" experts are listed below:

- "Pictures, maps graphics were useful. No cultural bias found. However intent and organization was not clear. Sometimes the navigation was not consistent, I had to hit the browser "back" button to get to a previous page
- Not sure, in the middle of the story, the goal was to find the missing acorns.
- Content structure – dependent on what choices the reader made.
- The reader does not know that they are the "mole" until the explanation of the squirrel is given and then the word "you" is used and then the realization that "you" and "mole" are one and the same person.
- Did not state what reading level or grade it was intended for.
- Maybe gender bias? The "girl-mole" was made out to be "less than sharp".
- 1 spelling error "pealing" should be "peeling".
- Not sure if they are "hot words" but there are certain words or choices for the reader that is given. It works well.
- Hints work well, please note that the "hint" for the riddle, the reader is forced to click on the hint before clicking on the riddle.

- Not sure of purpose, but maybe that was the idea.
- Not very clear at times, for example, when given choices, there is no navigation to go back and make a different choice.
- Could be more explicit in certain situations, and less in others for example the byline of the weasels I found to be a bit long.
- All conclusions (for different endings) added a sense of completion.
- This was well done, the acorns, gold coins, playing detective, were put to good use.
- However, once the reader made a choice, there was no navigation to go back and make a different choice. Possibly another goal of the story?
- To find the "thief" kept up the motivation level, or added motivation. Use of gold coins and finding the acorns proved to also heighten motivation.
- The map at the beginning was not explained until a few screens later.
- Sometimes screens were filled with too much information. For example the explanation on how to go about finding the "thief", using the acorns, using the gold coins, avoiding the weasels, was a bit much. No video or audio was used.
- Not aligned. I question the font face and size. Font face seemed to say "serious" instead of "fun".
- Consistent."
- "An engaging and interesting activity! I suggest left-justifying the text under each screen (rather than centering it) for readability. According to Nielsen (2000), "Almost all text should be left justified. By having a steady reference point for the

eye to start scanning, the user can read much faster than when faced with centered or right-justified text." (p. 126)."

- The word "pealing" should be "peeling."
- One screen includes the following: "Click the "riddle" button below to answer the monkey-troll's riddle." For me, the button was actually to the right, not below.
- Reference: Nielsen, J. (2000). *Designing Web Usability*. Indianapolis, IN, New Riders.

Changes Made to the Prototype

After considering the feedback in all three areas of expert review, the main issues fell in the areas text length and alignment. Experts from areas of "content validation" and "design validation" both commented on how long the text was, noting that there were too many words on many of the pages. Further, some of the words may have been unnecessary, and it took a long time to get through the introduction to the purpose of the story. Both "design validation" experts noted that text should be aligned differently. Working with this information, the following changes were made:

- One spelling error was corrected.
- I went through the text and removed any words/sentences that were not necessary.
- All text was changed to be left-aligned (It was previously centered).
- These changes would allow the reader to move more quickly through the introductory pages, as the pages are less "wordy."
- In spite of navigational comments, no back buttons were added within the story. The story was created with the purpose that the story should only feed forward

with the choices provided. Alternate endings could be achieved by reading the whole story again upon completion.

Pilot Test Results

Descriptions

The participants were children enrolled in a "out-of-school-time" program at a local Baptist church. I was able to have access to the population through the director of the children's program. The director is a fellow USF doctoral student. The director was able to tell me the ages and grade levels of the children, so that I could pull those who had completed the third grade. This was a summer program, so the children were in-between grade levels.

The program consisted of an African American population. Although the program was physically located at a church, children did not have to be Baptist or church members to participate in the "out-of-school-time program." The intent of the program was to be open to serve the local community. Children who attended lived in the surrounding low-income areas, attended the local public schools and walked to the summer program. The program included tutoring as well as activities. Activities included regular trips to a swimming pool, as well as weekly museum and library visits. United Way covered the cost of lunches and snacks. Participants ranged from first-graders to teenagers. Many of the children lived with grandparents, foster care or other extended family. According to the director, they enjoyed their time at the center and were usually in no rush to head home at day's end.

Children were very active, playful and involved with each other. On the day I observed, they were in the craft room. This was a large gym-like room with a stage, a

few tables, many chairs and a piano. The walls were covered with colorful art projects and drawings that the children had done throughout the summer. Most, if not all, projects were based upon themes from children's books. I was visiting during the last week of the camp, as the regular school year was starting the next week. I was told attendance was low. I was using children who had completed third grade, as the story required a third grade reading level.

I observed the children during the day at the program so that the "novelty effect" of my presence would wear off. However, there didn't seem to be much of a novelty effect. The children were pretty involved with coloring with markers and construction paper. They were writing their wishes onto construction paper. Each child's drawing/design would then be placed as a leaf onto to a giant paper tree on the wall. There were about 20 children in the room. Some looked to be concentrating on their designs. Others were jumping around, reaching over one another and looking at what others were doing. Most children seemed to be concentrating on what they were doing. They were very outgoing with one another. It was very loud. Everyone was interested in what the others were doing. The director introduced me, but for the most part the kids kept doing what they were doing.

The church building had a computer room with about 12 computers. According to the program director, the children were used to the computer room, had all used the computers before, and were very used to moving around the program building (in and out of various rooms) as needed. As noted in my IRB paperwork, I am not using the children's real names to protect their identities. Descriptions of participants are as follows:

- Marge was a quiet girl and very serious.
- Mary was very quiet, small and smiley.
- Derek was outgoing, excited and always smiling. (Surprisingly, he did not want to be tape-recorded, so I wrote down my conversation with him. The director was surprised he did not want to be recorded, as he was more of a playful than typically shy kid).
- Jay was very mature and well-spoken for his age. He was very polite with a laid back personality.
- Ann was a bit rambunctious and impatient.
- Carol wanted to work, was very quiet, extremely soft-spoken and almost hard to hear.
- (More information about the above participants will be covered later in the chapter when I cover the final interviews).

The two participants for the pilot test were Dee and Alicia. Dee and Alicia are sisters from the same household. Dee is more outspoken and Alicia is quiet. They were very close, leaning on each other and constantly looking to each other. They were uneasy about the idea of working separately, and they wanted to read the story together. I made an on-the-spot decision to allow them to read the story together. I thought that this change would still achieve the results of pilot-testing (to see if the prototype worked). This change became an advantage because the girls automatically began to read out loud. They were comfortable to voice their thought-processes as they went along, thereby

producing think-aloud protocols. This was exemplified on a page that described some carrots that Mole would take with him. The carrots were in the picture, but they were not interactive or "clickable." Alicia asked Dee, "Why didn't you take the carrots?" Dee answered, "It wouldn't let me." I noted this so that I would be able to ask them during the interview if they were used to clicking on items like that.

Summary of Pilot Test Transcripts

(See appendix for full transcripts). Both Dee and Alicia had read interactive stories in the past. Alicia said that she read five interactive stories while in the third grade. She said that her teacher lets her go online and read stories. Dee did not read her interactive stories while in school, and she had a different teacher than Alicia. Both girls said they like the interactive stories and that they are fun. They also like making their own stories in Powerpoint. Dee and Alicia had both written their own stories in school while in the third grade. They used Powerpoint to create the stories. They did not have any particular protocol for writing the stories or deciding upon the inclusion of pictures.

> Dee: Sometimes we, you know, we, we do our own stories. See we go in powerpoint, right, and we do pictures and all that.
> Alica: And in my class our teacher we go on a …um, and sometimes our teacher lets us go as long as it's educational and she has these things under her favorites and she says once you finish reading the stories, she'll print questions and we'll answer the questions and well give it to her. That's like a test without her giving it to us.

When asked if they like making the stories, they replied as follows:

> Dee: Yea, because it's all your ideas from your brain is coming into the computer and like your diary and all that.
> Alicia: It's actually all what's in your head.

The pilot-test participants stated that they have read stories like "Mole P.I." before. As far as stories where they assumed the role of the main character, Alicia has not read any. Dee has read five in school. Both said they felt like they were in control of what Mole did. When asked for specific examples of what they liked, they replied with the following:

> Alicia: I like the bows the pink bows.
> Dee: I liked when we could choose any way we could go.

I noted that some of the words appeared to be longer or harder than what they were used to. I said I was going to take many of those harder words out. They talked about stories that have the built in dictionaries/pronunciation devices, noting they would like such devices in this story had that (beyond my programming skills). We talked about the pictures. I did see them looking around a lot in the pictures and wondered if there should be more in the pictures.

> PI: I noticed you guys were looking around in the pictures a lot. Do you like it when there is a lot to click on in the pictures?
> Alicia: Yea
> PI: Are you used to stories that give you more things in the pictures?
> Alicia: They give you a picture and they give you a picture and on the next page they give you a picture
> Dee: So they like give you a place like where they should be. I like when they trick you and you try but not the right place and it's really in the wrong place. If you're trying to find something. They could be more smaller or they could blend in with things like the grass and it could blend in with things and like sand and stuff and then when you find all of the things and it said great job. You had some of those things but not the blending but the part where it said great job.

When asked, they said that they did not have any trouble moving around the story. I then asked if the story was too long for them (It took a little over an hour to go through, which was much longer than I had expected).

> PI: Were there some parts where it was a little long?

PI to Alicia: I saw you were stretching and moving around a little
Alicia: Sometimes I get sleepy.
Alicia: I get nervous
PI: You looked like you read well. Really, some people it relaxes them.
Dee: Oh Yeah, I have to go to sleep and then when I wake up I have a fresh brain (Dee smiled and softly repeated "fresh brain").

As far as choices that were made, Dee was glad she chose to meet the girl Mole. While it did not directly effect the outcome of the story, it was important to her that Mole met a girl. The importance of readers associating characters with their own lives will be discussed further within schema theory and inside view in chapter 5. I will also discuss the relationship with the underlying theories of interactive fiction that were originally put forth in the literature review. For example, transactional theory and reader-response theories surfaced as readers created their own stories. Examples presented when Dee explained that Mole now had a friend that he could visit and have coffee with. In another example, Marge was proud that Turtle stood up for himself. She was also happy that everyone had a friend at the end of the story. Derek was happy that Mole would have another mole that was just like him. These examples revealed that the story was not independent of the learner. There was evidence of greater interaction. My transcripts provide examples of the readers going beyond the story. Dee and Alicia talked about Squirrel having an "overbite." This was one notation that I made while they were reading the story. While I added the "overbite" detail as a small characteristic for a squirrel, I did not expect that detail to greatly surface. However, Alicia had an overbite. When she and Dee approached the selection about Squirrel, Alicia told Dee about her own overbite. Further, Dee seemed interested to learn what Alicia was telling her. In this manner, the participants were connecting in substantive ways with their own lives. This will be

discussed further in chapter 5 in terms of "insider view." Insider view, as described by Leibling (1989) is a part of comprehension and pertains to the ways readers understand and connect to characters in text. Leibling (1989) asserts that rounded and well-developed characters allow readers to find ways of connecting with and comprehended characters, thereby comprehending the text.

I was concerned that participants would have trouble with the riddle portion, but these two had done riddles before. Answering the riddle and typing the text in did not seem to pose any problems.

> PI: Did you have a favorite part?
> Alicia: My favorite part was the Riddle
> Dee: Yeah, the riddle
> Alice: I'm not very good at riddles but…
> PI: Have you done riddles before? Did you know what a riddle was?
> Dee: I knew what a riddle is, like a joke
> Alicia: Sometimes my step mom gets these Popsicles they have riddles on it.
> Dee: Then you have to try to figure it out because it's like a question

Here it seemed that understanding the context of a riddle was an extension from home, as an example of taking what they already knew and transferring it in their schema.

> PI: Did you like typing in an answer. Where you comfortable doing that?
> Alice: yea
> Dee: I love typing. It's very fun.

When asked about anything they didn't like, they said they did not have a "least favorite" part. They said they liked all of it, and that it was interesting. When asked about other stories that they like to read, they answered as follows:

> Alicia: I like to read stories that have meanings and that stories, just like…cop stories… Hard stories the stories that make you think and like big books.
> Dee: That make you concentrate actually like on the book, to make you think. I like mystery books.

When asked what characters they liked, they replied as follows:

PI: You mentioned the girl mole. What characters did you like or not like?
Alicia: I like the squirrel.
Dee: yea the squirrel and the boy mole
Alica: the boy mole and the baby ducks the beaver
PI: What did you like about the squirrel?
Dee: Squirrel, that he's very nice and takes people out for a walk and really if somebody's tired he says "hop in my basket."

When Dee described this part, her body posture changed. She sat up very straight with a big grin and announced "hop in my basket" louder than the rest of her description.

Alicia: yea
PI: What about the beaver?
Dee: He was kind, friendly and nice.
Alicia: funny… He was kind to make the mole a bridge to cross over the pond. He was funny with the extras sssss.

When Dee and Alicia described the beaver, it was evident that they were not just repeating story pieces. They became giggly and starting speaking like the beaver to each other.

PI: And why'd you like the baby ducks (note they were not main characters)?
Alicia: They were cute.

As far as any changes that needed to be made to the story, they did catch an error where I had the word "are" two times in a row. They also said the story should be just a little shorter.

Problems words and phrases:

- Decorating
- Squinty
- Senseless
- Official – (extremely hard)
- Detected
- Decision
- Resembles
- Issues
- Effect
- Creative solution
- Weasels

- Suspicious little critters
- Prisoners
- Residents
- Accessory
- Burrow
- Beady eyes
- Throughout
- Decorative
- Suspicious environment
- Situation
- Obligated
- Curiosity
- Gnawing

Ideally, I would have liked to keep these words, but I did not have the programming capacity to aid readers with difficult words. Further, I set my position as the observer/interviewer so that I would not be able to assist struggling readers in my role. For the purposes of this research, the only option seemed to be to remove the difficult words and phrases so that participants could get through the story. Because the two girls read out loud, I was able to see the areas where they struggled to read or understand the text. This included an area that explained Mole's nails. There was too much text on the pages that described the weasels and the weasel's castle. They moved the mouse around on those screens, but there was nothing hidden in the pictures. It seemed that they wanted to be clicking on things rather than doing so much reading. By the castle description, Alicia was stretching, put her hand on her head, and rolled her head back. Eventually they reached a part that asked them to search for clues within the picture, and they suddenly perked up (body movement). They found the three items right away.

There were several images that contained "loop" clicks rather than branching off into other parts of the story. In an opening page with an image of the tree house, parts of

the tree can be clicked to view the inside of either Mole's home or Squirrel's home. Upon viewing the inside of the home, there is "back" button to return to the previous treehouse scene. These types of loops provide extra information, but the information serves no purpose in the actual path of the story. As opposed to secretly placed "Easter eggs," the presence of these images was made known to the readers. Within the regular story text, it briefly mentioned that the inside of the homes could be seen by clicking on the tree.

The girls clicked to see both of the homes in the tree and returned to the original screen with no problems. The text that describes the "squirrel" character mentions that he has an overbite. This part of the description seemed trivial to me, but Dee became excited because she also had an overbite.

They were very quick to check all the scenes for hidden acorns. As soon as they got to each new page, their faces aimed straight toward the pictures. They ran the mouse over each new picture before reading the text. In the girl Mole's house, they found the fake acorns right away. They tried to click on places on the map, but the map feature was not interactive. They also tried to click on some carrots in one scene, but the carrots were not an interactive feature. As a result, I asked them if they were used to having more things to click on in these types of stories.

They continued to search most scenes for acorns by moving the mouse around to see if the icon changed. They got to a beaver character, which made them giggle because the beaver used extra "s"s in his words. However, they were also appearing restless by this point at the beaver bridge. They had been reading for one hour. They were sighing and taking breathes between readings. Finally, they found the real acorns, and the

mystery was solved. Alicia and Dee lit up and got excited when they found acorns! There was still a few more pages of reading, but Dee said it "doesn't matter" now. She was tired after she found acorns. They did keep reading until the end of the story. Once the story was over, there were no more choices. It was "the end," and I thought they would be glad to be done (after appearing tired of reading a few times). However, Dee automatically went to the Internet's "back" button to step back in the story. She said "This is getting interesting now!" She did go back a few screens, and I did not stop her. I watched to see what would happen. As a result of a few different choices, she got a slightly different ending. However, the girls liked both endings.

Pilot Test Revisions

The revised prototype is posted at the following web address: http://www.haunsy.com/Haunsy/AllMoleSiteFiles/START%20HERE.htm

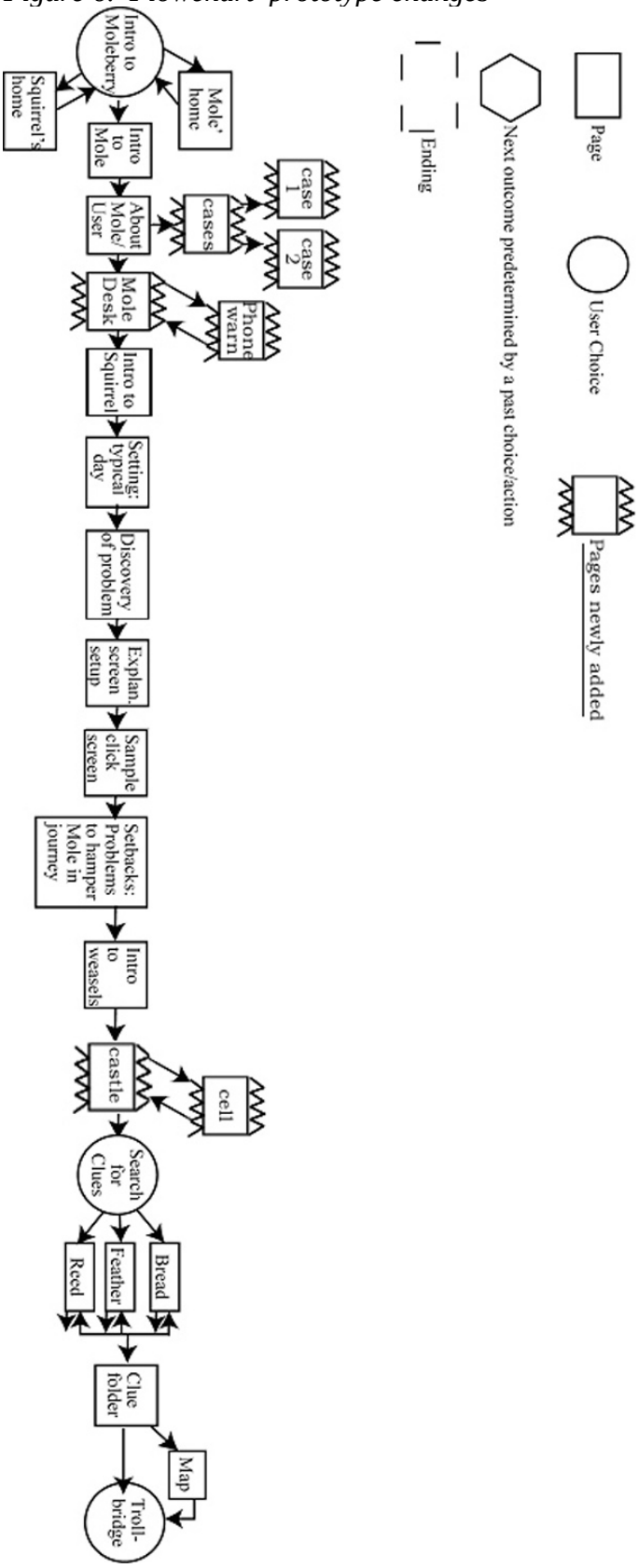
The initial purpose of the pilot test was to test the prototype for usability with the target market. Additionally, the primary purpose of the pilot test was to "test run" interview questions and look for any areas that might add to the interest of the study. I noted that the pilot test participants carefully searched most screens looking for items to click. Based on observations and interview transcripts during the pilot test phase, more hidden options were added into the main images. These features were added during the introductory pages, and the additions are noted in the updated flowchart (SEE FIGURE). The additions serve only as loops that do not lead anywhere. The additional hidden features were added as possible entertainment value after observing and interviewing pilot-testers. Images were modified as described below.

