

Exploring the Interaction Design of Electronic storybooks

Chen, Ju-Yuan, Senior Lecture

Department of Visual Communication Design, Jinwen University of Science and Technology, No. 99, Anzhong Rd., Xindian Dist., New Taipei City 23154, Taiwan, jullian@just.edu.tw

Abstract

People love stories and enjoy the plot, and today e-storybooks are available. Keeping the original taste of story narration, e-storybooks need the effects of multimedia like the “interaction” to make stories greater fascination. A story incorporates characters, plot, setting, happening, and other elements. The form meets children’s thinking and experiences the best among all kinds of children literature and acts as a good learning in education.

An interactive e-storybook has various ways of communication and multimedia reflections of plots. To take an “Exploring the Interaction Design of Electronic storybooks” by means of literature review and empirical analyses, this study explores the techniques to design an interactive e-storybook. The combination of the story narrating techniques and the multimedia shall produce the various teaching materials to be transmitted and shared. This study shall act as the basis of interactive e-storybook designing for designers and browsers so as to activate and enrich e-storybooks.

Keywords: Electronic storybook, Interactivity, Interactive design,

1. Introduction

The development of the internet and multimedia technologies offers us various alternatives to present the traditional media such as books, videos, and audio records. For example, an e-storybook composer can apply the multimedia features in the creative story presentations. An e-storybook producer can help the composer fulfill the story presentation by planning systematically and taking the good use of multimedia elements like animation, image, and videos. Moreover, the well designed browsing environment and interface are necessary to prevent the operational challenges from interfering with the interesting reading and appreciation. Consequently, the story narration with multimedia is a new challenge in terms of composition, production, and browsing. An interactive e-storybook, with various ways of communication and multimedia presentations of plots, provides more flexible and creative design for curriculum and better presentations of personal thinking. Besides the multimedia elements like video and image, the creative design becomes the essential feature of e-storybooks.

The e-publication of storybooks indicates the changes in the forms of composition and reading in addition to the changes in the publication form. This look into the creative design of e-storybooks focuses on the story design, the creative design, the design types of e-storybooks, and the interactive e-storybooks.

2. Story and Electronic storybook

A story, with the complete structure from the exposition through the conflict towards the dénouement, shall convey the author's "meaning." Surprising effects, conflict and barricades production, and suspense making techniques are used to narrate one happening or more.ⁱ A "story" consists of happenings, while a "happening" is composed of the "conflict/ barricades/ problems", the search for the resolution, and the outcome. A story composer should take the theme making, the subject selection, and the composition into account, for the design of an interactive e-storybook depends on the story itself, and for a touching film does not come out of a poor play. From the very beginning of producing an interactive e-storybook, the story theme and the composition nature should be fully commanded. A story, with the basic structure moving from the exposition to the dénouement, shall be "reasonable" enough to convey the author's "meaning."

In the literature, the term of "Electronic Book" first mention was by Van Dam. An electronic book is the medium to store and convey texts or image by electronic means in a broader sense.ⁱⁱ For Barker, an electronic book, a new form different from traditional paper book, also consists of many pages, but each page is the designed digital information. An electronic book can be seen as the active, multimedia collection of many interactive pages.ⁱⁱⁱ

3. Interactivity

Garrison holds that the interaction is the “mutual communication between two people or more for the purpose of explanation or challenges.”^{iv} Gilbert & Moore thinks that the interaction is the “mutual communication between two people or more for the purpose of missions, education, competition, or social relations in the learning scenario.”^v Rogers defines the interaction as the “participation of two people who can exchange their roles and control the other side’s argument during the communication.”^{vi} Anyway, the definition of the interaction emphasizes the idea of “exchanges” and “mutuality”, so the interaction acts as the “opportunity for the participants to build the mutual relation and to attend their communication.”

