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# Stories From The Other Side of the Screen: Identifying Social Construction Within Educational Software

Brenda G. Matthis

## Description

Educational software programs are teachers, providing social construction with the lesson. How do we evaluate them? This is an excerpt from a Qualifying Paper Research at the Harvard Graduate School of Education, which included graphics screen images and detailed descriptions of narratives from mathematics software. This paper is available through the Monroe Gutman Library at Harvard University.

## Abstract

Designers of software programs provide their narratives, perspectives, and points of view through the software programs they develop, consciously and explicitly or not. As the providers of these narratives, the software designers are considered the authors of this medium. These authors' narratives contribute to the social construction of the users of the software as they gain cognitive instruction and entertainment. This is especially important to consider when it comes to educational software used by children in the classroom and in the home. The traditional process for the examination of narrative and content in a medium is a review. Narratives in software should be examined as other media, such as books, film, and music, are examined for their narratives -- but they are not. Assessments of current software review publications find their reviews of narrative incomplete or non-existent. Reviews of narratives are crucial in understanding the social construction children possibly could absorb from that software. Educators and parents are encouraged to design and use their own review criteria in selecting educational software for their classroom and children.

## There Are People Behind the Software

The concept that the narrative of the author is present in a medium has long been an accepted understanding. The narrative of media provides the audience with an indication of the social norms, rules, and understandings that together build a social construction. The audience experiences the information, learning, and entertainment of the media, and the social construction that is bonded to the information is also learned. We experience this phenomenon when we read books, listen to music, and view film. When reading *Cat On A Hot Tin Roof*, we are aware that the author Tennessee Williams is male, and if we

read the jacket cover or the novelist's brief biography in the book, we learn he is from the American South, lived in the period of the early 20th century, and other profile information. This knowledge of the author provides some understanding of his perspective and background, which can provide clarity to the story and to the reasons why the characters and story line follow a particular path. When listening to Mozart, we are aware of the culture, period, and musical influences that together provide a profile and perspective of this composer and the impact they had on his music. In the case of film, the director is considered the author or auteur 1 of the film although a team or crew of cinematographers, editors, and other film professionals have creative input. For example, Woody Allen is the author of his films despite the editors and other writers involved. His background as a New Yorker, Jew, and a neurotic is a self-acknowledged and well-documented point of view of his films; the audience is aware of the impact his profile has on his films.

There is an author in software programs, too. Authorship, commonly considered an issue of ownership, is defined in this discussion as "[T]he occupation or career of writing books, articles, etc. ... origin of work, esp. with reference to an author, creator, producer, etc." (Random House College Dictionary, 1984, p. 91). The authors of computer programs are software designers, developers, and engineers, and as authors they have narratives.

## **What is Story from the Other Side of the Screen?**

The entire software program is within the context of the author's narrative; i.e., the author's points of reference and ideas of what should appear on the screen, actions that are allowed by the program and the user of the program, characterizations that appear in the program, and the logic of the program, are at the design discretion of the software designer. These and many other components of the author's narrative together provide a social construction that is available to the user of the program along with the cognitive instruction. In his study of children who play Nintendo, Provenzo (1991) found that children begin to identify with the interpretations and reasonings of the storylines in the games as they played the game. In addition, if the game is engaging enough, the children will overlook interpretations of the story and characters so that they can continue to play the game. Once that connection is made, the child is in relationship with the software and, if the software remains engaging, the social construction provided will be accepted software program (Malone in Provenzo, 1991), the most common being characterizations of the agents<sup>3</sup>, and the logic and decisions allowed in the software.

These engagement strategies are successful. Children react strongly to character representations with whom they can identify and the actions they are allowed to take in software. In his study of children who play Nintendo video games, Provenzo found that children identify closely with the characters provided in the video games, and began to act out the software program (Malone in Provenzo, 1991), the most common being

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There are three major design features that are affected by the software's authors and very important in the engagement of the children to that software: characterizations by gender (Provenzo, 1991), ethnicity (Mander, 1991), and circumscription of the logic (Matthis, 1996) in the software. These design features are defined here as follows:

Gender is defined as male, female, or neither which would describe a character whose appearance seems gender-neutral, e.g., an animal or animated creation.