- In one image, Mole is shown looking at a case folder, while a stack of folders sits on the floor in front of him. I updated this image by making the pile of folders a hidden link or "Easter egg" as previously described. If the user clicks on the stack of folders, a new screen will open up. The new screen displays the titles of two closed cases. Further, clicking on one of the titles will open a screen that briefly describes the closed case. Closing the latter description returns the user to the original path of Mole looking at the original case file.
- In an image where Mole is at his desk, there is a telephone on the desk. If the user clicks the telephone, a large notice will pop up saying "Please do not use my phone to make long distance calls." When this window is closed, the user is returned to the original screen with the image of Mole at his desk.
- In an image of the weasels' castle, clicking on the top-middle of the castle will display a close-up shot of the jail cell inside the castle. Again, the user is returned to the original screen once the additional window is closed. None of the additions serve as actual branches in the story.

The foremost introductory pages were within the first 18 pages/screens of the story. When the original pages were analyzed for reading level according to the Flesch-Kincaid Grade Level model, the grade level score was at 3.9. The original text also had 100 sentences with an average of 11.47 words per sentence and 4.26 characters per word. While the pilot-test participants would be entering fourth grade within the next week, the reading level and amount of text seemed too tedious. I had already eliminated some excess wording after the expert review test. After the pilot-test, I eliminated even more words. Many of the words that I took out were descriptive. As noted earlier by one of

the expert participants, I could use less descriptive words since the pictures showed so much. Therefore, I felt the need to remove most of the descriptive text after the pilot test in an effort to keep the text length down. I had also carefully noted the troubled words and phrases during the pilot-test reading, so I removed most of those. After the final revision, the first 18 pages of introductory text had 80 sentences with an average 9.66 words per sentence and 4.12 characters per word. The reading level was reduced to 2.7.

Figure 6. Flowchart prototype changes



The transcription process

As previously mentioned in the "methods" section, another student from the department of Secondary Education helped me during the transcription process in order to prevent bias. The other transcriber is an Ed.S. student who has worked in the field of instructional development for several years. During the pilot-test transcriptions, we separately transcribed from the same recording and matched the written records. The remainder of the interviews were spot-checked and transcribed by the second transcriber. Again we found that her written transcripts matched the transcriptions as I had documented them. The interview recordings were somewhat slow and were documented word-for-word.

Interview Results

Symbols used in the transcripts

Note that in the following selections, "PI" stands for "Prinicipal Investigator." Items italicized in "( )" are side notes or my thoughts as to what was being said. Exerts that are related in the same topic but from different interviews are separated with "***".

Themes

Selection of themes

Themes were chosen by a combination of pulling topics with the most excited reactions and those which occurred the most times during interviews. In several instances, the participants' reactions showed that they took the role of Mole P.I. beyond being a storybook character that they were reading about. They assumed the role of Mole P.I. Reflecting Gee's identity principles (to be further elaborated upon in chapter 5), they took on the role and reported Mole's characteristics. Several reactions showed that they

thought about Mole's life beyond the story. In some instances, participants were giggly or loud when they talked about the story. It was evident that they were not merely reporting the facts of a reading selection. During the participants' reading times and interviews, I noted all reactions that occurred in more excited manners than others. Some pages were read silently, while participants physically and verbally showed more excitement on other pages. Further, participants were more excited in body posture, tone and amount of description when answering some questions over others. For example, Alicia told me about a "bad" choice that she made in the story. Along with her description, her body posture changed. She was giggly and hunched over a bit as if she had actually done something sneaky in real life.

> Alicia: So the bad choice that he picked was to go into the lady's drawer. It could have been her underwear.
> Alicia and Dee: (giggle)
> Dee: It could have been some private stuff that she didn't want him to see.

When Dee described Squirrel, she became more animated. She sat straight up and invented a strong voice for Squirrel as she pretended to be him. He never actually said "hop in my basket" during the story. This was invented by Dee in her description as follows:

> Dee: Squirrel, that he's very nice and takes people out for a walk and really if somebody's tired he says "hop in my basket."
> Alicia: yea

In describing the beaver, Dee and Alicia giggled back and forth and talked liked the beaver to each other.

> PI: What about the beaver?
> Dee: He was kind, friendly and nice.
> Alicia: funny
> Dee: He was kind to make the mole a bridge to cross over the pond.
> Alicia: He was funny with the extras "s"s.

Dee: sssssssss

Dee was also excited in explaining that Mole met another mole during the story. Here she added her own description that Mole and the girl mole can continue to visit each other and have coffee. She smiled as she seemed sincerely happy for Mole, as if he was a real life creature living in the here and now.

Dee: Yea, cause the mole didn't really know that he was the only mole in Moleberry. But that was a great choice to knock on the door. Now he's very proud he's not the only one, the only mole in Moleberry. Now he's interested in someone. And then maybe he might keep going to the girl's house and have coffee. *(There were <u>no</u> coffee or dating references in the story).*
PI: So you like that he made a friend?
Dee: yeah

Derek also liked the idea that Mole met another mole during the story. When he got to the page with the girl mole, he turned around and told me in an excited tone, "There's another one like me!"

PI: What was your favorite part or parts and why?
Derek: Girl mole… because there was another like me.

Marge liked the end of the story, again referring the general welfare of Mole. She also liked Turtle, who yelled at Mole. At first, I did not understand why she liked the fact that Turtle yelled at Mole (since she was Mole). However, Marge explained that she was happy that Turtle stood up for himself.

Marge: I liked turtle because he yelled at Mole and told him "you're not supposed to step on my shell without knocking first."
PI: Why did you like it that he yelled at Mole?
Marge: Because he stood up for himself.

Further, some participants became excited when they read that certain characters had traits similar to the participants' own real-life traits. The text that describes the "squirrel" character mentions that he has an overbite. This part of the description seemed trivial to

me, but Dee became excited because she also had an overbite. Further, Derek also liked Mole because he had something in common with him.

PI: Tell me about a character you liked or disliked?
Derek: I liked Mole because he bites his fingernails and I bite my fingernails too.

Beyond the original research questions, several prominent themes emerged based upon observations and interviews. The original research questions will be addressed later in the chapter. The major themes fall into the categories as follows:

- character
- identifying with the character
- responding with choices
- sense of right and wrong
- expectation of help features (from previous IF exposure)

I will first cover the newly emerged themes so that I can then discuss them in terms of their importance to IF and the ADDIE stages.

Theme 1. Character

During Marge's interview, she mentioned a story that she wrote in school. She called her story "Bad Cinderella." Her assignment had been to write a fairy tale from the opposite point of view. Marge was quick to tell me that in her story, Cinderella used to be nice until her parents got in a car accident. I then asked her if it was important for her to know why mean/bad characters are that way. She answered that it was important. This conversation made me realize how important the "good" and "bad" character roles are.

In other instances, participants were quick to either like or dislike characters while knowing little about those characters. In many cases, it was enough to tell the reader that

the character was nice or mean. For example, an introductory page warned to beware of the weasels because they were mean and might capture other animals. As a result, a few participants did not like the weasels because they were mean, even though those participants never actually encountered the weasels. Both Jay and Derek avoided choices in the story that might lead them near the weasels.

PI: Were there any other characters you liked or didn't like?
Jay: The only characters I didn't like the weasels they were kind of mean. *(He never encountered the weasels and actually chose not to go that way because he "didn't want to go to jail." He had only read that the weasels were mean).*
***
PI: Were there characters or parts of the story that you didn't like?
Derek: Weasels are bad. They throw people in jail.

As far as liking the characters, all but one participant liked Mole. Ann said that she did not like Mole because he was ugly. (Ann clicked through the story without reading most of it. She asked to stop in the middle because she said that she did not like to read). Reasons that participants liked Mole were as follows: He was a detective, he got to solve cases, he was helping a friend and he was just nice. Not only did most participants like the main character, they were also concerned with his welfare. When asked about what they liked in the story, many had answers that related to something good that happened for Mole.

PI: What did you like about him?
Jay: Because he was a detective, and I like detective stories.
PI: Was there anything that you didn't like about him?
Jay: That he picks his Fingernails because it took him too long too to dig (*Note that it was only mentioned that he was a slow digger… It didn't actually impact the story*).
***
PI: Who'd you like?
Carol: Squirrel
PI: Why'd you like the squirrel?

Carol: He could go up in trees and things (*Note that Squirrel never described that way in story. She made that association of squirrel's climbing trees on her own.*).
PI: Did you like mole's personality?
Carol: Yes because he solved the case.
***
PI: You mentioned the girl mole. What other characters did you like or not like?
Alicia: I like the squirrel.
Dee: Yea the squirrel and the boy mole
Alicia: the boy mole and the baby ducks the beaver
PI: What did you like about the squirrel?
Dee: Squirrel, that he's very nice and takes people out for a walk and really if somebody's tired he says "hop in my basket."
Alicia: yea
PI: What about the beaver?
Dee: He was kind, friendly and nice.
Alicia: funny
Dee: He was kind to make the mole a bridge to cross over the pond.
Alicia: He was funny with the extras "s"s.
Dee: sssssssss
PI: And why'd you like the baby ducks? *(Note that they were not main characters. They were only pictured once in the story. I did also note in my observations the girls smiled and softly said "awe" when they saw the baby ducks while reading the story).*
Alicia: They were cute.

When I asked participants what good or bad choices they made in the story, they focused on how they pictured Mole being better off from now on. It was almost as if they had changed life for Mole, and he would be living the outcome now that the story was over.

PI: Were there any choices where you glad that you made or really sorry you made that choice?
Dee: Yea, cause the mole didn't really know that he was the only mole in Moleberry. But that was a great choice to knock on the door. Now he's very proud he's not the only one, the only mole in Moleberry. Now he's interested in someone. And then maybe he might keep going to the girl's house and have coffee. *(There were <u>no</u> coffee or dating references in the story).*
PI: So you like that he made a friend?
Dee: yeah

Derek also liked the idea that Mole met another mole during the story. When he got to the page with the girl mole, he turned around and told me in an excited tone, "There's another one like me!"

PI: What was your favorite part or parts and why?
Derek: Girl mole… because there was another like me.

Marge liked the end of the story, again referring the general welfare of Mole.

PI: What was your favorite part and why?
Marge: The ending because they were all friends.

Marge's interview was the one that really made me realize the importance that the participants placed on character. Marge really seemed to pick up on character traits. She was also one of the few participants who had written a story of her own, so I was able to ask her about character in a different perspective.

PI: Have you written stories in the past? Tell me about those.
Marge: "Cinderella's Opposite." Evil Cinderella was in charge and mean. She used to be nice but her parents got in a car accident so she was mean.
PI: Is it important for you to know why a character is mean in a story?
Marge: Yes
PI: Tell me about a character you liked?/disliked? *(in Mole P.I.)*
Marge: I liked turtle because he yelled at Mole and told him "you're not supposed to step on my shell without knocking first."
PI: Why did you like it that he yelled at Mole?
Marge: Because he stood up for himself.
PI: Descibe Mole P.I.'s personality – what do you like – how would you want him to be?
Marge: Yes, because he was helping a friend.

Theme 2: Identifying with character(s)

In several of the participant responses it was clear that the participant was taking on the identity of Mole P.I. when referring to the Mole as "me" or "I."

PI: Were there parts you didn't like?
Mary: The part where after I dug through the wall… after I buried through the wall… had to put back the wall.

PI: Oh, so when you made the decision and then you had to work to put the wall back? *(Note the emphasis on "I had to…," referring to Mole as "I.")*
Mary: (head nod yes)
PI: Was there a character you liked?
Mary: Mole
PI: Why'd you like mole?
Mary: Because I had to build the wall. I had to look for the acorns to see who took them.

Further, some participants became excited when they read that certain characters had traits similar to the participants' own real-life traits. The text that describes the "squirrel" character mentions that he has an overbite. This part of the description seemed trivial to me, but Dee became excited because she also had an overbite. Further, Derek also liked Mole because he had something in common with him.

PI: Tell me about a character you liked or disliked?
Derek: I liked Mole because he bites his fingernails and I bite my fingernails too.

When questioned, most participants answered that they did feel like they were being the main character controlling the story.

PI: Did you feel like you were in control of the story?
Jay: yes
PI: Did you feel like you were being "Mole?"
Jay: yes
PI: What about when you picked the pond over the castle? Why did you pick that?
Jay: I didn't want to go to jail.
PI: What was it like to be "Mole, P.I.?"
Jay: It was fun cause you have to figure out who stole the acorns.
PI: Did you feel responsible for what happened to mole in the end?
Jay: Yes mam, but something good happened to him.
PI: Hmm, hmm, so you liked that?
Jay: (head nod yes)

Theme 3: Responding via choices and methods of moving around

While observing Carol, I noted that she seemed to be reading and concentrating very intently. Once finished, she went through the story again by herself. I did not stop her from going back and trying different options, as I thought this could lead to more information during the interview. She back-buttoned through the story. She seemed to want to concentrate, so I did not ask questions while she read. Once she was done reading, she was very quiet and extremely soft-spoken and almost hard to hear. Despite the fact that she appeared to be interested in the interactive fiction, she told me that she preferred to read chapter books. She said that she did not like to make choices in the interactive fiction story. This was surprising to me since she did go back through the story on her own.

PI: You said didn't like being Mole P.I., didn't like making his choices?
Carol: yeh

Other than Carol, the participants indicated that they liked having choices in the story. I had hoped to collect more information on how participants made choices. However, most did not give any real reasoning for their choices. Most participants liked the fact that there were choices, and most felt that they made all of the correct choices. There seemed to be an interest in exploring new areas rather than really thinking about what might happen if one path is chosen over another. Further, participants indicated that they liked clicking things and looking for hidden objects. This suggested to me, that to some degree, the "choices they liked making" would be more adequately described as "activities they liked doing."

Alicia and Dee were my pilot-testers. As shown in the following dialogue, they liked the fact that they were able to make choices. Further, this excerpt also reveals that they really liked clicking and looking for hidden pictures. In the prototype, it was necessary to find three hidden picture clues in order to move forward with the story. While finding the pictures was not necessarily a "choice" in the story, the participants' input was necessary for the story to continue. The following selection ends with Dee suggesting that I could have put more hidden pictures in the story.

PI: Can you give me an example of a part you liked?
Alicia: I like the bows, the pink bows.
Dee: I liked when we could choose anyway we could go.
Alicia: yea
PI: I noticed you guys were looking around in the pictures a lot. Do you like it when there is a lot to click on in the pictures?
Alicia: Yea
PI: Are you used to stories that give you more things in the pictures?
Alicia: They give you a picture and they give you a picture and on the next page they give you a picture.
Dee: So they like give you a place like where they should be. I like when they trick you and you try but not the right place. And it's really in the wrong place. If you're trying to find something, they could be more smaller or they could blend in with things like the grass and it could blend in with things and like sand and stuff. And then when you find all of the things and it said "great job." You had some of those things but not the blending, but the part where it said "great job."

It seemed to be important that the participants had the ability to make choices, even if they randomly chose the responses to those choices. It seemed to be empowering that choices were merely offered. The following excerpts are examples of participants "making choices":

PI: Did you like making choices having to pick if he went this way or that way?

Mary: yes
PI: Did you have any hard times moving?
Mary: (head nod yes)
PI: yes? When?
Mary: Yes, a little when I had to pick which hole to go through
PI: You had a little trouble deciding? How did you ultimately decide?
Mary: I picked the left side.
PI: How did you pick it? Did you have a reason or you just decided to pick a side?
Mary: Just picked it
***
PI: How did you feel about having to choose one option over the other? Did you ever feel stuck or you liked it?
Jay: I like that actually. If I got stuck, I kind of liked it cause then you go to a whole other place that you didn't want to go to.
PI: How did you use the map?
Jay: No, I just said, "Oh um let me go there go there," and hope it works out.
PI: What about when you went to the other mole's house?
Jay: First I went the other way but went straight into the house.
PI: That's right because you went to the bunny's house?
Jay: (head nod yes)
PI: Was it difficult in any way? Did you have any trouble moving around?
Jay: no
PI: What were some of the things that you liked as you moved around the story? Did you like finding the hidden things?
Jay: I liked clicking on things
PI: So you liked when you clicked on things… Did you like when you entered text?
Jay: (question look)
PI: Like when you did the riddle…
Jay: I did.
***
PI: What did you like about it?
Mary: I liked looking and clicking to find the acorns to see what you had to find.
PI: Ok so you liked clicking on things?
Mary: (head nod yes)
PI: How does this story compare to another one you've read?
Mary: There not like the same so like I don't have to keep reading and reading for clues.
PI: What do you mean there not the same?
Mary: Yeah, I mean there kind like the same
PI: The other stories you read?
Mary: because I still have to go through

PI: Can you give me an example?
Mary: Like I have to do the work and …and I have to like read the clues.
PI: In the other stories you read?
Mary: yea
PI: And so how was this one different than that? You mean you didn't have to …
Mary: Like do the work
PI: Oh, the other ones you read you don't have to do the work.
Mary: (Big head nod yes)
PI: So which do you like better, those other ones you read or this one?
Mary: I kind of like this
PI: You like doing this, doing the work and finding out things?
Mary: (head nod yes)

While observing Ann, I noticed that she was fidgety and clicking through the screens too fast to actually be reading. She never did finish the story as she said it was too long and asked to stop. She said that she did not like to read. However, she had read interactive fiction stories in the past. Although she didn't like to read, she did like making choices. According to her interview, the stories that she liked contained mostly pictures, with choices requiring little reading.

PI: Did you like making choices throughout the story?
Ann: yes
PI: What didn't you like?
Ann: All the reading before clicking. I don't like reading.
PI: Have you read interactive stories like this before?
Ann: Yes
PI: How were they different?
Ann: They were not as long. There were more pictures. You just clicked on things. Less words and just clicked on pictures.