A. Interpersonal & Human-Computer Interaction

In interpersonal communication, the “interactiveness” is defined as the “mutual communication of information among a given sender and a given receiver, who exchange messages and feedbacks based on the other side’s reaction.” Rafaeli & Sudweeks says that the interactiveness is somewhat of the mutual communication of messages and has something to do with the previous messages. Expanding the participants’ range,^{vii} Schultz holds that the mutual communication shall not be limited between two people or in the face-to-face context, but the “serial correlation” among messages and the “responsiveness” between the communicators do play a key role in the communication.^{viii} Rafaeli & Sudweeks emphasizes the role exchange and mutuality during the interaction and sees the interactiveness as the context of communication for the simulation and the continual exchange. The constraint on the participants is produced during the exchange, and the participation in the communication interests the user. The whole communication process requires the mutual participation and discussion on the messages.^{ix}

The interactiveness is seen as a key idea and strength in computer communication. From the perspective of human-computer interaction, the interactiveness is the main ability of the electronic media and enables the new system of communication technology to make response to the user in the same way as interpersonal dialogues. Ha & James considers that the human-computer interaction exemplifies the human desire to build interaction for the demand. Many communication researchers adopt the face-to-face communication as the ideal standard for interaction and evaluate the interactiveness of the communication by comparing other types & contexts of interaction to the face-to-face communication.^x The richness of the face-to-face interaction becomes the goal for the human-computer interaction as well. For Graham, the interactiveness presents the combination of all the media in the digital way and somehow allows the user to interact.^{xi}

The interpersonal interaction is often used as one standard to evaluate the human-computer interaction and seen as the ideal standard for the human-computer interaction. However, Yi-Chien Lee holds that the two interactions are quite different: The user in the human-computer

interaction has limited control with the limited interaction within the area planned by the designer; the message exchanges in the interpersonal interaction are mutually dependent and dominated by the free, creative human thinking, which we shall tell from the close loop limited by the designer in the human-computer interaction.

The differences between the interpersonal and human-computer interactions are:

- (a). Interaction target: The former occurs between two people, while the latter occurs between a person and a computer.
- (b). Message exchange: The exchange is not limited in the former, but that in the latter is limited by the design and functions loaded on the electronic carrier.

B. Level of Interactiveness

The level of the “interactiveness” mainly depends on the type of interaction between the sender and the receiver and the controllability. Borsook & Higginbotham mentioned the seven elements of interactive. (a) Immediacy of response (b) Non-sequential access of information (c) Adaptability (d) Feedback (e) Options (f) Bi-directional communication (g) Grain-size.^{xii} From the seven elements for interaction, proposed by Borsook & Higginbotham, feedbacks and alternatives to meet different personal demands are required in this mutual type of communication.

The types of interaction between the software and the user act as the basis for Misanchuk to divide the interactiveness into three levels:

- (a). In the responsive interaction, the user’s reaction is limited by the stimuli fixed in the system.
- (b). In the active interaction, the user can build the information integration, choose the responses in the present system, and actively reflect her or his thinking and demands.
- (c). In the mutual interaction, at the highest level, the response between the user and the system changes in the similar way as the interpersonal communication, exemplified by the virtual reality and the AI (artificial intelligence).

Rafaeli & Sudweeks thinks that the idea of interactiveness has lately been applied in all the new media and should be divided into three levels:

- (a) Declarative communication: the traditional media like TV and radio broadcasting.
- (b) Reactive communication: one side makes response to the other.
- (c) Fully interactive communication: a communication situation in which the medium system simulates the social reality and which continues in a series.^{xiii}

No matter what the medium is, the communication process does not usually fulfill the complete interaction. The “fully interactive communication” has greater participation and communication than the “reactive communication”, which is greater than the “declarative

communication.” The three levels of interactiveness are not totally independent on one another: The situation of the fully interactive communication includes the reactive and declarative interactions, and the situation of the declarative communication includes that of the declarative communication. In the level of interactiveness, the fully interactive communication ranks first, preceding the reactive communication, followed by the declarative communication.

C. Interactive Design

Through the interface of the interactive software, the user experiences the learning opportunity provided by the software (to interact with the learning content) and communicate socially with other members (to interact with the learning community). In the consecutive analysis of the user's interaction process with the electronic book, the perception of the user's optic and auditory nerves conducts the “affective interaction” with the style and artistic design of the perceived interface, the “operative interaction” to key in the chosen route, the “cognitive interaction” with the message sent from the software and the active using opportunity provided by it, and the “community interaction” for the real-time or non-real-time contact or cooperation with other members. The main points for the design are as follows:

(a) Affective Interaction

Motivation, metaphor, situation, atmosphere, plot, characters, language, posture, action, culture, style, taste, page layout, and hues are taken into account by the design. The in-depth design of the affective interface has to refer to Humpherys' (1997) suggestion after examining the theater theories: The structure of the human-computer conversation and the design of the aspect like the emotional engagement and the meaning construction are to be considered in promoting the level of the user's deep interaction. In other words, the user's motivation has to be considered.^{xiv} As Hui-Ching Ji advises, the plot design and the integration of games, simulation, and challenges during the digital development shall perfect the story narration and engage the user more in the learning activities.