Ethnicity is any feature that suggests a cultural or racial background. Ethnicity is identified by skin color, speech accent, language spoken, and cultural name. An additional design feature that is included in this category is second language facility, where an additional language is provided in which to use the software, suggesting a cultural or ethnic provisional narrative.

Circumscription of logic is a narrative indicator created as a result of this research, and is defined as a design feature that makes a decision of logic in the software that could be left to interpretation. An example of circumscription of logic narrative is illustrated in a decision designed in the software program SimCity, a city development simulation game, where the child creates and develops a city. The child is guided in making decisions by the software's "rules for city development,"<sup>4</sup> which provides detailed reasoning for what the child, as city developer, can and cannot do, presumably imitating real-life. The experience of a real city development simulation is misleading for, when paying for taxes, the algorithm or basis for calculation for the tax bill is not provided.<sup>5</sup> Taxes are a primary concern in capitalist development but the software author did not provide this information. What is the narrative provided here? How was it decided that this lesson of city development is not provided? Is this a case of software designers' oversight? Did the software designers deem the information not necessary to know? How would this narrative differ if the software designers were H & R Block, Nintendo, or Scholastic?<sup>6</sup>

Regardless of the reason, the narrative result is: You don't need to understand, or be able to question, the tax calculations even after paying the tax -- pay the tax or you can't continue to play the software. This omission is significant in terms of narrative because the game's social construction is narrowed and, in this case, negatively circumscribed by the author, the software designer, by the withholding of important rules that provide learning and understanding of city development -- which is the purpose of the game. The player must adhere to the limits of the software, assume the narratives as provided by the

software, and absolutely follow the rules of the software -- or the child can't play.

Circumscription of logic is a manifestation of narrative that is not expected to be evaluated by review publications for three reasons. First, it is a new concept developed, in this research, out of the necessity to define a narrative structure embedded in the design and logic of the software. Second, the review publications examined to date, if they evaluate the design of the software, discuss these designs as features or options available for use. For example, the Design Features category of the review publication *Children's Software Revue* defines this category as "How 'smart' is this program?", and includes sub-categories such as "The program has speech capacity", and "A child's ideas can be incorporated into the program design in some way". Although these definitions are important to narrative in other ways, which is discussed in more detail later, they do not represent an evaluation of the design logic or decisions that can be made in the software. Third, circumscription of logic should not only be explicitly defined but have a method with which to identify its occurrence. This is very difficult to do since there are many types of logic that can occur in a software program, and such a method has not been found. However, the *SimCity* illustration does provide a skeletal framework with which to circumscription of logic identification method was developed by this researcher, referred to as COLIM.

## **Analyzing Narratives in Educational Software**

A diverse range of publications offer reviews of children's educational, entertainment, and edutainment<sup>7</sup> software, which include and are not limited to news weeklies, newspapers, software manufacturers, software magazines, digazines<sup>8</sup>, and periodicals. From these, review publications were selected that were not organizationally related to, or take advertising dollars from, software publishers, and whose sole purpose was the review of children's educational software. Based on these criteria, the review publications selected that examine educational software were *Children's Software Revue* (CSR), *The Computer Museum's Guide to the Best Software for Kids* (CMG), and the *International Society for Technology in Education's Educational Software Preview Guide* (ESPG).<sup>9</sup> Moreover, the publications's primary purpose must be the review of educational software for children.<sup>10</sup>

*Children's Software Revue*, edited by Warren Buckleitner, Ellen Wolock, and Ann Orr, is published six times a year, available by subscription (\$24) and website, and provides a mission statement in their publication: "Children's Software Revue helps teachers and parents better use computers with children by providing timely, accurate, objective information about the children's software market" (p.2).

*The Computer Museum Guide to the Best Software for Kids*, edited by Cathy Miranker and Alison Elliott, is a book last published in 1995 (\$14), and states: "[It] was conceived to fill a need at The Computer Museum. After a day of exploration, more and more

families would end their visit to the museum with a question: What software should we get for our children?" (p. ix).