Marge, on the other hand, seemed to like most things about the story. She was excited that she was able to "change up" a story as it went along. However, the following excerpt from her interview highlighted another important theme. Many participants seemed to have the idea that there were "right" and "wrong" choices.

In reality, there were just different choices. Mole would have been okay in the end via all paths. He merely ended with a few different situations or locations.

PI: How did you feel about having to choose one option over another?
Marge: Felt like I made the right choices because I liked how it turned out. Yes (*said loud and excitedly*)… finally you can change up a story.

Theme 4: sense of right and wrong/is there only one correct answer?

The Mole P.I. prototype had ten different endings. The story was not written with any "bad" endings. All endings were just different. In one ending, Mole returned one stolen acorn. In another ending, he recovered all of the acorns. Several endings had Mole at a picnic with Squirrel. Yet in other endings, the frog also joined the picnic. All ending were good for Mole in some way. As the prototype designer, I assumed that readers would know that there are various ways to do things. I incorrectly assumed that they would know that different choices might just reveal different items or different perspectives on some of the characters. I had hoped to see more evidence that the opportunity to view different perspectives was a strength in the interactive fiction. However, I did not see any evidence that participants thought that there could be more than one "correct" path. This sense of clear right and wrong endings may come from participants' previous exposures to interactive fiction. In Jay's interview, he told me about an interactive fiction story that he read at school. He said that he would get a prize upon finishing.

PI: What was that one about?
Jay: Well it was somebody gets lost and you have to go find them, read books on the way. And when you're all done, you get a prize.
PI: And those other ones that you read, was there one right or wrong answer… or you could get there multiple ways?

Jay: Usually you go in and have to answer correctly. *(note sense that there is only one correct answer or one way to get a reward).*

Alicia and Dee also had previous experiences with interactive fiction in the classroom. In the following exert, they mention how they are given "test" questions with the reading.

PI: Ok, so you have guys read online stories before?
Dee: Yea
Alicia: Yea
PI: Or interactive stories?
Alicia: Yea, at school
Dee: Yea, cause sometimes we do tests at school and sometimes we, you know, we, we do our own stories. See we go in powerpoint, right, and we do pictures and all that.
Alicia: And in my class our teacher… we go on a …um, sometimes our teachers lets us go as long as it's educational and she has these things under her favorites and she says once you finish reading the stories she'll print questions and we'll answer the questions and we'll give it to her. That's like a test without her giving it to us.

Mary also mentioned that she knew she picked the correct choice at a point in the Mole story.

PI: And what happened once you picked the left side?
Mary: Well I know I picked the right *(correct)* side when I went through the bunny house and I had to help them put back the wall.
PI: Pretty sure you made all the right decisions? *(one right answer)*
Mary: Yes
PI: So your pretty sure you made all the right decisions… You liked the way it turned out for Mole?
Mary: Yes
PI: Did you like feeling responsible for how it turned out for Mole?…
Mary: (head nod yes)

Marge had some issues where she felt that she made some "wrong" choices. Again, there were no "wrong" choices. Marge took about 1 and a half hours to complete the story, while most children were done within 45 minutes. She kept using the back button and returning to the beginning of the story. She intensely

explored all pictures. She was the only one to ultimately find most of the "Easter eggs" that were planted after the pilot-test. While she seemed to be slow moving through the story, she was really skipping back a lot and rereading.

PI: Tell me about a time when you felt like you were controlling the story.
Marge: No. I didn't. I got frustrated when it said it wasn't right when I clicked the choice.
PI: When did it say "It wasn't right? Can you give me an example?"
Marge: Like when I'm in math class and we have a test and I get it back… and I missed two. I get really mad because I tried hard.
PI: Can you give me an example from the story?
Marge: Like when I click one thing and it said "that's too heavy" and I clicked another and it said "that's too hard." *(Note that it never really said that anywhere in the story).*

Theme 5: Help features

Participants seemed able to move through the story without needing help outside of the story. Several used riddle clues. Alicia, Dee, Derek, Carol and Jay used the clues when answering the riddle. They were able to click where they needed to click and move around the screens with no apparent problems. I had anticipated that the riddle would be the most difficult part of the story, as the questions were tricky and words could be hard to spell. However, all participants worked through the riddles successfully. Most participants did say that they would like the option to have words within the story sounded out to them, as this was a feature they were used to having when on the computer.

PI: I noticed there were a lot of words that were probably longer than what you guys were used to.
Dee: Yea
Alicia: (head nod yes)
PI: So I'm going to take out a lot of those words.
Dee: We can do them like interesting words. We could do like, um… Let's say like a lady was walking down the street okay? And then you were coming right?… And then actually you trip and fall and

you said that um… " it was utterly, utterly my fault." And they say "what utterly means?" because it's interesting to them. They might say "what utterly means?" Utterly means that it definitely means its my fault.

Alicia: Or you could use other easy words to just say it was my fault

PI: So do you think in a story like this it would be better to have smaller words you didn't struggle with or to once in a while have longer words?

Dee: longer words

Alicia: a little bit longer words

PI: So do you think with longer words like what you just told me?

Dee: oh yeah I'll use… I look in the dictionary and I'll find a word but I don't really understand it, so I go the easy way.

Alicia: My mom says if we don't know a word and we're stuck when we're reading, just underline it and if you have a chance go on the computer and look in the dictionary.

PI: So with stories like this, it would really helpful if you could just click on a word that's just right there?

Alicia: (head nod yes)

Dee: So like if you don't know… and what if you were taking a test and you're not allowed to ask questions. And then all you have to do is click on a word and it helps sound it out for you it.

PI: And then would you also want to know what it means?

Alicia: Yea cause when you click on it on the other side it also shows dictionary.

***

PI: Have you ever used the stories that have a feature where you can click on a word and it pronounces it for you?

Marge: Yes

PI: Did you wish this story had that?

Marge: Yes

PI: When you used that feature, do you sound out the word first or do you click on it right away to here how it is pronounced?

Marge: I try to sound it out first, and then I click on it.

Several participants found the map helpful. Jay had mentioned previously that he did not use the map. Dee and Alicia had wished that the map was more interactive.

PI: And I noticed you used the map a few times. Did you like having the map there?

Dee: It was a little easier so we didn't have to be like "where are we?"

PI: I also noticed in the beginning you tried to click on the map. Are you used to having that in other stories… where you click and it takes you somewhere?
Dee: Cause when we click on it and it gets bigger and it tells you about the island…cause if we want to know what the island's about
Alicia: It tells you how do you get there, what's on the island.
Dee: And what do you do there.
***
PI: How did you use the map?
Derek: Just used the map to see where I was
PI: Would you have liked it better if you could have clicked on the map to get to a location or see information about it?
Derek: liked as was, no mouse clicking needed
***
PI: How did you use the map?
Marge: Everytime I moved, I looked at the map. It was helpful.

Summary

Initially, I stated Hayes-Roth's seven principles of interactive fiction as a fundamental building block for the prototype of Mole P.I. My observations and interviews appeared to show reflection of these principles. The prototype seemed to be empowering in that most participants felt they succeeded to the correct ending. In reality, the prototype was not written with a "bad" ending. All endings were just different. Most participants said that they felt like they were in control of the story and that they liked making the choices for the main character. Character did present as a main theme throughout the interviews, and Hayes-Roth's principles do serve to facilitate a character-driven story. Further, participants felt responsible for how the story turned out, and they liked the way it turned out. Some of the participants really seemed to relate to Mole, the main character. Derek liked the fact that Mole chewed his nails because Derek chewed his nails. When talking about parts of the story, several participants referred to Mole as "I" or "me" when telling me about the story. Participants were mixed with some who

had read interactive stories before and some who had not. The participants who had not read interactive fiction before did say this story was different than ones they read because they had to make choices. Overall, the idea of right/wrong and good/bad seems set for this age group. I was not sure that they could understand that there could be more than one answer. Those who had read interactive stories in the past commented that there were "correct" answers in order to get credit. However participants in the pilot test commented that "this is getting interesting" once they reached the last screen of the story. The pilot test participants were also the ones who had written their own stories before. Not all of the participants liked making choices while reading. This seemed to be an individual call. Carol told me that she did not like making choices. She preferred to read chapter books and liked having everything set for her. On the other hand, Marge excitedly said "finally you can change up a story."

Participants were asked about favorite parts of the story or parts that they did not like. I anticipated that this would lead to more about methods of input or making choices. However, the participants' answers were based on character traits of the story characters for the most part. It seemed that the main importance was having a "good" character and staying away from "bad" characters.

All participants wished the story had built-in pronunciation/dictionary capabilities. The single area that seemed to cause the most trouble was the text itself. Some words seemed too long or unfamiliar to the participants. This was more evident during the pilot-testing. The regular participants used the prototype after I had made text revisions as previously mentioned. The final participants would be entering the 4th grade within the next week, and the reading level was a 2.7 in the prototype that they read.

However, final participants still said that they would like the option of having help with the text. Further, they seemed to have this expectation from reading prior stories or general computer usage with such features. The instructional technology principles that were met when the prototype was assessed during expert review-testing were essential in allowing participants to move around the story. The layout, consistency, integration of maps, fonts, and images that were developed by following instructional technology standards were successful in allowing users to move around and choose help when needed.

Most of the participants did not write their own stories in school. Dee, Alicia and Marge were the only ones who had written stories. Even though they went to the same school but had different teachers, the other five participants had not written stories before. I had hoped to gain more insight into what the students did for the Sunshine State Standards and how it could relate in the world of Interactive Fiction. However with so many of them not having written stories, many of the Sunshine State Standards were not in check. Recall the summary of Sunshine State Standards for third graders call for abilities in writing as follows:

- make predictions
- prepare organized ideas for writing
- focus on main ideas
- provide or recognize supportive information
- use creative writing strategies
- use technology to write
- create stories focused on single topics
- provide story lines that are easy to follow
- organize story in logical terms of beginning middle and end
- understand plot and how story conflicts are resolved
- infer or conclude about story elements such as traits/motives of characters
- see cause-and-effect and in relation to his or her own
- use information from literature to defend his or her interpretation of that literature

Of the above list, the participants in this study would only be able to relate to the following standards without having written on their own:

- Understand plot and how story conflicts are resolved
- Infer or conclude about story elements such as traits/motives of characters
- See cause-and-effect and in relation to his or her own life

I had also hope to gain more insight into how readers of interactive fiction make choices. However, many of the participants admittedly picked choices without much regard of where it might lead. In describing experiences with reading in relation to schema theory, Mandler (1984) asserts that children's expectations of story structures may contribute to their inability to verbalize. Mandler (1984) states

> "From an early age people develop expectations about the overall form of traditional stories; they learn that these stories involve protagonists who have goals and events cause other goals and events in predictable ways. They also learn story conventions that differ somewhat from other event sequences. Such knowledge is abstract because it is not dependent upon the particular contents of a story. Its abstract character is reminiscent of musical schemas, which are also independent of the particular sequence of notes employed in a given composition. The abstract character of such schemas means that people cannot always verbalize their knowledge about them; nevertheless, the knowledge can be shown to influence the way in which they comprehend and remember a particular production" (p. xi).

While the participants seemed unable to express their thought processes behind some of their choices, they were able to elaborate in other areas. These other

areas arose as themes, which are further elaborated upon in chapter 5. In the following chapter, themes are discussed as they relate to theory and pose impact in several areas.

CHAPTER 5: SUMMARY

Research Questions

What defines valid IF?

The definition of interactive fiction asserted earlier in the literature review encompassed the premise that interactive fiction is a potential narrative, a simulation of a world, and an outcome-based structure in which action is judgment-based by the learner. Since the prototype used within this research met each of the above conditions, I would hold that these conditions of the aforementioned definition partially define valid IF. As such, valid IF must contain choices for the reader.

Here I refer back to the underlying theories of interactive fiction that were originally put forth in the literature review. Transactional theory and reader-response theories surfaced as readers created their own stories. In one sense, readers created their own stories by making individual choices. Different readers chose to go down different paths. However, interviews also revealed that readers made their own stories beyond the text of the interactive fiction prototype. This was exemplified when Dee explained that Mole now had a friend that he can visit and have coffee with. The physical story was over, yet Dee continued with her own description of how she pictured Mole living. As mentioned in the previous chapter, Marge was proud that Turtle stood up for himself. She was also happy that everyone had a friend at the end of the story. Derek was happy that Mole would have another mole that was just like him. These examples revealed that the story was not independent of the learner. There was evidence of greater interaction. My transcripts provide examples of the readers going beyond the story. Dee and Alicia talked about Squirrel having an “overbite.” This was one notation that I made while they

were reading the story. While I added the overbite detail as a small characteristic for a squirrel, I did not expect that detail to greatly surface. However, Alicia had an overbite. When she and Dee approached the selection about Squirrel, Alicia was excited to tell Dee about her own overbite. Further, Dee seemed interested to learn what Alicia was telling her. In this manner, the participants were connecting in substantive ways with their own lives.

What defines high quality IF?

Beyond meeting the bare definition-based criteria for valid IF, additional factors would contribute to high quality IF. In this research, I consider high quality IF to be a work that is appealing to the target market. Hence, I will concentrate on the qualities that led participants to answer positively about their experiences with the IF prototype. Most of these areas were previously themed in the latter chapter as follows:

- character
- identifying with the character
- responding with choices
- expectation of help features (from previous IF exposure)

These selections are more fully elaborated upon below.

Character

- During interviews, participants were most excited when talking about the different characters in the story. The children were quick to identify characters that they liked or disliked. In this prototype, the characters were all animals with distinct personalities. When describing why they liked or disliked certain characters, some participants repeated what was written about the character in the

story. For instance, Derek did not like the weasels because he read that they were mean. Even though he never directly encountered the weasels during the story, his facial expression and voice were determined when he told me that he did not like the weasels because they were bad. While some participants believed what they read without meeting the characters, other participants interacted with the characters and formed their own opinions. For example, Marge liked the turtle that yelled at Mole (even though she was "Mole"). When asked why she liked the turtle, she answered that he stood up for himself when Mole stepped on his shell. All participants who actually read the story liked the character of Mole. Ann was the exception to the case. She did not like Mole, but she did not actually read the full story. I developed the character of Mole and his journey as described earlier in the "design" phase of the ADDIE model. Further, all characters were approved during expert review testing (the "implementation" phase of the ADDIE model). In accordance with the literature guidelines used, characters in the prototype met the following attributes:

- Characters should be well developed and interconnected with conflict.
- Events should affect the characters, but the events may also be caused by the character's very nature.
- Protagonists should not be flat or stereotyped. (By exception, romance, folk, and science fiction stories tend to contain flat or stereotyped characters).
- Stories with animal realism should portray characters that are true to the animals' nature.

- It is possible to fully develop characters even in the shortest of stories.

Further, the main character of Mole was developed along the guidelines of "The Hero's Journey," as explained earlier. As such, Mole was not perfect. He had flaws. For example, he bit his nails, which made him a slow digger. He was called to duty within the story and had to face some of his fears before returning home. In all endings, Mole changed slightly or learned something for the better. This development of the character along the guidelines of "The Hero's Journey" and literature guidelines seemed to produce a likeable character for the participants in this research.

Insider view

The participants liked Mole. As evidenced by the interview transcripts, the participants related to Mole. They were able to assume his identity and care about what might happen to him beyond the story. This conveys the idea of "insider view" as established by Liebling (1989). According to Liebling (1989), "Inside view can be thought of as a foundation of traits, thoughts, emotions and perceptions. It conveys a general feeling about the character and the character's view of the world" (p. 19).

Liebling asserts that insider view is the way by which children are able to relate to and understand text. It is imperative that characters are well developed in order for children to have such an understanding and interest in the character, and eventually the text. According to Liebling (1989),

> "Because fiction often succeeds or fails on the "roundness" of characters (Forster, 1927;Hall, 1987), it is important for students to read a variety of texts in which the writer's creation of character is central to the success of the story. As students begin to discriminate the qualities which make

> memorable protagonists and antagonists round or "dynamic" from those which make secondary characters "flat" or "one-dimensional," they begin to understand the importance of character development in the creation of enduring fiction" (p. 10).

Hence, children were able to relate to and like Mole because he was a "round" character. The establishment of the character proved to be essential, as described by Leibling. The "insider view" comprehension could additionally be seen when Alicia described her overbite to Dee. As the fictional squirrel had an overbite, Alicia described her own overbite. Squirrel was round enough to be interesting to the participants. He allowed them to have an "in" into the text, bridging the story to something about their own lives. This may also be seen in view of schema theory, to be discussed in a further section.

Identifying with the character

- The participants in this research did not have any trouble identifying with Mole. Some identified with him on the basis that he was a detective, and they were making his choices. Derek seemed to identify on another level with Mole because they were both nail-biters. When asked what he liked about Mole, he answered that he liked the fact that Mole was a nail-biter because he bit his nails too. For Derek, it might have been more empowering that a character with same "flaw" as he had was able to solve the case and be successful. When interviewing participants, they all answered with "I" or "me" when referring to Mole. This ability to identify with the main character is important in allowing participants to feel empowered, as discussed in the next theme.

The idea that participants related to parts of the story by linking personal experience is grounded in schema theory. Schema theory explains how learners relate new information to that with which they are already familiar. Marshall (1995) bases her definition of schema upon past theories of Piaget and Bartlett as

> "a memory structure that develops from an individual's response to the environment… Individuals are not passive creatures acted upon by the environment, constructing their own perceptions as they assimilate new experiences into existing schemas and adapt the schemas to accommodate the constraints of the experiences" (p. 15).

While schema theory may help to explain how some students theoretically related to the story, I refer back to Gee's principles of why this identification with the protagonist is empowering.

Empowered learning

In the literature review, I described Gee's (2003) principles of empowered learning. These principles consisted of customization, co-design, and identity and manipulated and distributed knowledge. With the "customization" principle, the participant chooses character interactions. A good example of "customization" in Mole P.I. was when Jay chose the path away from the castle because he did not want to go near the weasels. In this sense, Jay was able to customize the story by choosing the characters that would be in his own plot. With the "co-design" principle, the participant makes choices that feed forward into the story. This was exemplified many times in Mole P.I. When I questioned participations about good or bad choices that they made, they were able to provide a good or bad example based upon what happened after they made that

choice. For example, Mary said that she chose an option that made her accidentally burrow into the wall of a rabbit's home. She identified this choice with the fact that she then had to help the rabbit rebuild the wall. Dee said that it was a good decision to knock on one of the doors. The door she was referring to was the home of another mole. She said she was very glad about that choice, because now Mole will have another friend. With the "identity" principle, the participant becomes the protagonist in first-person. This again can be exemplified in the above example with Mary. When Mary spoke of the wall being rebuilt, she said "I had to" rebuild the wall. With the "manipulated and distributed knowledge" principle, the participant sees the outcome of his or her choices. All participants were asked if they felt like they were in control of the story, if they felt responsible for what happened to Mole, and if they liked the way it turned out. With the exception of Ann (who did not read the complete story) and Carol (who did not like making the decisions), all other participants said that they felt in control, responsible for Mole, and that they liked the way it turned out for him.