(b) Operative Interaction

The design takes the functions, the route list, the hyperlink, the competition, and the cooperation into account. Preece holds that only those users who can answer these questions are considered to have successful using experiences in a digital environment: Where am I? Where can I go? How do I go there? What have I seen so far? What else is there for me to see?^{xv}

(c) Cognitive Interaction

The contents of cognition are the media elements of a message, so the design gives consideration to: (1) The achievements, cognition, attitude, and skills of use, (2) The visual interface and the static & dynamic states, (3) The audio, music, and sound effects of the audio interface. The design shall provide the user an appropriate opportunity to explore, consider, and find the relation among messages so as to organize the messages and to solve problems by

means of understanding and summarizing the concepts.

(d) Community Interaction

The design gives consideration to the interpersonal interaction like e-mail, discussion and message boards, chat room, IM (instant messaging), and online meetings. A successful community is up to four elements: the stable interactive mechanism, the stable stream of people, the enthusiastic clients, and the hard-working manager. Since the community is based on the “relation”, the website designer and operator are advised to strengthen the material social interaction at the beginning of the website (such as the ice-breaking before the course starts in order to get the community’s identification and engagement) besides the simulated social interaction on-line so that the emotional contact among the community clients should be improved to enable the online interaction. The cooperation among the participants should receive consideration from the interactive design of the community’s learning cooperation.

The interactive design of multimedia shall enable the users to decide the order and speed of their browsing, and above all, what they want to explore or skip. The interactive design should consider where and how the users get the command as well as what the users may want to do at different times. Every product may have been created in different ways, but the basic requirement for the interactive design is simplicity, clarity, and ease of use.

4. Types of Interactive Design for E-Storybooks

The present e-storybooks are mainly played by computer CD-ROM or on-line. The types of interactive design are as follows:

A. Controlling Browsing Patterns

- (a) Tabbed Page: To browse page by page is the most common pattern so far. For example: “A surprise for Mitzi Mouse” “The Grumpy Bug” and “Color The Rainbow”.
- (b) Hyperlink: The hyperlink is designed into the story, exemplified by hyperlinks on some pages into the footnotes. For example: “You Be The Judge”.

B. Object Selection

- (a) Condition setting: The conditions are set to be fulfilled for the next page to browse. For example, some questions have to be answered, or some objects need selecting according to the requirement. The “Rubens Road Safety Adventure” is belong the kind of design.
- (b) Small animation: The small animation is designed on each page and to be appreciated by the browser’s click with the mouse.
- (c) Object dragging: During the plot, the characters or objects involved in the story can be clicked and dragged to other positions on the page.

C. Plot Development

- (a) Naming: In these stories, the participants can feel engaged by naming the important roles like the protagonists. For example: “Mermaid Interactive Storybook”.
- (b) Role Play: The readers can choose any role to play for their engagement. Some roles have been designed by the system, and some can be combined by the readers’ free choices of hair styles, faces, facial features, dressing, and modeling.
- (c) Story with Game: The stories are narrated with games incorporated into the plot. For example: “Something New On The Globe” and “Emily Elizabeth Goes To School”.
- (d) Different Narrative Points of View: The different role choices come to different approaches to a story. The compact disk of “The Mouse Bride” gives the browsers four roles to read the story and different feelings by the narration from the four points of view.
- (e) Multi-Channel Plot: The plot development, not limited in a single channel, is divided into two or more directions at a given turning point towards different dénouements.

D. User’s Participation

- (a) Story Chain: Generally, a story begins with a text or picture and continues with the following tellers. The story chain is group work.
- (b) Story Making: Like the story chain, a story begins with a text and continues with the participants’ composition. Unlike the story chain, developed by a group, the plot development is multi-channel and by many participants. For example: “Story Map”.
- (c) Story rewriting: A story is usually designed for the user to change the elements such as protagonists, plot, and setting. The story can be turned into another, exemplified by “Rewriting the Challenge of Composition Labyrinth.”