The ISTE Educational Software Preview Guide is published each year after the meeting of the Annual Software Evaluation Forum, and available in hardcopy or disk from the participating institutions (\$10). "[It] lists favorably reviewed technology resources for instructional use in preschool through grade twelve. It is NOT a buying guide. It has been developed solely as an aid to educators in locating programs they may want to preview. The Consortium's participants recommend that all resources be previewed by educators to determine its suitability for their instructional programs and students" (p. vi).

Each review publication varies in purpose, structure, review criteria, the depth of the criteria, and the testers<sup>12</sup> used.<sup>13</sup> Children's Software Revue and Educational Software Preview Guide are published bi-monthly and annually, respectively, however the Computer Museum Guide is a one-time published book and doesn't indicate if follow-up publications will be available. The one consistency across these publications is the audience: parents and educators. These review publications also represent a broad range of availability, via subscription and web, bookstores, and educational institutions, respectively.

Mathematics was the educational software category chosen to be examined because it's considered an important skill for children to learn both by parents and teachers. Educational Resources (is an educational software and technology distribution house with 34% of the school market.<sup>14</sup> Each year they publish their Top Ten selling software by subject and genre<sup>15</sup>. ER's 1996 list of the "Top Ten" mathematic software sold to schools (Appendix A) was selected as the titles reviewed. These titles would represent the mathematic educational software most likely used by teachers and parents to teach mathematical concepts and skills in ER's market, and may infer the titles used in the remaining portion of the market.

## **Considerations for Evaluating Narratives in Educational Software**

Of the three review publications selected for examination, Children's Software Revue (CSR) , The Computer Museum Guide to the Best Software for Kids (CMG), and the ISTE Educational Software Preview Guide (ESPG), only CRS and CMG provided review criteria. It is the only selected review publication with criteria that explicitly address any the three selected manifestations of narrative: gender, ethnicity, and circumscription of logic.

CSR has six major review categories: Ease of Use, Childproof, Educational, Entertaining, Design Features, and Value. The "Educational" category is described as "What can a child learn from this program?", and provides thirteen evaluation sub-categories. Two of those sub-categories are "Content is free from gender bias" and "Content is free from

ethnic bias". There are no criteria that in some way addresses circumscription of logic. Each sub-category is rated, and the range includes A= Always, S.E. = Some Extent, N = Never, and n.a. = Not Applicable. A CSR software program review lists the average score for each of the six categories, and a total average score of the six categories' ratings. As a result, it is not possible to know the rating given for sub- categories such as "Content is free from gender bias" and "Content is free from ethnic bias", and determine how gender and ethnicity narratives appear in that software program.

ESPG did not publish the review criteria used by its Annual Software Evaluation Forum, stating only that "The products listed in [the] guide have been favorably reviewed at participating sites by knowledgeable computer-using educators. Placement of a title on a list and into specific subjects, grade levels, and instructional modes reflects the best judgment of the Consortium's participants . . . The Consortium's participants recommend that all resources be previewed by educators to determine their suitability for their instructional programs and students". Although its review criteria are not explicitly stated, there are several implied criteria:

The Consortium "lists favorably reviewed technology resources for instructional use" (p.vi).

Criteria: The software title must pass each of the participants' criteria, whatever those criteria may be.

Implications: As representatives of departments of education, computer consortiums, universities, and school districts , their recommendations imply expert knowledge. In the preface, the Guide states "It is NOT a buying guide...but an aid to educators in locating programs they may want to preview". However, software titles have been selected out at this point, and some criteria were used for that selection. That criteria could have included narrative in the form of checking for character representation and the software's logical design.

"Titles not included in the guide fall into the following categories:

Not yet widely reviewed,

not readily available to review,

unfavorably reviewed,

or outside the specified categories".