I further asserted in the literature review that interactive fiction is capable of empowering learners in the same ways that Gee (2003) claims that learners are empowered by video games. I contend that these same areas of empowerment apply to interactive fiction. In both video games and interactive fiction, learners are able to embody the role of the protagonist and take charge of plot movement. However, video games differ from IF in that they do not need to develop coherent plots, well-rounded characters or any other elements of good literature. As first established by Liebling's (1989) theory of "insider view" and evidenced by my interviews, well-rounded characters are essential to fiction. This may be the area that potentially makes interactive fiction

stronger than video games. Proper character leaves the potential to connect beyond the time period in action. For example, video game players may feel empowered while they are playing, but that power may not linger once they are done playing. A work of interactive fiction with a well-rounded character can involve the reader to a level beyond the text. This was exemplified when participants talked about the ongoing welfare of the main character after the story was read and closed. Based on the importance of character, IF can potentially empower beyond the realm of games. IF offers potential for insider view, which allows readers to truly relate stories and characters to their own lives. Beyond the story, this leaves a wealth of room for dialogue about text and character. While interviewing readers after the prototype, it was clear that they were not answering questions in any "reading passage" and "drill test" type of situation. They actually wanted to talk about Mole and what happened with the other characters. They wanted to talk about what would further go on in Mole's town such as who would be friends and who was still mean. Further, they had the possibility of talking about their actions and results in the story.

According to Gee's "identity" principle, one has three identities when playing video games. These identities include the real, virtual, and projective. The real identity is the person playing the game (i.e., the soon-to-be fourth grade participant in this study). The virtual identity is the role that the person is assuming (i.e., Mole in this study). The projective identity is the character with the attributes that the reader wants to possess (i.e. a nice, helpful, smart detective animal who makes friends). As the participant assumes the virtual identity of Mole, he/she is heavily invested in making the virtual character (Mole) into the projective character with all the dreamy traits of being nice and solving

the case. As opposed to reading a book in second-person view, the participant is assuming total responsibility for Mole in first-person. If something bad happens to a character in a book, the reader may feel bad for the character. However, this projective identification is much stronger in interactive fiction, as the participant is responsible for the anything bad that happens to the character (in this case, Mole). In interactive fiction, the participant may feel bad and guilty for what happens to the protagonist. Likewise, the participant may be overjoyed and feel a sense of pride when something good happens to the protagonist. As noted earlier, these senses of projective identity were seen in various instances during this study.

Interactive fiction and connecting to the world

The idea of empowering learners through reading has also been established in a therapeutic sense through the field of bibliotherapy. Bibliotherapy is dependent upon the aforementioned character and story traits that readers may understand. In bibliotherapy, patients begin by reading text. However, the true therapy lies in going beyond that text. When patients can relate the text and character issues to their own lives, infinite opportunities for dialogue and further understanding open up. According to Doll and Doll (1997), the definition of bibliotherapy has differed from help with reading (including self-help books) to definitions that stress the interactive process of bibliotherapy. Wanless (1988) identifies bibliotherapy as a type of creative therapy that appeals to those who don't feel good about other creative therapies (such as art therapy). Wanless (1988) states that the characters of the stories give rise to discussion, stating that "We went on to discuss the characters in the story, how they may have felt and how the story made us feel" (p. 183).

According to Rubin (1978),

> "According to various authorities, the values of bibliotherapy include the opportunity to learn to know one's self better, to understand human behavior and to find interest outside of the self. Literature may promote the mechanisms of indentification, compensation and rationalization. Thus it may enable the reader to recognize that he is not the first to meet and solve his problem, and to find face-saving solutions that help him to meet life without feelings of inferiority, or guilt, fear or shame. Or the reading experience may bring to the forefront of the reader's concsciousness problems he has as yet failed to recognize as his own and, subsequently, provide the insights needed for solution…. In addition to these personal values, bibliotherapy may contribute to the socialization of the individual. Reading may increase ability to understand others by giving social insights, promoting empathy and thus, for example, modifying racial attitudes" (p. 241).

Interactive fiction, as in this prototype, proved to be a type of text that allows readers into the world so that they may understand and possibly surpass what is written within the text. It seems natural that interactive fiction also has a unique potential to allow learners to play out scenarios without damaging their real lives.

Expectation of help features

- Most participants noted that they wanted help options with the text. Those who had read interactive fiction before said that the other stories sounded words out

when clicked. Another participant described having a dictionary feature where the reader can right click, as in a word processing program. Regarding the map that was included in the prototype, some chose to use it and some did not. Those who chose to use the map said that it was helpful. Based upon this feedback, it seems that various forms of help should be available so that participants can pick and choose help options as they prefer.

How can valid, high quality IF be developed with a rigorous, systematic process such as ADDIE?

How does the ADDIE Analysis phase apply to the development of valid, high quality IF?

During the development stage, the need for this research was established along with characteristics of the target audience. This phase was important as it was used to establish the checklists used by expert review-testers in following stages. In the case of the Mole P.I. prototype, I used three checklists that would be evaluated by three sets of experts. This included the checklists for the seven principles of interaction fiction in accordance with Barbara Hayes-Roth (1998), literature guidelines in accordance with Rebecca Lukens (2003) and instructional design by Alessi and Trollip (2001).

How does the ADDIE Design phase apply to the development of valid, high quality IF?

The design was centered around and evaluated according to standards set forth by Alessi and Trollip and related story-writing guidelines and interactive fiction principles that are covered in the literature review. Cognitive Considerations were also addressed during this phase. As such, the development of the prototype centered around the blueprints of the design phase. The Alessi and Trollip guidelines were instrumental in development of

the navigation of the prototype, which seemed to be successful based upon the final observations and interviews. Hayes-Roth's principles of interactive fiction allowed for Gee's (2003) principles of empowered learning. The literature guidelines were of extreme importance, as they covered the areas of character, art, and text. Many changes to the text were made in accordance to the comments by expert review testers who used the literature guideline chart. Further, this chart played heavily into the successful development of the main character.

How does the ADDIE Development phase apply to the development of valid, high quality IF?

The chosen means of development were explained during this phase. This included the use of web pages to make a story that could be navigated by the user. Further, javascript was used as a programming language due to the advantages of allowing different types of input. The development phase was important because it determined the extent to which participants would be enabled to make choices by different methods. For example, the riddle that required a typed-in answer was made possible by using javascript.

How does the ADDIE Implementation phase apply to the development of valid, high quality IF?

The implementation phase determined the validation and revision of the prototype. Experts in instructional technology and children's literature tested the prototype. The prototype was then revised according to expert review-test feedback. The revised prototype was then be pilot-tested by two participants in the target market. Further revisions were made according to feedback on the pilot-test. This phase was imperative, as the substantial changes were made to the prototype (described in an earlier section).

The prototype would not have worked well if not for this stage. The original reading sections were too long. This was pointed out by expert review testers and again by pilot-testers. Even after shortening the text, it was too exhaustive for pilot-testers. The changes shown as necessary in this phase created the workable prototype, so that participants could use it as intended and provide feedback. While the most valuable information probably came from the interviews with the target market participants, the expert review and pilot testers provided invaluable information during this stage that resulted in the working prototype.

How does the ADDIE Evaluation phase apply to the development of valid, high quality IF?

The evaluation phase explained how data about the revised prototype will be collected from the target audience. This was important in solidifying interview technique, so that collection could go smoothly.

Overview/Summary of Interactive Fiction in relation to Theory and Research

Interactive fiction encompasses several areas of unique potential to learners. Among these areas are the opportunities for establishing genuine interest in characters, immersion into the text, empowered reading/learning, new literacy challenges, and exposure to therapeutic/real-world scenarios. However, the educational community may not embrace interactive fiction if standards and guidelines fail to be established and followed. There is the risk that interactive fiction may become more game-like with little reading or character development if created for commercial purposes. Kamil, Intrator and Kim (2000) discussed research in the field of electronic texts and literacy and noted

that the importance of these issues becoming mainstream in the field of literacy is vital in developing a knowledge base with understandings of cognitive strategies and engagement. If a research stance is not taken from within the education field, hypermedia will only be influenced by fields outside of education. In short, a lack of research in the educational arena will allow interactive fiction to fall solely into the hands of gaming companies that will not likely follow literature guidelines and develop characters to create the same potential experiences.

On the other hand, interactive fiction that has been created outside of the educational community may still be strong in potential. While some interactive fiction may be more game-like, other works may indeed meet many literature guidelines. After all, reading teachers and commercial publishers all want to "hook the reader" in the end. At the same time, educational texts have been accused of being too bland to interest readers. Leibling (1989), having established the great need for texts that interest readers with rounded characters, also points out that school systems choose basal readers that do not offer enough detail and roundness to involve readers to a point of understanding. She suggests that teachers actually use trade books rather than basal readers to involve learners.

According to Liebling (1989),

> "As children learn to read and write, it is important that they have ample opportunities to read texts in which the content is sufficiently interesting to warrant discussion of literary quality. In elementary reading instruction, however, the primary source for texts continues to be the basal readings series. Basal readers are criticized frequently for the emphasis on

> skills rather than the literary content of stories (Cheney, 1987). Ravitch (1986) bemoans the "striking neglect of classic literature" in current basals while Ohanian (1987) is dismayed that the 'ruffles and flourishes' which characterize the language of engaging literature are often deleted from basal reader adaptations of fiction. Cheney (1987) argues that the current emphasis of basal readers on process and skills rather than the enduring quality and style of the selections is misguided. She writes, "In the basal readers most widely used now, 10% or less of the content is classic children's literature" and that selections of contemporary fiction are "generally by writers whose names are unknown outside the textbook industry" (p. 14). She recommends that reading programs be developed which include more original words and fewer stories written according to readability formulas. Until this occurs, elementary school teachers should rely on trade books rather than reading textbooks in teaching reading" (p. 9).

While Leibling recommends trade books, I would further recommend interactive fiction. However, not all interactive fiction stands to offer so much potential. Due to the above reasons, I established a definition and guidelines by which the prototype in this research was developed. As shown in this research with my prototype, IF could offer so much opportunity to go beyond the text, enhance comprehension, and bring reading into learners' lives.

Limitations and Implications

This qualitative study was based upon the participants as described. I have tried to describe the participants so that future readers and researchers can decide how closely any characteristics may be to their own groups of interest. This research was an attempt to capture important elements and steps in the creation of a quality interactive fiction prototype. I was limited in ability to relate participant's experiences with the Florida Sunshine State Standards for the precise grade level due to the participants non-exposure to some of the standards in their school. Future research may involve more intricately dissecting the Sunshine State Standards and using participants from another school before attempting to align any interactive fiction experiences with those standards.

Because the target audience was so quick to like or dislike certain characters, a more comprehensive study that focuses only on characters within interactive fiction would be helpful to the field. Along those lines, participants were able to relate to characters but remained most enthusiastic about those characters that had similar traits to the participants' real-life traits. This raises interest in the areas of choosing character preferences (like avatars). While many game avatars can be built to be the perfect character, would some users prefer flawed characters? I refer again to the example of Derek. Derek, a nail-biter, was excited that Mole was a nail-biter. Even with this "flaw," Mole was able to solve the case and be a successful character. It seems that there would be many interests and learning possibilities that might be explored with having imperfect characters that participants can relate when overcoming obstacles.

Future for the Mole P.I. Prototype

Data collection showed evidence that the Mole P.I. prototype met many of the characteristics for being a good story and work of interactive fiction while providing successful characters and plot movement. However, additional characteristics surfaced that would more fully satisfy the target audience if included. All of the additions would be technical in nature rather than concerning the story line. These additions would also require extensive computer programming. As suggested by the target audience participants, the following features are desirable:

- Interactive map – While a picture map was included on all screens, it was not interactive. At least one participant referred to an interactive story in which she was able to click on the map location to either obtain more information or be taken to the site. From my perspective as the author and illustrator, such an inclusion would have to be carefully considered to keep the story flowing. I tried to balance graphics and text, and I have concerns that more picture-clicking may lead to less reading.
- Word pronunciation – All participants stated that they would like the option to be able to click on words and have those words sounded out.
- More hidden pictures/clickable objects – The pilot test participants really requested more hidden pictures and objects to examine within the images. As a result, I added a few hidden features. However, most of the regular participants did not search the pictures or find any of the additional "Easter eggs" that I planted.

Several participants stated that there was too much text, even though the reading level was 2.9 after pilot-test changes and participants were to be entering the fourth grade. One participant told me that she did not like reading. She said she had done interactive stories that she liked before but those had more pictures and much less text.

Beyond suggestions from the target audience, I would prefer a way to encourage reading the story again to see other points of view. Interactive fiction, specifically this prototype, can present many different viewpoints and introductions of different characters. While each reading should present a cohesive story, there is much more opportunity for critical thinking skills if student were to reread the story another way. For example, it is not possible to meet all characters in one reading. Another reading with different choices may provide more introspection about previous characters. It seems that there may need to be a better way to reach a middle ground. I was hoping to see participants read, make choices, and want to read more. While the target audience liked the prototype overall, they seemed to want to do more clicking than reading.

I can't help but be reminded of various commercially available "interactive books" that contain games and little to no reading and no plot coherence. While young readers will likely be exposed to these types of "books," it does not seem like a positive direction for readers. Again, I would refer back to the idea that "interactive fiction" should strive to meet the same guidelines as found in traditional literature texts. A good indication seemed to be that participants were so concerned with character in the Mole P.I. prototype. I would hope that future changes to Mole P.I. could move towards a middle ground in which the students have their share of interactive images while also

relying upon a fair share of text. As stated in the earlier literature guidelines, images and text should work together in a "marriage." I would hold that this pertains to all literature regardless of the medium.

REFERENCE:

Abbott, C. (2002). 'Writing the visual: the use of graphic symbols in onscreen texts' *Silicon Literacies: Communication, Innovation and Education in the Electronic Age* (ed. I. Snyder), pp.31-46 London: Routledge.

Alessi, S. M. and Trollip, S. R., 2001. *Multimedia for Learning: Methods and Development*, 3rd ed, Needham Heights, Massachusetts: Allyn & Bacon.

Baudrillard, J. (1991). The precession of simulacra. In D. Hlynka, & J. Belland, (eds.) *Paradigms regained: the uses of illumative, semiotic and postmodern criticism as modes of inquiry in education technology*. Englewood Cliffs, NJ: Educational Technology.

Beavis, C (2002). Reading, writing and role-playing computer games in I. Snyder (Ed), *Silicon Literacies; Communication, Innovation and Education in the Electronic Era.* London: Routledge.

Carvin, A. (2006) EdWeb Exploring Technology and School Reform. [Online]. http://www.ibiblio.org/edweb/constructivism.dewey.html

Chu, M. (1995) Reader response to interactive computer books: examining literary responses in a non-traditional reading setting. *Reading Research and Instruction, 34*, 352–366.

Denzin, Norman K. (1978). *The research act : A theoretical introduction to sociological methods.* New York : McGraw-Hill.

Desilets, B.J. (1989). Reading, thinking, and interactive fiction. [On-line]. English Journal. V78 n3 p75-77.

Doll, Beth & Doll, Carol (1997). *Bibliotherapy with Young People: Librarians and Mental Health Professionals Working Together.* Englewood, Colorado: Libraries Unlimited.

Doty, D.E., Popplewell, S.R., & Byers, G.O. (2001). Interactive CD-ROM storybooks and young readers' reading comprehension. *Journal of Research on Computing in Education, 33*, 374-384.

Duffy, T. & Cunningham, D. (1995). Contructivism: Implications for the design and delivery of instruction. In D.H. Jonassen (Ed.), *Handbook of research on educational communication and technology*. New York: Scholastic.

Fernandez, M. (1999). Electronic versus paper: do children learn from stories on the computer? *Learning and Leading with Technology, 26* (8), 32-4.

Gass, S.M. & Mackey,A. (2000). *Stimulated recall methodology in second language research.* Mahwah, New Jersey: Lawrence Erlbaum Associates.

Gee, J.P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave/Macmillan.

Gredler, M. E. (1996). Educational games and simulations: A technology in search of a (research) paradigm. In D. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 521-540). Washington, DC: Association for Educational Communications and Technology.

Hannafin, M.J., Hannafin, K.M., Hooper, S.R., Rieber, L.P., & Kini, A.S. (1996). Research on and research with emerging technologies. In D.H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 378-402). New York, NY: Simon & Shchuster Macmillan.

Harris, R. (2003). *The hero's journey life's great adventure*. Harris Communications
Accessed: October 27, 2006 http://www.yourheroicjourney.com/Journey.shtml

Haunstetter, D., & Kozdras, D. (2006) Empowering students through interactive fiction: Visual literacy implications. In B.E. Griffin (Ed.), *Imagery and artistry: animating the minds eye, selected readings of the international visual literacy association* (pp. 89-98). San Fransisco: International Visual Literacy Association.

Hayes-Roth, B. (1998). Interactive fiction: Character-based interactive story systems. IEEE Intelligent Systems. [Online].
http://www.computer.org/intelligent/ex1998/pdf/x6012.pdf

Johnson-Eilola, Johndan. (1998). Negative Spaces: From Production to Connection in Composition in In Todd Taylor and Irene Ward (Eds.), *Literacy Theory in the Age of the Internet.* New york: Columbia University Press, 17–33.

Jonassen, D. H., & Reeves, T. C. (1996). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology.* New York: Simon & Schuster Macmillan.

Kress, G. R. (2003). *Literacy in the new media age*. London: Routledge.

Lancy, D. F. & Hayes, L. (l988). Interactive fiction and the reluctant reader. *English Journal, 77,* 42-46.

Lankshear, C. & Knobel, M. (2003). *New literacies: Changing knowledge and classroom learning.* Open University Press.

Lankshear, C. & Lawler, M. (1987). *Literacy, schooling and revolution.* New York, The Falmer Press.

Liebling, C. (1989) "Inside view and character plans in an original story and its basal adaptation" *Theory into Practice*, Vol. 28, No. 2, Learning through Text (Spring, 1989), pp. 88-97.

Lodge, D. (1977). *The models of modern writing: Metaphor, metonymy and the typology of modern literature*. Ithaca, NY: Cornell University Press.

Lowe, Richard. (2006). Beyond "eye-candy": Improving learning with animations. [on-line]: http://auc.uow.edu.au/conf/conf01/downloads/AUC2001_Lowe.pdf.

Lukens, R.J. (2003). *A critical handbook of children's literature.* 7th ed. Boston, Allyn and Bacon.