The design types of the present interactive e-storybooks have been introduced above, but the design types are not limited in these categories. For instance, the combination & changes of those types and the development of new types can produce more creation of interactive e-storybooks. The interactive design of e-storybooks includes the affective interaction in the situation, the operative interaction? in the browsing paths, the cognitive interaction? in the content, and the community interaction with other browsers.

5. Conclusion

The design of a good e-storybook begins step by step from the theme selection, through the script design, production, assessment & revision, the data collection, and the development of the operation manual, the learning package & the side products, to the publication. From the perspective of the interactive design, this study looks into the integration of e-storybooks into the users’ learning. When the multimedia element is introduced into the electronic version of storybooks, the good content, the consideration to the affective, operative, cognitive & community interactions based on the goals of use, the appropriate types of the interactive

design are all necessary. This study aims to be the reference for composers, browsers, and producers to design and develop outstanding interactive e-storybooks.

i

ii

iii **Reference**

1. Bordwell, D. and Thompson, K. 2001. *Film Art: An Introduction*. McGraw Hill, New York; pp. 384-430.
2. N. Yankelovich, N. Meyrowitz, N. Van Dam, October 1985. Reading and writing the electronic book *IEEE Computer*, 18(10):15-30,
3. Barker, P. 1992. "Electronic books and libraries of the future", *The Electronic Library*, Vol. 10 No.5, pp. 139-49.
4. Garrison, D. R. 1993. A cognitive constructivist view of distance education: An analysis of teaching-learning assumptions. *Distance Education*, 14(2), 199-211.
5. Gilbert, L., & Moore, D. R. 1998. Building interactivity into web courses: Tools for social and instructional interaction. *Educational Technology*, 38(3), 29-35.
6. Rogers, E.M., 1995. *Diffusion of innovations*. (4th ed.), Free Press, New York.
7. Rafaeli, S. and Sudweeks, F. 1997. Networked Interactivity. *Special Issue, Journal of Computer Mediated Communication*, 2(4), edited by F. Sudweeks, M. McLaughlin and S. Rafaeli, available online at <http://www.ascusc.org/jcmc/vol2/issue4/editorsintro.html>.
8. Schultz, T. 1999. Interactive options in online journalism: a content analysis of 100 U.S. newspapers. *Journal of Computer-Mediated Communication*, 5(1).
9. Ibid 7
10. Ha, L. and James, F. L. 1998. Interactivity reexamined: A baseline analysis of early business web sites. *Journal of Broadcasting and Electronic Media*, 42(4), 457-474.
11. Graham, L. 1999. *The principles of interactive design*. NY: Delmar.
12. Borsook, T. K., & Higginbotham-Wheat, N. 1991. Interactivity: What is it and what can it do for computer-based instruction? *Educational Technology*, 31(10), 11-17.
13. Ibid 7
14. Humpherys, S. 1997. Audience engagement with interactive multimedia: An overview of four research projects.
15. Preece, J. 1993. Human-computer interaction in the informatics curriculum. *Education and Computing*.

Web-site

- * A Surprise for Mitzi Mouse
<http://www.candlelightstories.com/D001/Mitzi1.asp>
- * The Grumpy Bug, Where Do Slippers Sleep?
<http://www.nickjr.com/>
- * Color The Rainbow
<http://www.storyplace.org/preschool/activities/colorstory.asp>
- * You Be The Judge
<http://michiganepic.org/YBTJ/YBTJ1.html>
- * Rubens Road Safety Adventure
<http://www.ruben.govt.nz/storybook.html>
- * Mermaid Interactive Storybook
<http://www.chickenofthesea.com/storybook.asp>
- * Something New On The Globe
<http://www.wubbiesworld.com/storybook.html>
- * Emily Elizabeth Goes To School
http://teacher.scholastic.com/clifford1/flash/story_4.htm
- * Rewriting the Challenge of Composition Labyrinth.
<http://funreading.educities.edu.tw/writing/vary.php>
- * Story Map
<http://www.readwritethink.org/materials/storymap/>

iv

v

vi

vii

viii

ix

x

xi

xii

xiii

xiv

xv