Mandler, J. (1984). *Stories, Scripts, and Scenes: Aspects of Schema Theory*. Hillsdale, NJ: Erlbaum.

Marshall, S. P. (1995). *Schemas in Problem Solving*. Cambridge: Cambridge University Press.

Matthew, K. (1997). A Comparison of the influence of interactive CD-ROM storybooks and traditional print storybooks on reading comprehension. *Journal of Research on Computing in Education*, *29*, 263-274.

Mejias, U. A. (March 2004). Social literacies: Some observations about writing and wikis [online] http://ideant.typepad.com/ideant/2005/03/social_literaci.html
Last accessed March 28, 2007

Moallem, M. (2001). Applying constructivist and objectivist learning theories in the design of a Web-based course: Implications for practice. *Journal of Educational Technology & Society*, 4(3).

Montfort, N. (2002). Toward a theory of interactive fiction. *IF Theory*, 3. [Online]. http://nickm.com/if/toward.html

Murray, J.H.(1998). Interactive fiction: Building coherent plots in interactive fiction. *IEEE Intelligent Systems*. [Online]. http://www.computer.org/intelligent/ex1998/pdf/x6012.pdf

Netgrrl and Chicoboy. 'What am I bid? Reading, writing and ratings and eBay.com.' In I. Snyder (Ed.), *Silicon literacies: Communication, innovation and education in the electronic age.* (pp 15-30). London: Routlege, 2002.

New London Group. (1996). 'A pedagogy of multiliteracies: Designing social futures', *Harvard Educational Review, 66,* p. 60-92.

Rieber, L.P. (1994). *Computers, graphics, and learning*. Madison, Wisconsin: Brown & Benchmark. [Online]. http://www.nowhereroad.com/cgl/chapter8/index.html

Reeves, T. (2000). Enhancing the worth of instructional technology research through "design experiments" and other development research strategies. In *AERA Annual Meeting*, pp. 1–15

Rosenblatt, L. M. (1978). *The reader, the text, the poem: The transactional theory of the literary work.* Carbondale: Southern Illinois University Press.

Rossman, R.B., & Rallis, S.F. (1998). *Learning in the field: An introduction to qualitative research.* Thousand Oaks, CA: Sage.

Rubin, Rhea (1978). Bibliotherapy sourcebook. Phoenix, AZ. Oryx Press.

Shaffer, D. W., & Gee, J. P. (2005). *Before every child is left behind: How epistemic games can solve the coming crisis in education* (WCER Working Paper No. 2005-7): University of Wisconsin-Madison, Wisconsin Center for Education Research.

Smith, V. (2001). All in a flap about reading: Catherine Morland, Spot, and Mister Wolf. [On-line]. *Children's Literature in Education* v*32* n3 p225-36.

Stewart, W. (2006). Ted Nelson discovers hypertext. [online]. http://www.livingnet.com/w/wi_nelson.htm

Street, Brian V. (1995). *Social literacies: Critical approaches to literacy in development, ethnography, and education*. London & New York: Longman.

Talley, S. Children, storybooks and computers. *Reading Horizons, 38* (November/December 1997) p. 116-28

Taylor, Todd, and Irene Ward, eds. *Literacy Theory in the Age of the Internet*. New York: Columbia University Press, 1998.

Thompson, A., Simonson, M., & Hargrave, C. (1996). Educational technology: A review of the research, 2nd ed. Washington, D.C.: Association for Educational Communications and Technology.

Trushell, J., et. Al., Year 5 Pupils Reading an "Interactive Storybook" on CD-ROM: Losing the Plot? *British Journal of Educational Technology, 32* (September 2001) p. 389-401. Eric Accession No: EJ635529

Vogler, Christopher. The Writer's Journey: Mythic Structure For Writers. 2nd Edition. Michael Wiese Productions, Studio City, CA. 1998.

Wanless, Jan. Bibliotherapy – its value in occupational therapy in Jean M. Clarke and Eileen Bostle (1988)Reading Therapy. The Library Association. London

Weeden, C. (1987). *Feminist practice and poststructuralist theory*. New York: Blackwell.

Wolf, D. & Wolf, A. (2005). The Easter Egg Archive. http://www.eeggs.com/faq.html

Yeaman, A. R. J., Hlynka, D., Anderson, J., Damarin, S., & Muffoletto, R. (1996). Postmodern and poststructural theory. In D. H. Jonassen, (Ed.), *The handbook of research for educational communications and technology* (pp. 253-295). New York: Simon & Schuster/ MacMillan.

APPENDICES

Appendix A: Log

9/8/2006-9/14/2006 Received feedback notes from proposal defense
10/2/2006 Hayes-Roth research
10/23/2006 sent Hayes-Roth letter
1/2/2007-1/9/2007 back and forth email correspondence with Hayes-Roth
1/29/2007 update to Dr. White/Major professor
4/1/2007 sent lit review portion to Dr. King for suggestions/input
4/11/2007 Email from Dr. White with final suggestions to expert review test and "go ahead"
4/16/2007 sent expert review tests out to IT
4/17/2007 Received expert review tests from IT expert 1
5/3/2007 Received expert review tests from IT expert 2
5/14/2007 sent expert review test out to childhood ed.
5/25/2007 Received expert review test results from childhood ed. expert 1
5/27/2007 Received expert review test results from childhood ed. expert 2
5/27/2007-7/2007 Summarized/ Made revisions according to expert review test results
7/2007 IRB forms
7/13/2007 IRB reviewed forms
7/18/2007 IRB revision request
7/25/2007 IRB approval
8/1/2007-8/6/2007 contact with director of out-of-school time program/IRB forms signed
8/7/2007 pilot test/pilot test
8/8/2007-8/11/2007 transcribed pilot test info/ checked with co-transcriber
8/13/2007 (Monday) data collection
8/14/2007 (Tuesday) data collection
8/15/2007 – 9/15/2007 transcribe data collection/ checked with co-transcriber
11/9/2007 – sent copy of research back for member checking
1/17/2008 – research defense

Appendix B: Sample of Original Text

This is the town of Moleberry. In Moleberry, there is a tree in which two small animals live. "Squirrel" lives toward the top of the tree, while "Mole" lives beneath the tree. Mole and Squirrel are great friends. (If you click on either home, they might let you peek inside).

Squirrel has a fluffy tail and a slight overbite. His two front teeth are further exaggerated when he smiles. His teeth help him when he eats his favorite food, acorns. Mole is smaller than Squirrel and a darker shade of gray. He has squinty eyes, poor eyesight and a round little body. He often worries over senseless matters and bites his nails. Mole moves around underground by digging and scraping out new tunnels. With his stubby nails, it takes him longer than if he had his naturally sharp and curved nails. Even with his stubby nails, Mole still gets around quite well. In fact, he is the official private detective of Moleberry. Whenever there is a mystery to be solved, Mole is on the job. He is small, sneaky and able to move over or under the ground without being detected. His official name is "Mole P.I." That stands for "Mole, Private Investigator." Pay close attention... In this story, you will be playing the role of Mole. You will be in charge of making his most important decisions!

Now let's learn a little more about Squirrel, your closest friend.

Squirrel cannot move around in the same manner as you. Squirrel scurries, climbs trees, and rides his tricycle. That's right, squirrel has a tricycle with a large basket on the back. When he is not collecting acorns in his basket, he lets you sit in there for a ride. Squirrel never goes far if he is not on his tricycle. If you are are gone too long, Squirrel will go looking for you. The two of you have a very caring friendship.

Appendix B: (Continued)

Every weekend, acorns fall from the tree in which you and Squirrel live. As your weekend tradition, you gather the acorns in the basket from Squirrel's bike. The two of you then spend the afternoon pealing and eating acorns and sipping maple tea.

On this particular weekend morning, you and Squirrel appear outside only to find that there are no acorns on the ground! Of course, you check the tree to make sure that the acorns have fallen. Indeed, the acorns are not in the tree nor are they on the ground. Someone has clearly stolen the acorns in the early morning. Squirrel, who is most upset, immediately begs you to find the acorns and the thief. He gives you two gold coins to cover expenses.

Throughout your journey in this case of missing acorns, you will be able to track your whereabouts and your money on the right side of the screen. The map of Moleberry will always be in the top right corner. The red "X" on the map will change positions as you move around. Right now, the red "X" is showing that you are at the tree house.

In the right middle section, you will always see how many gold coins you have. The bottom right section of the screen will always present the "next page" button or a set of choices.

It is very important that you remember to explore the main picture on each screen. If you see anything that looks like an acorn, you should click on it. The only way that you will get the acorns back is by clicking on them in the picture when you first see them. In the picture above, there is something that resembles a pile of nuts. Find and click on them as an example.

Appendix B: (Continued)

Very good! Those look like they could be nuts, possibly acorns. Remember to look for nuts in the pictures throughout your journey. An important step to solving this case is to find and click on the acorns!

Now, there are some issues that you will need to work around as you go.

Here are the three issues that will affect your journey:

1. You only have two gold coins. You may not be able to solve the crime if you run out of money too soon.

2. You cannot swim. If you need to cross water, you will need to find someone to help or a creative solution.

3. The weasels...

The weasels are very suspicious little critters. They live in a big castle that was built by old weasels a long time ago. The tall castle was made so that weasels could look out from the high towers and see across the land. There is a bridge with a donkey-led carriage that carries visitors to and from the castle. The weasels only trust the carriage passengers led by the donkey. They often capture anyone that comes within a close distance of their castle without the donkey. Where do the captured critters go?

Way in the top of the castle, there is a jail cell. Sometimes the weasels capture prisoners who trespass near their castle. Other times, prisoners are turned into them by other residents in Moleberry. If you catch the acorn thief, you'll need to turn the thief in at the weasel's jail.

The weasels keep all of their dirty laundry in the jail cell. When they capture a prisoner, the prisoner must wash their stinky laundry. The weasels don't wear a lot of clothes, so their laundry is mostly made up of socks (even stinkier)!

That should be all that you need to know to get started. Before you leave the tree house, you'll need to find the few clues that were left at the crime scene.

The clues are pictured to the right. Find and click each clue in the above picture of the tree house. The pictures to the right are there to show you what each clue looks like. You'll need to find each clue as it is hidden in the tree house picture to move on. Once you have all the clues, you can set out to explore Moleberry!

One clue down. Two to go!

Keep going. You have one more clue to find.

Great work, Detective! You have found three clues that are related to the acorn thief. Keep these clues in mind throughout your hunt. Now that you're done searching the crime scene, it's time to explore Moleberry in search of the acorn thief!

Would you like to view a close-up version of the map or just get started? Click on your choice to the right.

Here is a large-scale image of the map of Moleberry. Only the permanent buildings, water and land are marked. You may run into other animals at any time. Remember, your goal is to search Moleberry to find the missing acorns and the thief who stole them.

Appendix C: Revised Text

This is the town of Moleberry. "Squirrel" lives in the top of the tree, while "Mole" lives below the tree. Mole and Squirrel are great friends. (If you click on either home, they might let you peek inside).

Squirrel has a fluffy tail and an overbite. His two front teeth stick out when he smiles. His teeth help him when he eats his favorite food, acorns.

Mole has squinty eyes, poor eyesight and a round little body. He often worries over silly things and bites his nails. Mole moves around underground by digging and scraping out new tunnels. Most Moles have long and sharp nails to help them dig. Because Mole bites his nails, he is a slow digger.

Even with his short nails, Mole still moves around well. In fact, he is the best private detective in Moleberry. He is small, sneaky and able to move over or under the ground without being seen. His full name is "Mole P.I." That stands for "Mole, Private Investigator."

In this story, you will be playing the role of Mole. You will be in charge of making his most important choices!

Now let's learn a little more about Squirrel, your closest friend.

Squirrel likes to climbs trees and ride his tricycle. That's right, Squirrel has a tricycle with a large basket on the back. When he is not collecting acorns in his basket, he lets you sit in there for a ride. Squirrel never goes far if he is not on his tricycle. If you are are gone too long, Squirrel will go looking for you. The two of you have a very caring friendship.

Appendix C: (Continued)

Every weekend, acorns fall from the tree in which you and Squirrel live. Then you gather the acorns in the basket from Squirrel's bike. The two of you like to spend the afternoons peeling and eating acorns and sipping maple tea.

When you and squirrel go outside, there are no acorns today! Someone has stolen all of the acorns. They are not on the tree or on the ground.

Squirrel, who is most upset, begs you to find the acorns and the thief. He gives you two gold coins to cover expenses.

While you go through the story, you will be see where you are by looking at the map on the top right side of the screen. The red "X" on the map marks where you are.

Below the map, you will see how much money you have.

The bottom right section of the screen will always show the "next page" button or a set of choices.

Explore the main picture on each screen. If you see anything that looks like an acorn, you should click on it. Do you see anything in this picture that looks like a pile of nuts? If you see a pile of nuts, click on them.

Very good! Those look like nuts. Remember to look for nuts in the pictures. To solve this case, you will need to find and click on the acorns!

Here are the three things to remember:

1. You only have two gold coins.
2. You cannot swim.
3. There are weasels.

Appendix C: (Continued)

The weasels are very odd. They live in a big castle that was built by old weasels a long time ago. There is a donkey with a wagon. The donkey uses the wagon to bring other animals over the bridge to and from the castle. The weasels only like visitors who come with the donkey. If you come without the donkey, they may throw you into their jail. There is a jail in the top of the castle. The weasels keep all of their dirty laundry in the jail. Prisoners must wash the smelly laundry. The weasels don't wear a lot of clothes, so their laundry is mostly made up of socks (even stinkier)!

There are three clues to help you solve this case. The clues are pictured to the right.

Find and click each clue in the above picture.

One clue down. Two to go!

Keep going. You have one more clue to find.

Great work, Detective! You have found three clues that are related to the acorn thief. Keep these clues in mind throughout your hunt.

Would you like to view a close-up version of the map or just get started? Click on your choice to the right.

Here is the map of Moleberry. Only the buildings, water and land are marked. You may run into other animals at any time. Remember, your goal is to search this town to find the missing acorns and the thief who stole them.

Appendix D: Transcripts

("PI" = principal investigator)

PI: Ok, so you have guys read online stories before?
Dee: Yea
Alicia: Yea
PI: Or interactive stories?
Alicia: Yea, at school
Dee: Yea, cause sometimes we do tests at school and sometimes we, you know, we, we do our own stories. See we go in powerpoint, right, and we do pictures and all that.
Alicia: And in my class our teacher… we go on a …um, sometimes our teachers lets us go as long as it's educational and she has these things under her favorites and she says once you finish reading the stories she'll print questions and we'll answer the questions and we'll give it to her. That's like a test without her giving it to us.
PI: So do you like those?
Dee: Yea, very fun
Alicia: Yea
PI: What about the stories you make in powerpoint. Do you like doing those?
Dee: Yea, because it's all your ideas from your brain is coming into the computer and like your diary and all that.
Alicia: It's actually all what's in your head.
PI: So you write it and it's all your ideas?
Dee: Yea
Alicia: (Head Nod)
PI: How do you go about writing it? Do you have an idea for a beginning and an idea of how you want it to end…. or you just start writing?
Dee: Just start writing
Alicia: We just start writing
PI: And let it take you where it's going to take you?
Dee: yea
PI: Do you put pictures in?
Dee: yea
Alicia: First I do the writing and then I see if I want to put pictures in.
Dee: Sometimes I make a graph and see what I want to write in the graph and then I say well maybe I don't want to do that. So while I'm going, I just might just think of something while I'm doing it
PI: Was this story different than ones you've done before?
Alicia: No, we've done ones like this.
Dee: I like mysteries.
PI: Have you've done stories where you were the main character?
Dee: Yea, I did five of them, in school, I did five of them with my teacher.
Alicia: I didn't. We weren't in the same class last year but this year we hope we have the same teacher.
PI: Oh, you guys don't know yet?

Appendix D: (Continued)

Alicia: No we don't know. I hope we are.
Dee: Cause if she doesn't understand something, I might understand it and we can work together on homework.
PI: When you were reading the story, did you feel like you were controlling what the mole was doing?
Dee: Yea
Alicia: (head nod yes)
PI: Can you give me an example of a part you liked?
Alicia: I like the bows, the pink bows.
Dee: I liked when we could choose anyway we could go.
Alicia: yea
PI: (S) I noticed… Part of me doing this and you guys are being a big help… I'm going to be able to pick out some parts that are too long. I noticed there were a lot of words that were probably longer than what you guys were used to.
Dee: Yea
Alicia: (head nod yes)
PI: So I'm going to take out a lot of those words.
Dee: We can do them like interesting words. We could do like, um… Let's say like a lady was walking down the street okay? And then you were coming right?… And then actually you trip and fall and you said that um… " it was utterly, utterly my fault." And they say "what utterly means?" because it's interesting to them. They might say "what utterly means?" Utterly means that it definitely means its my fault.
Alicia: Or you could use other easy words to just say it was my fault
PI: So do you think in a story like this it would be better to have smaller words you didn't struggle with or to once in a while have longer words?
Dee: longer words
Alicia: a little bit longer words
PI: So do you think with longer words like what you just told me?
Dee: oh yeah I'll use… I look in the dictionary and I'll find a word but I don't really understand it, so I go the easy way.
Alicia: My mom says if we don't know a word and we're stuck when we're reading, just underline it and if you have a chance go on the computer and look in the dictionary.
PI: So with stories like this, it would really helpful if you could just click on a word that's just right there?
Alicia: (head nod yes)
Dee: So like if you don't know… and what if you were taking a test and you're not allowed to ask questions. And then all you have to do is click on a word and it helps sound it out for you it.
PI: And then would you also want to know what it means?
Alicia: Yea cause when you click on it on the other side it also shows dictionary.
PI: I noticed you guys were looking around in the pictures a lot. Do you like it when there is a lot to click on in the pictures?

Appendix D: (Continued)

Alicia: Yea
PI: Are you used to stories that give you more things in the pictures?
Alicia: They give you a picture and they give you a picture and on the next page they give you a picture.
Dee: So they like give you a place like where they should be. I like when they trick you and you try but not the right place. And it's really in the wrong place. If you're trying to find something, they could be more smaller or they could blend in with things like the grass and it could blend in with things and like sand and stuff. And then when you find all of the things and it said "great job." You had some of those things but not the blending, but the part where it said "great job."
PI: Were there some things where you had trouble moving around or you didn't know where to go or what to do?
Dee: No
Alicia: Mmm mmm (head nod no)
PI: Were there some parts where it was a little long?…
PI to Alicia: (S) I saw you were stretching and moving around a little.
Alicia: Sometimes I get sleepy. I get nervous
PI: You looked like you read well. Really, some people it relaxes them.
Dee: Oh Yeah, I have to go to sleep and then when I wake up I have a fresh brain (Dee: smile, and softly repeats "fresh brain")
PI: Were there any choices where you glad that you made or really sorry you made that choice?
Dee: Yea, cause the mole didn't really know that he was the only mole in Moleberry. But that was a great choice (to knock on the door). Now he's very proud he's not the only one, the only mole in Moleberry. Now he's interested in someone. And then maybe he might keep going to the girl's house and have coffee.
PI: So you like that he made a friend?
Dee: yeah
PI: Did you Favorite part?
Alicia: My favorite part was the riddle.
Dee: Yeah, the riddle
Alice: I'm not very good at riddles but…
PI: Have you done riddles before? Did you know what a riddle is?
Dee: I knew what a riddle is, like a joke.
Alicia: Sometimes my step mom gets these popsicles they have riddles on it.
Dee: Then you have to try to figure it out because it's like a question.
PI: Did you like typing in an answer? Where you comfortable doing that?
Alice: yea
Dee: I love typing. It's very fun.
PI: And was there a least favorite part?
Dee: Yeah, my most favorite part was going into lady's house.
PI: was there a part you didn't like?
Dee: I liked all of it.
Alicia: Me too

Dee: It was very interesting.
PI: What were some stories that you read in your classes that were like this?
Alicia: I like to read stories that have meanings and that stories, just like…cop stories …hard stories, the stories that make you think and like big books.
Dee: That make you concentrate actually like on the book, to make you think. I like mystery books. You have to figure out how the mystery began and how it ends. We read a book it's called, I can't remember what it's called it's called, computer something… but we read for school.
PI: Was it on the computer?
Dee: No, it was called a computer thing. It was like this lady and man, this boy and girl and they were on the computer. Then they didn't know and they looked at something. Then they looked at something. They saw a word, a mystery and it didn't say who it was from. And they were trying to figure out who it was from. They got ahead and ahead and ahead… Oh, it was called "Computer mysteries." And then at the end of the thing, the people got arrested because they were saying mean or bad things. But I was saying that it's not right to answer questions on the computer, cause you don't know who it is.
PI: So that was kind of an important story because it was true to real life?
Dee: It was really in real life but they just made it into a cartoon.
PI: You mentioned the girl mole. What other characters did you like or not like?
Alicia: I like the squirrel.
Dee: Yea the squirrel and the boy mole
Alica: the boy mole and the baby ducks the beasver
PI: What did you like about the squirrel?
Dee: Squirrel, that he's very nice and takes people out for a walk and really if somebody's tired he say "hop in my basket."
Alicia: yea
PI: (S) What about the beaver?
Dee: He was kind, friendly and nice.
Alicia: funny
Dee: He was kind to make the mole a bridge to cross over the pond.
Alicia: He was funny with the extras "s"s.
Dee: sssssssss
PI: And why'd you like the baby ducks?
Alicia: They were cute
PI: What changes would you make to this story?
Dee: You said "are" two times.
PI: Oh yeah, that's a good one.
PI: Do you think the text would be better if it was shorter?
Dee: Just a little, a little cause you could say at the end "I hope you had a great time. Thank you for going on this."
PI: What's it like being Mole P.I., being the mole?
Alicia: Nice
Dee: Well, he didn't want to go at first. Well, the squirrel didn't want him to scare the ducks. Sometimes he didn't want to go into the lake

Appendix D: (Continued)

Alicia: So the bad choice that he picked was to go into the lady's draw. It could have been her underwear.
Alicia and Dee: (giggle)
Dee: It could have been some private stuff that she didn't want him to see
PI: So What was Mole's job?
Alicia: To investigate who stole the acorns.
PI: (S) And I noticed you used the map a few times. Did you like having the map there?
Dee: It was a little easier so we didn't have to be like "where are we?"
PI: (S) I also noticed in the beginning you tried to click on the map. Are you used to having that in other stories… where you click and it takes you somewhere?
Dee: Cause when we click on it and it gets bigger and it tells you about the island…cause if we want to know what the island's about
Alicia: It tells you how do you get there, what's on the island.
Dee: And what do you do there.
PI: What about Moles' personality?
Alicia: I liked him.
PI: Are their any changes you would make to mole to make him act a certain way?
Dee: No he was good.

Interview with "Jay"

PI: Ok Jay, have you read stories like that before?
Jay: Yes
PI: Lots of them?
Jay: Mmmm, A couple
PI: Did you like that one?
Jay: Yes mam
PI: Is there anything different from the others…Can you give me the names of some others?
Jay: Well there was one at my school, "The Library."
PI: What was that one about?
Jay: Well it was somebody gets lost and you have to go find them, read books on the way. And when you're all done, you get a prize.
PI: And those other ones that you read, was there one right or wrong answer… or you could get there multiple ways?
Jay: Usually you go in and have to answer correctly.
PI: Did you feel like you were in control of the story?
Jay: yes
PI: Did you feel like you were being "Mole?"
Jay: yes
PI: What did you like about him?
Jay: Because he was a detective, and I like detective stories.
PI: Was there anything that you didn't like about him?
Jay: That he picks his fingernails because it took him too long too to dig.

Appendix D: (Continued)

PI: How did you feel about having to choose one option over the other? Did you ever feel stuck or you liked it?
Jay: I like that actually. If I got stuck, I kind of liked it cause then you go to a whole other place that you didn't want to go to.
PI: (S) What about when you picked the pond over the castle? Why did you pick that?
Jay: I didn't want to go to jail.
PI: (S) What about when you went to the other mole's house?
Jay: First I went the other way but went straight into the house.
PI: (S) That's right because you went to the bunny's house?
Jay: (head nod yes)
PI: Was it difficult in any way? Did you have any trouble moving around?
Jay: no
PI: What were some of the things that you liked as you moved around the story? Did you like finding the hidden things?
Jay: I liked clicking on things
PI: So you liked when you clicked on things… Did you like when you entered text?
Jay: (question look)
PI: Like when you did the riddle…
Jay: I did.
PI: What other kinds of things do you like to read?
Jay: Funny and athletic books
PI: So do you read books that have animal characters like that?
Jay: Yea like one I read had an animal character.
PI: Who was it?
Jay: "The Library"
PI: Oh, the one you did in school?
Jay: (head nod yes)
PI: Have you ever written stories?
Jay: no
PI: Did you have to write stories for school?
Jay: Not this year
PI: I was just curious. Some people mentioned using Powerpoint to write stories. You haven't had to do that in school?
Jay: no
PI: So you liked mole then?
Jay: (head nod yes)
PI: Were there any other characters you liked or didn't like?
Jay: The only characters I didn't like the weasels they were kind of mean. (Note he never encountered the weasels and actually chose not to go that way because he "didn't want to go to jail" He had only read that the weasels were mean).
PI: Were there any changes you'd make to the story…anything you'd like?
Jay: No changes
PI: What was it like to be "Mole, P.I.?"
Jay: It was fun cause you have to figure out who stole the acorns.

PI: How did you use the map?
Jay: No, I just said, “Oh um let me go there go there,” and hope it works out.
PI: Did you feel responsible for what happened to mole in the end?
Jay: Yes mam, but something good happened to him.
PI: Hmm, hmm, so you liked that?
Jay: (head nod yes)
PI: Personality… you said you didn’t like that he bit his finger nails?
Jay: (head nod yes)
PI: I think that’s all my questions. Do you have anything you want to add?
Jay: no
PI: Thank you

Interview with “Carol”

PI: Have you read online stories before or any stories where you had choices like this one?
Carol: Yes
PI: Do you usually like those?
Carol: Yes
PI: Have you read them in school?
Carol: No
PI: Have you read them at home or on your own?
Carol: No
PI: Where have you read them?
Carol: In a book
PI: Did you read the choose your own ending stories?
Carol: No. I don’t usually like short stories.
PI: What other stories have you read that you like as far back as you can remember?
Carol: Chapter books
PI: Can you think of a name of one?
Carol: “Roll of Thunder”
PI: What was that about?
Carol: About a little boy and he didn’t want to get his clothes all dirty. Then a patch of lightening struck, and they were all scared.
PI: Was this story (I pointed to the computer) a lot different than what you’re used to reading?
Carol: (head nod yes)
PI: Because you had choices?
Carol: (no answer)
PI: …or because the character was different because he was just a little animal?
Carol: Because it was just a little animal
PI: Did you feel like you were in control of the story?
Carol: No
PI: Did you like making choices?
Carol: (head nod no)
PI: You want something that’s a little more set for you?

Appendix D: (Continued)

Carol: (head nod yes)
PI: So you didn't like having options to choose?
Carol: (head nod no)
PI: Did you like the things like when there were pictures hidden in the other pictures?
Carol: (head nod yes)
PI: So you like the game type of things? Did you like the riddle?
Carol: (head nod yes)
PI: Were there any choice you made that you were glad you made the choices like picking one way over another?
Carol: Yes… (Further description was too soft spoken to hear… She put her head down while talking…inaudible).
PI: (S) Well, you went through and did it again. How'd you do it the second time?
Carol: So didn't pick the same ones
PI: You just chose different things to see what would happen the second time?
Carol: (head nod yes)
PI: Who'd you like?
Carol: Squirrel
PI: Why'd you like the squirrel?
Carol: He could go up in trees and things.
PI: That's a good point. Were there any parts you didn't like? What didn't you like?
Carol: The monkey troll
PI: Were there any parts of the reading you didn't like or any parts of the choices you didn't like
Carol: It took a long time to read (said in a low dragging voice as negative)
PI: Have you written any stories?
Carol: No
PI: Do you want to write stories?
Carol: No
PI: No, you don't think so? Do you like to draw?
Carol: Yes
PI: Oh good, me too. What kinds of things do you like to draw?
Carol: Pictures
PI: Pictures? Do you draw animals?
Carol: yea
PI: How does this (pointed to computer) compare to other stories you read? Did you like it less or better? I know you said it was different.
Carol: Liked it less
PI: Okay, I asked you. You said you liked squirrel.
Carol: (head nod yes)
PI: Where their ones you didn't like?
Carol: (head nod yes)
PI: Who was that?
Carol: the troll
PI: The troll, that's right… Do you have any suggestions for this story?

Carol: no
PI: You said didn't like being Mole P.I., didn't like making his choices?
Carol: yeh
PI: How did you use the map?
Carol: (head nod yes)
PI: How did you use the map?
Carol: (blank stare/No answer)
PI: To look at to see where you were?
Carol: yes
PI: Did you like mole's personality?
Carol: Yes because he solved the case.
PI: Because he solved the case, cool. Those are all my questions. Thank you.

Interview with "Mary"

PI: What your name?
Mary: Mary
PI: Mary, thtat's a pretty name.
PI: Did you read online stories before?
Mary: no
PI: Did you ever read stories like that where you could make choices?
Mary: Yeh
PI: Do you usually like stories like that?
Mary: yes
PI: Did you like this story?
Mary: yes
PI: Did you feel like you were in control of the story?
Mary: (head nod no)
PI: Did you like being mole… being the main character, Mole P.I.?
Mary: Yes
PI: What did you like about it?
Mary: I liked looking and clicking to find the acorns to see what you had to find.
PI: Ok so you liked clicking on things?
Mary: (head nod yes)
PI: Did you like making choices having to pick if he went this way or that way?
Mary: yes
PI: Did you have any hard times moving?
Mary: (head nod yes)
PI: yes? When?
Mary: Yes, a little when I had to pick which hole to go through
PI: You had a little trouble deciding? How did you ultimately decide?
Mary: I picked the left side.
PI: How did you pick it? Did you have a reason or you just decided to pick a side?
Mary: Just picked it

Appendix D: (Continued)

PI: Were you glad you picked the left side?
Mary: yes
PI: And what happened once you picked the left side?
Mary: Well I know I picked the right side when I went through the bunny house and I had to help them put back the wall.
PI: Pretty sure you made all the right decisions?
Mary: Yes
PI: So your pretty sure you made all the right decisions… You liked the way it turned out for Mole?
Mary: Yes
PI: Did you like feeling responsible for how it turned out for Mole?…
Mary: (head nod yes)
PI: You liked being him?
Mary: (head nod yes)
PI: Did you have a favorite part?
Mary: (head nod no)
PI: Were there parts you didn't like?
Mary: The part where after I dug through the wall… after I buried through the wall… had to put back the wall.
PI: Oh, so when you made the decision and then you had to work to put the wall back?
Mary: (head nod yes)
PI: What other stories have you read that you like?
Mary: read some at school… an owl story
PI: Have you ever written any stories?
Mary: No
PI: How does this story compare to another one you've read?
Mary: There not like the same so like I don't have to keep reading and reading for clues.
PI: What do you mean there not the same?
Mary: Yeah, I mean there kind like the same
PI: The other stories you read?
Mary: because I still have to go through
PI: Can you give me an example?
Mary: Like I have to do the work and …and I have to like read the clues.
PI: In the other stories you read?
Mary: yea
PI: And so how was this one different than that? You mean you didn't have to …
Mary: Like do the work
PI: Oh, the other ones you read you don't have to do the work.
Mary: (Big head nod yes)
PI: So which do you like better, those other ones you read or this one?
Mary: I kind of like this
PI: You like doing this, doing the work and finding out things?
Mary: (head nod yes)

Appendix D: (Continued)

PI: Was there a character you liked?
Mary: Mole
PI: Why'd you like mole?
Mary: Because I had to build the wall. I had to look for the acorns to see who took them.
PI: Was there anything you'd like to see different or anything you'd like to do that you didn't get to?
Mary: no
PI: Did you use the map?
Mary: (head nod no)
PI: And so you said you liked being Mole and making his decisions... Did you like how it turned out?
Mary: yes
PI: And you liked his personality you liked how he looked?
Mary: (yes head nod)
PI: Was there anything you didn't like? I already asked you… and what did you say?
Mary: I liked everything

Interview with "Derek"

PI: Have you read online stories before or stories that gave you choices?
Derek: no
PI: Tell me about a time when you felt like you were controlling the story.
Derek: When I found the other mole
PI: How did you feel about having to choose one option over another?
Derek: Didn't go to the castle because I didn't want to go to jail
PI: Give me an example of a time when it was easy or not so easy to move around within the story.
Derek: It was hard in the girl Mole's house because there were supposed to be acorns.
PI: Tell me about a choice you made when you were glad that you made that choice…or surprised by the result of your choice.
Derek: Girl Mole
PI: What was your favorite part or parts and why?
Derek: Girl mole… because there was another like me.
PI: What parts didn't you like? Why?
Derek: liked it all
PI: What stories have you like better or worse than this one? Are there others you prefer to read?
Derek: I liked that story.
PI: Have you written stories in the past?
Derek: no
PI: Tell me about a character you liked or disliked?
Derek: I liked Mole because he bites his fingernails and I bite my fingernails too.
PI: How did you use the map?
Derek: Just used the map to see where I was

Appendix D: (Continued)

PI: Would you have liked it better if you could have clicked on the map to get to a location or see information about it?
Derek: liked as was, no mouse clicking needed
PI: How did you feel about making Mole's decisions for him? How did you feel about being responsible for what happened to Mole?
Derek: yes, liked it.
PI: Descibe Mole P.I.'s personality. What do you like? How would you want him to be?
Derek: Liked him as he was because he gets find acorns and he bites his fingernails
PI: Were there characters or parts of the story that you didn't like?
Derek: Weasels are bad. They through people in jail.

Interview with "Ann"

PI: Have you read interactive stories like this before?
Ann: Yes
PI: How were they different?
Ann: They were not as long. There were more pictures. You just clicked on things. Less words and just clicked on pictures.
PI: Was there anything you liked about this story?
Ann: When he had to go over the bridge and went to jail because I didn't know he could do that. I was laughing but not out loud.
PI: Did you feel like you were in control of the story?
Ann: Yes
PI: Did you like making choices throughout the story?
Ann: yes
PI: What didn't you like?
Ann: All the reading before clicking. I don't like reading.
PI: What other stories have you read?
Ann: I don't know
PI: Tell me about a character you liked or didn't like.
Ann: I didn't like Mole. He was ugly
PI: Did you use the map?
Ann: What map?
PI: You didn't see the map?
Ann: No. I didn't any see map.

Interview with "Marge"

PI: Have you read online stories before or stories that gave you choices?
Marge: Yes
PI: I noticed that you looked around on all the pictures. Are you used to doing that in other stories?
Marge: No

Appendix D: (Continued)

PI: You found some hidden secrets in the pictures. How did you know to look and click in the pictures?
Marge: I just put the mouse all around the pictures until I see the arrow turn into a hand. It gave clues.
PI: Tell me about a time when you felt like you were controlling the story.
Marge: No I didn't. I got frustrated when it said it wasn't right when I clicked the choice.
PI: When did it say "It wasn't right? Can you give me an example?"
Marge: Like when I'm in math class and we have a test and I get it back… and I missed two. I get really mad because I tried hard.
PI: Can you give me an example from the story?
Marge: Like when I click one thing and it said "that's too heavy" and I clicked another and it said "that's too hard."
PI: How did you feel about having to choose one option over another?
Marge: Felt like I made the right choices because I liked how it turned out. Yes (said loud and excitedly)… finally you can change up a story.
PI: Give me an example of a time when it was easy or hard to move around within the story.
Marge: I had a little trouble. I couldn't figure out a word but sounded it out and got it.
PI: Do you remember what the word was?
Marge: No
PI: Have you ever used the stories that have a feature where you can click on a word and it pronounces it for you?
Marge: Yes
PI: Did you wish this story had that?
Marge: Yes
PI: When you used that feature, do you sound out the word first or do you click on it right away to here how it is pronounced?
Marge: I try to sound it out first, and then I click on it.
PI: Tell me about a choice you made when you were glad that you made that choice or you were surprised by the result of your choice.
Marge: With the weasels and the walnuts… I thought that was funny. I didn't know that would happen.
PI: What was your favorite part and why?
Marge: The ending because they were all friends.
PI: What parts didn't you like and why?
Marge: none
PI: What stories have you like better or worse than this one… or preferred to read?
Marge: The slug… almost like this… but not.
PI: Have you written stories in the past? Tell me about those.
Marge: "Cinderella's Opposite." Evil Cinderella was in charge and mean. She used to be nice but her parents got in a car accident so she was mean.
PI: Is it important for you to know why a character is mean in a story?
Marge: Yes
PI: Did you write this story on paper or the computer?

Appendix D: (Continued)

Marge: On paper. We wanted to write it on the computer, but the teacher said it would take too long.
PI: Why did you write the story?
Marge: We were supposed to be learning about details in stories, so we wrote this one. It had to be an opposite fairy tale.
PI: Tell me about a character you liked?/disliked?
Marge: I liked turtle because he yelled at Mole and told him "you're not supposed to step on my shell without knocking first."
PI: Why did you like it that he yelled at Mole?
Marge: Because he stood up for himself.
PI: Tell me about any changes you would make to this story (pictures,activities or text, stayed with certain characters longer, not met certain characters).
Marge: none
PI: Tell me what it was like being Mole, P.I.
Marge: Liked it and when he had his glasses reading.
PI: How did you use the map?
Marge: Everytime I moved, I looked at the map. It was helpful.
PI: Descibe Mole P.I.'s personality – what do you like – how would you want him to be?
Marge: Yes, because he was helping a friend.

Appendix E: Tables

Table 1 Sample Construct Validation Chart

principles of interactive fiction by Hayes-Roth (1998):					
	Excellent	Good	Serviceable	Weak	Poor
The participant's experience should be in the first-person point of view, should be immersed in an adventure from which he or she will not wish to be distracted, should have direction over the character's behavior and directly interact with other characters within the story.					
The story should be artfully designed to carry the participant along, such that the character is piecing together a puzzle as she moves throughout the plot. The plot has a directive arc as set by the author, yet the participant feels as though she is exploring and controlling the story.					
In keeping the participant actively involved in the story, encounters should occur naturally and be meaningful.					
The story world should be populated with many more autonomous characters than can be encountered in one visit. This will keep the participant wanting to come back, knowing that she will meet more and different characters than in the last "reading".					
The participant should be autonomous to decide which characters he or she interacts with. At the same time, other characters should appear to be autonomous. Other characters may approach or react differently towards the participant.					
The participant's choices should feed forward in shaping the story. A decision on one page or screen should be anticipatory of happenings on the next page or screen. The participant may suffer consequences or rewards of past actions. Characters from the past may return to haunt the participant.					
An adaptive storyteller should monitor and orchestrate the story so that the participant has a joyous experience upon every visit.					

Appendix E: (Continued)

Table 2 Construct Validation Norming Process Evaluation by Expert 1

The following are the seven principles of interactive fiction by Hayes-Roth (1998) ADA:					
	Excellent	Good	Serviceable	Weak	Poor
The participant's experience should be in the first-person point of view, should be immersed in an adventure from which he or she will not wish to be distracted, should have direction over the character's behavior and directly interact with other characters within the story.					X
The story should be artfully designed to carry the participant along, such that the character is piecing together a puzzle as she moves throughout the plot. The plot has a directive arc as set by the author, yet the participant feels as though she is exploring and controlling the story.			x		
In keeping the participant actively involved in the story, encounters should occur naturally and be meaningful.		x			
The story world should be populated with many more autonomous characters than can be encountered in one visit. This will keep the participant wanting to come back, knowing that she will meet more and different characters than in the last "reading".			x		
The participant should be autonomous to decide which characters he or she interacts with. At the same time, other characters should appear to be autonomous. Other characters may approach or react differently towards the participant.				x	
The participant's choices should feed forward in shaping the story. A decision on one page or screen should be anticipatory of happenings on the next page or screen. The participant may suffer consequences or rewards of past actions. Characters from the past may return to haunt the participant.				x	
An adaptive storyteller should monitor and orchestrate the story so that the participant has a joyous experience upon every visit.				x	

Appendix E: (Continued)

Table 3 Construct Validation Norming Process Evaluation by Expert 2

The following are the seven principles of interactive fiction by Hayes-Roth (1998):					
	Excellent	Good	Serviceable	Weak	Poor
The participant's experience should be in the first-person point of view, should be immersed in an adventure from which he or she will not wish to be distracted, should have direction over the character's behavior and directly interact with other characters within the story.					X
The story should be artfully designed to carry the participant along, such that the character is piecing together a puzzle as she moves throughout the plot. The plot has a directive arc as set by the author, yet the participant feels as though she is exploring and controlling the story.					x
In keeping the participant actively involved in the story, encounters should occur naturally and be meaningful.			x		
The story world should be populated with many more autonomous characters than can be encountered in one visit. This will keep the participant wanting to come back, knowing that she will meet more and different characters than in the last "reading".			x		
The participant should be autonomous to decide which characters he or she interacts with. At the same time, other characters should appear to be autonomous. Other characters may approach or react differently towards the participant.					x
The participant's choices should feed forward in shaping the story. A decision on one page or screen should be anticipatory of happenings on the next page or screen. The participant may suffer consequences or rewards of past actions. Characters from the past may return to haunt the participant.					x
An adaptive storyteller should monitor and orchestrate the story so that the participant has a joyous experience upon every visit.			x		

Appendix E: (Continued)

Table 4 Construct Validation of Prototype by Expert 1

The following are the seven principles of interactive fiction by Hayes-Roth (1998): For Mole P.I.					
	Excellent	Good	Serviceable	Weak	Poor
The participant's experience should be in the first-person point of view, should be immersed in an adventure from which he or she will not wish to be distracted, should have direction over the character's behavior and directly interact with other characters within the story.	x				
The story should be artfully designed to carry the participant along, such that the character is piecing together a puzzle as she moves throughout the plot. The plot has a directive arc as set by the author, yet the participant feels as though she is exploring and controlling the story.	x				
In keeping the participant actively involved in the story, encounters should occur naturally and be meaningful.	x				
The story world should be populated with many more autonomous characters than can be encountered in one visit. This will keep the participant wanting to come back, knowing that she will meet more and different characters than in the last "reading".	x				
The participant should be autonomous to decide which characters he or she interacts with. At the same time, other characters should appear to be autonomous. Other characters may approach or react differently towards the participant.	x				
The participant's choices should feed forward in shaping the story. A decision on one page or screen should be anticipatory of happenings on the next page or screen. The participant may suffer consequences or rewards of past actions. Characters from the past may return to haunt the participant.	x				
An adaptive storyteller should monitor and orchestrate the story so that the participant has a joyous experience upon every visit.	x				

Appendix E: (Continued)

Table 5 Construct Validation of Prototype by Expert 2

The following are the seven principles of interactive fiction by Hayes-Roth (1998): For Mole P.I.					
	Excellent	Good	Serviceable	Weak	Poor
The participant's experience should be in the first-person point of view, should be immersed in an adventure from which he or she will not wish to be distracted, should have direction over the character's behavior and directly interact with other characters within the story.	x				
The story should be artfully designed to carry the participant along, such that the character is piecing together a puzzle as she moves throughout the plot. The plot has a directive arc as set by the author, yet the participant feels as though she is exploring and controlling the story.	x				
In keeping the participant actively involved in the story, encounters should occur naturally and be meaningful.	x				
The story world should be populated with many more autonomous characters than can be encountered in one visit. This will keep the participant wanting to come back, knowing that she will meet more and different characters than in the last "reading".	x				
The participant should be autonomous to decide which characters he or she interacts with. At the same time, other characters should appear to be autonomous. Other characters may approach or react differently towards the participant.	x				
The participant's choices should feed forward in shaping the story. A decision on one page or screen should be anticipatory of happenings on the next page or screen. The participant may suffer consequences or rewards of past actions. Characters from the past may return to haunt the participant.	x				
An adaptive storyteller should monitor and orchestrate the story so that the participant has a joyous experience upon every visit.	x				

Appendix E: (Continued)

Table 6 Sample Content Validation Chart

Literature Guidelines	**Excellent**	**Good**	**Service able**	**Weak**	**Poor**	**N / A**	**Comments**
Character							
Characters should be well developed and interconnected with conflict.							
Events should affect the characters, but the events may also be caused by the character's very nature.							
Protagonists should not be flat or stereotyped. (By exception, romance, folk, and science fiction stories tend to contain flat or stereotyped characters).							
Stories with animal realism should portray characters that are true to the animals' nature. It is possible to fully develop characters even in the shortest of stories.							
Art							
A story may be distorted by poor illustrations.							
Pictures and words may play off of or substitute each other.							
Neither commonplace nor "show off" pictures add to the story.							
Pictures may tell more than the text.							
Pictures and text should work together in a "marriage."							
Design elements contribute to the success of a book; these include color, space, tone, line width and picture							

placement.							
Time							
Time elements should fit the story;							
In Historical fiction, events occur in the past. Details should fit accordingly with the time and place.							
Time lapses for science fiction occur in the future or past.							
Genres							
Mystery stories are dependent upon suspense. Unexplained events should be resolved by "reasonable discoveries."							
Neither sports nor mystery stories need be formulaic.							
When reading of different cultures, readers should be able to discover values that are alike their own.							
Other							
Aside from character, Stories also need action.							
Conflict should be well-developed and interconnected with character.							
Tension must exist to hold the reader's attention.							
Children are rarely attracted to nostalgic tones.							
Themes should not be preachy.							

Appendix E: (Continued)

Table 7 Content Validation Norming Process by Expert 1

Literature Guidelines	**Excellent**	**Good**	**Service able**	**Weak**	**Poor**	**N / A**	**Comments**
Character							
Characters should be well developed and interconnected with conflict.				x			
Events should affect the characters, but the events may also be caused by the character's very nature.				x			
Protagonists should not be flat or stereotyped. (By exception, romance, folk, and science fiction stories tend to contain flat or stereotyped characters).				x			na
Stories with animal realism should portray characters that are true to the animals' nature. It is possible to fully develop characters even in the shortest of stories.							
Art							
A story may be distorted by poor illustrations.				x			
Pictures and words may play off of or substitute each other.			x				
Neither commonplace nor "show off" pictures add to the story.			x				
Pictures may tell more than the text.			x				
Pictures and text should work together in a "marriage."			x				
Design elements contribute to the success of a book; these include color, space, tone, line width and picture				x			

placement.							
Time							
Time elements should fit the story;			x				
In Historical fiction, events occur in the past. Details should fit accordingly with the time and place.							na
Time lapses for science fiction occur in the future or past.							na
Genres							
Mystery stories are dependent upon suspense. Unexplained events should be resolved by "reasonable discoveries."							na
Neither sports nor mystery stories need be formulaic.							na
When reading of different cultures, readers should be able to discover values that are alike their own.							na
Other							
Aside from character, Stories also need action.			x				
Conflict should be well-developed and interconnected with character.				x			
Tension must exist to hold the reader's attention.				x			
Children are rarely attracted to nostalgic tones.							na
Themes should not be preachy.				x			

Appendix E: (Continued)

Table 8 Content Validation Norming Process by Expert 2

Literature Guidelines For the ADA site	**Excellent**	**Good**	**Service able**	**Weak**	**Poor**	**N / A**	**Comments**
Character							
Characters should be well developed and interconnected with conflict.					x		
Events should affect the characters, but the events may also be caused by the character's very nature.					x		
Protagonists should not be flat or stereotyped. (By exception, romance, folk, and science fiction stories tend to contain flat or stereotyped characters).					x		
Stories with animal realism should portray characters that are true to the animals' nature. It is possible to fully develop characters even in the shortest of stories.						x	
Art							
A story may be distorted by poor illustrations.						x	
Pictures and words may play off of or substitute each other.		x					
Neither commonplace nor "show off" pictures add to the story.			x				
Pictures may tell more than the text.			x				
Pictures and text should work together in a "marriage."		x					
Design elements contribute to the success of a book; these include color, space, tone, line width and picture		x					

placement.							
Time							
Time elements should fit the story;		x					
In Historical fiction, events occur in the past. Details should fit accordingly with the time and place.						x	
Time lapses for science fiction occur in the future or past.						x	
Genres							
Mystery stories are dependent upon suspense. Unexplained events should be resolved by "reasonable discoveries."						x	
Neither sports nor mystery stories need be formulaic.						x	
When reading of different cultures, readers should be able to discover values that are alike their own.						x	
Other							
Aside from character, Stories also need action.			x				
Conflict should be well-developed and interconnected with character.					x		
Tension must exist to hold the reader's attention.				x			
Children are rarely attracted to nostalgic tones.						x	
Themes should not be preachy.					x		

Appendix E: (Continued)

Table 9 Content Validation of Prototype by Expert 1

Literature Guidelines	**Excellent**	**Good**	**Service able**	**Weak**	**Poor**	**N / A**	**Comments**
Character							
Characters should be well developed and interconnected with conflict.		x					
Events should affect the characters, but the events may also be caused by the character's very nature.	x						
Protagonists should not be flat or stereotyped. (By exception, romance, folk, and science fiction stories tend to contain flat or stereotyped characters).	x						
Stories with animal realism should portray characters that are true to the animals' nature. It is possible to fully develop characters even in the shortest of stories.	x						
Art							
A story may be distorted by poor illustrations.	x						Excellent illustrations
Pictures and words may play off of or substitute each other.		x					On some pages you may not need as many words because the picture tells the story.
Neither commonplace nor "show off" pictures add to the story.		X					The pictures add to the story well.
Pictures may tell more than the text.	x						
Pictures and text should work together in a "marriage."		x					Some pages may have too many words for the grade level of students. However, the images are incredible and tell a lot about the story.
Design elements contribute to the success	x						

of a book; these include color, space, tone, line width and picture placement.							
Time							
Time elements should fit the story;			x				
In Historical fiction, events occur in the past. Details should fit accordingly with the time and place.						x	
Time lapses for science fiction occur in the future or past.						x	
Genres							
Mystery stories are dependent upon suspense. Unexplained events should be resolved by "reasonable discoveries."		x					I really liked the red herrings you threw in. It would have been fun to collect a few more false nuts.
Neither sports nor mystery stories need be formulaic.						x	
When reading of different cultures, readers should be able to discover values that are alike their own.						x	
Other							
Aside from character, Stories also need action.		x					
Conflict should be well-developed and interconnected with character.		x					
Tension must exist to hold the reader's attention.		x					
Children are rarely attracted to nostalgic tones.						x	
Themes should not be preachy.						x	

Appendix E: (Continued)

Table 10 Content Validation of Prototype by Expert 2

Literature Guidelines for Mole P.I.	**Excellent**	**Good**	**Service able**	**Weak**	**Poor**	**N / A**	**Comments**
Character							
Characters should be well developed and interconnected with conflict.	x						
Events should affect the characters, but the events may also be caused by the character's very nature.	x						
Protagonists should not be flat or stereotyped. (By exception, romance, folk, and science fiction stories tend to contain flat or stereotyped characters).	x						
Stories with animal realism should portray characters that are true to the animals' nature. It is possible to fully develop characters even in the shortest of stories.	x						
Art							
A story may be distorted by poor illustrations.	x						
Pictures and words may play off of or substitute each other.	x						
Neither commonplace nor "show off" pictures add to the story.						x	
Pictures may tell more than the text.	x						
Pictures and text should work together in a "marriage."	x						
Design elements contribute to the success of a book; these include color, space, tone, line width and picture	x						

placement.							
Time							
Time elements should fit the story;		x					
In Historical fiction, events occur in the past. Details should fit accordingly with the time and place.						x	
Time lapses for science fiction occur in the future or past.						x	
Genres							
Mystery stories are dependent upon suspense. Unexplained events should be resolved by "reasonable discoveries."	x						
Neither sports nor mystery stories need be formulaic.						x	
When reading of different cultures, readers should be able to discover values that are alike their own.						x	
Other							
Aside from character, Stories also need action.	x						
Conflict should be well-developed and interconnected with character.	x						
Tension must exist to hold the reader's attention.	x						
Children are rarely attracted to nostalgic tones.						x	
Themes should not be preachy.						x	

Appendix E: (Continued)

Evaluation form (Original Copyright © 2000 by Steve Alessi and Stan Trollip –This version is slightly altered.)

Table 11 Sample Design Validation Chart

	Excellent	**Good**	**Service able**	**Weak**	**Poor**	**N/ A**	**Comments**
Subject Matter It should not be assumed that users are automatically familiar with an organization of a program's content structure. Diagrams or maps are helpful to show users where they are or where they can go within the programs. Stereotypes and jargon should be avoided so that cultural bias may be prevented.							
Matches goals (no subject matter goal/entertainment)							
Content structure							
Content accuracy							
Language, style, grammar							
Reading Level							
Cultural bias-language							
Cultural bias-reference							
Technical items and jargon							
Spelling, grammar, and punctuation							
Glossary							
Hot words							
Auxillary Information Some programs may require auxillary information. This would include any documentation, directions, help or hints that pertain to the program.							
Introduction							
Directions							
Help							
Conclusion							
Affective Considerations Intrinsic and extrinsic motivation should be considered. The designer							

should seek to maintain challenge, satisfaction, attention and confidence in order to provide for intrinsic motivation. Although motivation should be a goal of the program, it should be balanced with instructional features. Assessments and feedback should be designed to increase ease-of-use and lessen anxiety.							
Motivation							
Interface							
Displays - Aesthetic quality should be considered in screen design. As such, screens should be uncluttered and all matter should be relevant to the program's goals. The order of information should flow from the top left to the bottom right.							
Presentation modes – All elements, including but not limited to text, graphics, video, audio, and color, should only be used when appropriate. Text should not be too long on any page as to control for excessive scrolling. Any video or audio should have accompanying controls so that the user may adjust or turn off sound or speed. It should be considered that video, audio and intense graphics tend to load slowly. Thus, the necessity of those elements should be weighed. Download times need to be acceptable.							
Text quality							
Animation & Graphics							
Audio							
Video							

Input							
Spacing – conventional spacing rules should be used within text, and spacing should be consistent.							
Navigation Navigation, such as buttons or links, allows the user to move throughout the program. Navigation should be consistent from page to page. Navigational aids, such as maps and menus, should be included for very complex programs. Some programs may opt to have bookmarking features or other restart points.							
Navigation Aids							
Consistency							
Restarting							
Bookmarking							
Pedagogy							
Methodologies							
Interactivity							
Cognitive Capacity Research has shown that only five to nine pieces of information can be stored in short memory at one time. Therefore, program information should be broken up and activies should be interspaced. "Page turners" and exceedingly long pages of text should be avoided and they are passive and may present too much information at a time.							
Cooperative learning							
Learning metaphor							
Learning strategies							
User Control and ease of use The user should be able to control extraneous options of the program, especially							

if audio or video is present. Programs that require user response should allow the user time to think and process information. It should be clear to the user when the program requires a response. Further the user should be clear on how that response should be made (click a picture, write in a prompt box, etc.)							
Questions							
Answering questions							
Quality of feedback Feedback Feedback should discriminate between right and wrong answers and it should be related to the user's input. The feedback should be presented so that it is clear, constructive, supportive and gains the user's attention. Small or single words tend to be disregarded by users. Slang or insulting remarks should not be used. Feedback should offer users a means to know when the have successfully completed the program.							
Format of feedback							
Mastery level							
Invisible Features							
Records and data							
Security and accessibility							
Too much data							
Robustness Robustness means that the computer program will not fail. As such, programs should be tested from the user's point of view. The program should further be tested under various conditions and on various operating systems and Internet browsers.							

For normal user actions							
For unusual user actions							
On different computers, software, and browsers							
Supplementary Materials							
Manual – general aspects							
Manual – program operation							
Manual – program content							
Auxiliary materials							
Other resources							
General Comments:							

Appendix E: (Continued)

Table 12 Norming Process of Design Validation by IT Expert 1

	Excellent	**Good**	**Service able**	**Weak**	**Poor**	**N/ A**	**Comments**
Subject Matter It should not be assumed that users are automatically familiar with an organization of a program's content structure. Diagrams or maps are helpful to show users where they are or where they can go within the programs. Stereotypes and jargon should be avoided so that cultural bias may be prevented.	X						
Matches goals (no subject matter goal/entertainment)			X				
Content structure		X					
Content accuracy			X				
Language, style, grammar			X				
Reading Level		X					
Cultural bias-language		X					
Cultural bias-reference		X					
Technical items and jargon		X					
Spelling, grammar, and punctuation		X					
Glossary						X	
Hot words						X	
Auxillary Information Some programs may require auxillary information. This would include any documentation, directions, help or hints that pertain to the program.		X					
Introduction		X					
Directions		X					
Help			X				
Conclusion		X					
Affective Considerations Intrinsic and extrinsic motivation should be considered. The designer should seek to maintain challenge, satisfaction, attention and confidence in order to provide for				X			

intrinsic motivation. Although motivation should be a goal of the program, it should be balanced with instructional features. Assessments and feedback should be designed to increase ease-of-use and lessen anxiety.							
Motivation			X				
Interface							
Displays - Aesthetic quality should be considered in screen design. As such, screens should be uncluttered and all matter should be relevant to the program's goals. The order of information should flow from the top left to the bottom right.		X					
Presentation modes – All elements, including but not limited to text, graphics, video, audio, and color, should only be used when appropriate. Text should not be too long on any page as to control for excessive scrolling. Any video or audio should have accompanying controls so that the user may adjust or turn off sound or speed. It should be considered that video, audio and intense graphics tend to load slowly. Thus, the necessity of those elements should be weighed. Download times need to be acceptable.	X						
Text quality	X						
Animation & Graphics	X						
Audio	X						
Video						X	
Input		X					
Spacing – conventional spacing rules should be used within text, and spacing should be	X						

consistent.							
Navigation Navigation, such as buttons or links, allows the user to move throughout the program. Navigation should be consistent from page to page. Navigational aids, such as maps and menus, should be included for very complex programs. Some programs may opt to have bookmarking features or other restart points.		X					
Navigation Aids		X					
Consistency		X					
Restarting			X				
Bookmarking						X	
Pedagogy							
Methodologies			X				
Interactivity			X				
Cognitive Capacity Research has shown that only five to nine pieces of information can be stored in short memory at one time. Therefore, program information should be broken up and activies should be interspaced. "Page turners" and exceedingly long pages of text should be avoided and they are passive and may present too much information at a time.		X					
Cooperative learning						X	
Learning metaphor		X					
Learning strategies		X					
User Control and ease of use The user should be able to control extraneous options of the program, especially if audio or video is present. Programs that require user response should allow the user time to think and process information. It should be clear to the user		X					

when the program requires a response. Further the user should be clear on how that response should be made (click a picture, write in a prompt box, etc.)							
Questions		X					
Answering questions		X					
Quality of feedback Feedback Feedback should discriminate between right and wrong answers and it should be related to the user's input. The feedback should be presented so that it is clear, constructive, supportive and gains the user's attention. Small or single words tend to be disregarded by users. Slang or insulting remarks should not be used. Feedback should offer users a means to know when the have successfully completed the program.			X				
Format of feedback		X					
Mastery level			X				
Invisible Features							
Records and data						X	
Security and accessibility						X	
Too much data						X	
Robustness Robustness means that the computer program will not fail. As such, programs should be tested from the user's point of view. The program should further be tested under various conditions and on various operating systems and Internet browsers.		X					
For normal user actions		X					
For unusual user actions		X					
On different computers, software, and browsers		X					
Supplementary Materials							
Manual – general aspects						X	
Manual – program operation						X	

Manual – program content						X	
Auxiliary materials						X	
Other resources						X	
General Comments:							

Appendix E: (Continued)

Table 13 Norming Process of Design Validation by IT Expert 2

	Excellent	**Good**	**Service able**	**Weak**	**Poor**	**N/ A**	**Comments**
Subject Matter It should not be assumed that users are automatically familiar with an organization of a program's content structure. Diagrams or maps are helpful to show users where they are or where they can go within the programs. Stereotypes and jargon should be avoided so that cultural bias may be prevented.							
Matches goals (no subject matter goal/entertainment)			X				
Content structure			X				
Content accuracy		X					
Language, style, grammar		X					
Reading Level		X					
Cultural bias-language		X					
Cultural bias-reference		X					
Technical items and jargon		X					
Spelling, grammar, and punctuation		X					
Glossary						X	
Hot words						X	
Auxillary Information Some programs may require auxillary information. This would include any documentation, directions, help or hints that pertain to the program.							
Introduction		X					
Directions		X					
Help						X	
Conclusion		X					
Affective Considerations Intrinsic and extrinsic motivation should be considered. The designer should seek to maintain challenge, satisfaction, attention and confidence in							

order to provide for intrinsic motivation. Although motivation should be a goal of the program, it should be balanced with instructional features. Assessments and feedback should be designed to increase ease-of-use and lessen anxiety.							
Motivation			X				
Interface							
Displays - Aesthetic quality should be considered in screen design. As such, screens should be uncluttered and all matter should be relevant to the program's goals. The order of information should flow from the top left to the bottom right.			X				
Presentation modes – All elements, including but not limited to text, graphics, video, audio, and color, should only be used when appropriate. Text should not be too long on any page as to control for excessive scrolling. Any video or audio should have accompanying controls so that the user may adjust or turn off sound or speed. It should be considered that video, audio and intense graphics tend to load slowly. Thus, the necessity of those elements should be weighed. Download times need to be acceptable.			X				
Text quality			X				
Animation & Graphics				X			
Audio			X				
Video			X				
Input			X				
Spacing – conventional spacing rules should be		X					

used within text, and spacing should be consistent.							
Navigation Navigation, such as buttons or links, allows the user to move throughout the program. Navigation should be consistent from page to page. Navigational aids, such as maps and menus, should be included for very complex programs. Some programs may opt to have bookmarking features or other restart points.							
Navigation Aids		X					
Consistency		X					
Restarting						X	
Bookmarking						X	
Pedagogy							
Methodologies			X				
Interactivity			X				
Cognitive Capacity Research has shown that only five to nine pieces of information can be stored in short memory at one time. Therefore, program information should be broken up and activies should be interspaced. "Page turners" and exceedingly long pages of text should be avoided and they are passive and may present too much information at a time.							
Cooperative learning		X					
Learning metaphor			X				
Learning strategies			X				
User Control and ease of use The user should be able to control extraneous options of the program, especially if audio or video is present. Programs that require user response should allow the user time to think and							

process information. It should be clear to the user when the program requires a response. Further the user should be clear on how that response should be made (click a picture, write in a prompt box, etc.)							
Questions		X					
Answering questions		X					
Quality of feedback Feedback Feedback should discriminate between right and wrong answers and it should be related to the user's input. The feedback should be presented so that it is clear, constructive, supportive and gains the user's attention. Small or single words tend to be disregarded by users. Slang or insulting remarks should not be used. Feedback should offer users a means to know when the have successfully completed the program.							
Format of feedback			X				
Mastery level			X				
Invisible Features							
Records and data						X	
Security and accessibility						X	
Too much data		X					
Robustness Robustness means that the computer program will not fail. As such, programs should be tested from the user's point of view. The program should further be tested under various conditions and on various operating systems and Internet browsers.							
For normal user actions		X					
For unusual user actions		X					
On different computers, software, and browsers						X	

Supplementary Materials							
Manual – general aspects						X	
Manual – program operation						X	
Manual – program content						X	
Auxiliary materials						X	
Other resources						X	
General Comments:							

Appendix E: (Continued)

Table 14 Design Validation of Prototype by IT Expert 1

	Excellent	**Good**	**Service able**	**Weak**	**Poor**	**N/ A**	**Comments**
Subject Matter It should not be assumed that users are automatically familiar with an organization of a program's content structure. Diagrams or maps are helpful to show users where they are or where they can go within the programs. Stereotypes and jargon should be avoided so that cultural bias may be prevented.		X					Pictures, maps graphics were useful. No cultural bias found. However intent and organization was not clear. Sometimes the navigation was not consistent, I had to hit the browser "back" button to get to a previous page
Matches goals (no subject matter goal/entertainment)						X	Not sure, in the middle of the story, the goal was to find the missing acorns.
Content structure			X				Content structure – dependent on what choices the reader made.
Content accuracy			X				
Language, style, grammar			X				The reader does not know that they are the "mole" until the explanation of the squirrel is given and then the word "you" is used and then the realization that "you" and "mole" are one and the same person.
Reading Level						X	Did not state what reading level or grade it was intended for.
Cultural bias-language		X					
Cultural bias-reference			X				Maybe gender bias? The "girl-mole" was made out to be "less than sharp".
Technical items and			X				

jargon							
Spelling, grammar, and punctuation			X				1 spelling error "pealing" should be "peeling".
Glossary						X	
Hot words		X					Not sure if they are "hot words" but there are certain words or choices for the reader that is given. It works well.
Auxillary Information Some programs may require auxillary information. This would include any documentation, directions, help or hints that pertain to the program.		X					Hints work well, please note that the "hint" for the riddle, the reader is forced to click on the hint before clicking on the riddle.
Introduction				X			Not sure of purpose, but maybe that was the idea.
Directions			X				Not very clear at times, for example, when given choices, there is no navigation to go back and make a different choice.
Help			X				Could be more explicit in certain situations, and less in others for example the byline of the weasels I found to be a bit long.
Conclusion		X					All conclusions (for different endings) added a sense of completion.
Affective Considerations Intrinsic and extrinsic motivation should be considered. The designer should seek to maintain challenge, satisfaction, attention and confidence in order to provide for intrinsic motivation.			X				This was well done, the acorns, gold coins, playing detective, were put to good use. However, once the reader made a

Although motivation should be a goal of the program, it should be balanced with instructional features. Assessments and feedback should be designed to increase ease-of-use and lessen anxiety.							choice, there was no navigation to go back and make a different choice. Possibly another goal of the story?
Motivation		X					To find the "thief" kept up the motivation level, or added motivation. Use of gold coins and finding the acorns proved to also heighten motivation.
Interface							
Displays - Aesthetic quality should be considered in screen design. As such, screens should be uncluttered and all matter should be relevant to the program's goals. The order of information should flow from the top left to the bottom right.			X				The map at the beginning was not explained until a few screens later.
Presentation modes – All elements, including but not limited to text, graphics, video, audio, and color, should only be used when appropriate. Text should not be too long on any page as to control for excessive scrolling. Any video or audio should have accompanying controls so that the user may adjust or turn off sound or speed. It should be considered that video, audio and intense graphics tend to load slowly. Thus, the necessity of those elements should be weighed. Download times need to be acceptable.		X					Sometimes screens were filled with too much information. For example the explanation on how to go about finding the "thief", using the acorns, using the gold coins, avoiding the weasels, was a bit much. No video or audio was used.
Text quality			X				Not aligned. I question the font face and size. Font face seemed to say "serious" instead

							of “fun”.
Animation & Graphics		X					
Audio						X	
Video						X	
Input		X					
Spacing – conventional spacing rules should be used within text, and spacing should be consistent.			X				Consistent.
Navigation Navigation, such as buttons or links, allows the user to move throughout the program. Navigation should be consistent from page to page. Navigational aids, such as maps and menus, should be included for very complex programs. Some programs may opt to have bookmarking features or other restart points.			X				
Navigation Aids			X				
Consistency			X				
Restarting				X			
Bookmarking						X	
Pedagogy							
Methodologies			X				
Interactivity		X					
Cognitive Capacity Research has shown that only five to nine pieces of information can be stored in short memory at one time. Therefore, program information should be broken up and activies should be interspaced. “Page turners” and exceedingly long pages of text should be avoided and they are passive and may present too much information at a time.		X					
Cooperative learning						X	

Learning metaphor			X				
Learning strategies		X					
User Control and ease of use The user should be able to control extraneous options of the program, especially if audio or video is present. Programs that require user response should allow the user time to think and process information. It should be clear to the user when the program requires a response. Further the user should be clear on how that response should be made (click a picture, write in a prompt box, etc.)		X					
Questions		X					
Answering questions		X					
Quality of feedback Feedback Feedback should discriminate between right and wrong answers and it should be related to the user's input. The feedback should be presented so that it is clear, constructive, supportive and gains the user's attention. Small or single words tend to be disregarded by users. Slang or insulting remarks should not be used. Feedback should offer users a means to know when the have successfully completed the program.			X				
Format of feedback			X				
Mastery level		X					
Invisible Features							
Records and data						X	
Security and accessibility						X	
Too much data						X	
Robustness Robustness means that the computer program will not fail. As such, programs should be tested from the		X					

user's point of view. The program should further be tested under various conditions and on various operating systems and Internet browsers.							
For normal user actions		X					
For unusual user actions		X					
On different computers, software, and browsers		X					
Supplementary Materials							
Manual – general aspects						X	
Manual – program operation						X	
Manual – program content						X	
Auxiliary materials						X	
Other resources						X	
General Comments:							

Appendix E: (Continued)

Table 15 Design Validation of Prototype by IT Expert 2

	Excellent	**Good**	**Service able**	**Weak**	**Poor**	**N/ A**	**Comments**
Subject Matter It should not be assumed that users are automatically familiar with an organization of a program's content structure. Diagrams or maps are helpful to show users where they are or where they can go within the programs. Stereotypes and jargon should be avoided so that cultural bias may be prevented.							
Matches goals (no subject matter goal/entertainment)	X						
Content structure	X						
Content accuracy	X						
Language, style, grammar	X						
Reading Level	X						
Cultural bias-language	X						
Cultural bias-reference	X						
Technical items and jargon	X						
Spelling, grammar, and punctuation	X						
Glossary						X	
Hot words						X	
Auxillary Information Some programs may require auxillary information. This would include any documentation, directions, help or hints that pertain to the program.							
Introduction	X						
Directions	X						
Help						X	
Conclusion	X						
Affective Considerations Intrinsic and extrinsic motivation should be considered. The designer should seek to maintain challenge, satisfaction, attention and confidence in							

order to provide for intrinsic motivation. Although motivation should be a goal of the program, it should be balanced with instructional features. Assessments and feedback should be designed to increase ease-of-use and lessen anxiety.							
Motivation	X						
Interface							
Displays - Aesthetic quality should be considered in screen design. As such, screens should be uncluttered and all matter should be relevant to the program's goals. The order of information should flow from the top left to the bottom right.	X						
Presentation modes – All elements, including but not limited to text, graphics, video, audio, and color, should only be used when appropriate. Text should not be too long on any page as to control for excessive scrolling. Any video or audio should have accompanying controls so that the user may adjust or turn off sound or speed. It should be considered that video, audio and intense graphics tend to load slowly. Thus, the necessity of those elements should be weighed. Download times need to be acceptable.	X						
Text quality		X					
Animation & Graphics		X					
Audio						X	
Video						X	
Input	X						
Spacing – conventional spacing rules should be	X						

used within text, and spacing should be consistent.							
Navigation Navigation, such as buttons or links, allows the user to move throughout the program. Navigation should be consistent from page to page. Navigational aids, such as maps and menus, should be included for very complex programs. Some programs may opt to have bookmarking features or other restart points.							
Navigation Aids	X						
Consistency	X						
Restarting						X	
Bookmarking						X	
Pedagogy							
Methodologies	X						
Interactivity	X						
Cognitive Capacity Research has shown that only five to nine pieces of information can be stored in short memory at one time. Therefore, program information should be broken up and activies should be interspaced. "Page turners" and exceedingly long pages of text should be avoided and they are passive and may present too much information at a time.							
Cooperative learning						X	
Learning metaphor	X						
Learning strategies	X						
User Control and ease of use The user should be able to control extraneous options of the program, especially if audio or video is present. Programs that require user response should allow the user time to think and							

process information. It should be clear to the user when the program requires a response. Further the user should be clear on how that response should be made (click a picture, write in a prompt box, etc.)							
Questions	X						
Answering questions	X						
Quality of feedback Feedback Feedback should discriminate between right and wrong answers and it should be related to the user's input. The feedback should be presented so that it is clear, constructive, supportive and gains the user's attention. Small or single words tend to be disregarded by users. Slang or insulting remarks should not be used. Feedback should offer users a means to know when the have successfully completed the program.							
Format of feedback	X						
Mastery level						X	
Invisible Features						X	
Records and data						X	
Security and accessibility						X	
Too much data	X						
Robustness Robustness means that the computer program will not fail. As such, programs should be tested from the user's point of view. The program should further be tested under various conditions and on various operating systems and Internet browsers.							
For normal user actions	X						
For unusual user actions	X						
On different computers, software, and browsers						X	

Supplementary Materials							
Manual – general aspects						X	
Manual – program operation						X	
Manual – program content						X	
Auxiliary materials						X	
Other resources						X	

General Comments:

An engaging and interesting activity! I suggest left-justifying the text under each screen (rather than centering it) for readability. According to Nielsen (2000), "Almost all text should be left justified. By having a steady reference point for the eye to start scanning, the user can read much faster than when faced with centered or right-justified text." (p. 126).

The word "pealing" should be "peeling."

One screen includes the following: "Click the "riddle" button below to answer the monkey-troll's riddle." For me, the button was actually to the right, not below.

Reference:
Nielsen, J. (2000). *Designing Web Usability*. Indianapolis, IN, New Riders.

Appendix E: (Continued)

Table 16 Target Audience Interview Questions

Target audience questionnaire (to be used in interview with children)
Have you read stories online before? If so, describe. Was this different? How?
Tell me about a time when you felt like you were controlling the story.
How did you feel about having to choose one option over another?
Give me an example of a time when it was easy to move around within the story. /not easy
Tell me about a choice you made when you were glad that you made that choice. /surprised by the result of your choice
What was your favorite part(s)? Why? (This could lead to question of input method – type, click, find picture, etc).
What parts didn't you like? Why? (This could lead to question of input method – type, click, find picture, etc).
What stories have you like better/worse/prefer to read?
Have you written stories in the past? Tell me about those.
How would you rate this story against any other story that you have recently read. (Next question would be based on participant's response on the spot).
Tell me about a character you liked? /disliked?
Tell me about any changes you would make to this story (pictures,activities or text, stayed with certain characters longer, not met certain characters).
Tell me what it was like being Mole, P.I.
Describe Mole P.I.s job.
How did you use the map?
How did you feel about making Mole's decisions for him? How did you feel about being responsible for what happened to Mole?
Descibe Mole P.I.'s personality – what do you like – how would you want him to be?

ABOUT THE AUTHOR

Denise Haunstetter is a Ph.D. candidate in Instructional Technology with a specialization in Childhood Reading at the University of South Florida. Her curriculum vita includes various published peer-reviewed articles and conference presentations in the areas of literacy and media technology. Affiliations include the Society of Children's Book Writers and Illustrators, the Association for Advancement in Computer Educations, and the College Reading Association. At the time of this writing, she is working on her dissertation on "Interactive Fiction."