Criteria: Respectively: The software titles must be reviewed by a predetermined quorum of the Consortium's participants. The software must be readily available for review - defining what is meant by "readily available", e.g., on the market or a copy was purchased or made available to the Consortium. There are criteria with which to judge software as favorable or unfavorable (addressed in #1 above). There are specified categories into the software must fall.

Implications: There is a consensus that must occur to recommend a software title. Software must be available for review (the meaning is not provided). If a software title is reviewed unfavorably, it could be for any reason including narrative. Software may not be reviewed, perhaps because its category is not educational or instructional such as games or entertainment, or doesn't fit into one of the specified categories.

CMG uses an evaluation "checklist" and "constantly asked questions about the qualities [they] considered essential" (p. xii). This checklist has three categories: learning, looks, and longevity. In examining these publications' review for manifestations of narrative, three concerns developed:

Software review publications rarely evaluate for gender and ethnic narrative in educational software, and in the one case where these narratives are evaluated (CSR) the ratings are obscured and such content is not discernible from the review before the software is purchased by the teacher or educator (see #3).

There are occurrences of unstated criteria. These unstated criteria not only suggest that there are unstated yet explicit evaluations made on educational software, as in the case of the ESPG's Consortium, but that it is plausible that narratives are one of the possible criteria in the judgment of these software. If this is so, knowing what types of narratives were examined would provide insight into the social construction provided by the educational software reviewed, even if that software were favorably reviewed.

Rating obscurity is observed in some reviews published by CSR, and CMG does not provide a rating or discussion for the individual criteria or questions asked in each category. In the case of CMG, a one sentence description is provided to summarize findings, along with a starred rating for that category. An overall starred rating is given to the software title.

If there is to be an awareness of narrative in educational software, there must be criteria used for the recognition of narrative. The necessity of an awareness of narrative examined in books, music, and film is supported and maintained by teachers and parents (Delpit, 1995; Slade and Kelly and Oberg, 1997; Postman, 1993; Mander, 1991; Garrison, 1997; Ayers and Ford, 1996). It is curious that narrative examination in media has not crossed-over into software programs. Reflection on the development of review criteria for its media predecessors suggests several explanations for the absence of narrative review in software.

First, software programs are a new medium, and their use in schools as an educational tool is a very recent development. The review of software programs has not yet matured to the stage where narrative is reviewed as an important and required criterion, as in the other media. CSR is the first of the selected review publications to explicitly evaluate for narrative, as determined by this research.

Second, the creation of software review publications is a very recent occurrence. The software market is extremely lucrative and the opportunity to provide purchase recommendations is good for for-profit publications and the manufacturer. With the advent of software that teaches, a concern for the selection of appropriate software for children has resulted in the development of non-profit software review periodicals; one of the earliest being CSR in 1991.

Third, narrative in digitized media is a very new concept. The challenge to understand how modern media affect our perceptions of ourselves and social construction continues, and this issue is still debated in discussions on the impact of television and film (Cosby, 1994; Davies, 1996; Szulc, 1997). As each new digitized medium is created, the narratives continue to exist in its content, but remain unaddressed until we learn to adapt to the new medium itself. Fourth, only recently were software programs considered as a technology containing a narrative or point of view (Matthis, 1997; Friedman and Nissenbaum, 1997). It was previously considered a tool or object that contained information but not necessarily a social construct.

The absence of the review of narrative in educational software is especially noteworthy since narrative is a key component used by software publishers to engage the learner in the program. Without an intriguing, attention-getting character, action, or fun purpose, the software is not expected to succeed (Blank and Berlin, 1991; Burton in Baker, Clay, and Fox, 1996; Davies, 1996; Provenzo, 1991). But are those narratives helpful or hurtful as they are absorbed by the learner? And how would teachers and parents know this if the criteria for checking narratives are included in the software review process?

## **Conclusion**

The challenge for parents and educators is to find not only the most appropriate software for their children, but the most appropriate software review publication on which to base their selections.

Just as parents and educators are learning how to purchase software, and to know the criteria on which to base that purchase, they must also learn how to select a review publication that will guide them in that purchase.

Based on this research's theory that gender, ethnicity, and circumscription of logic are the major software design features important in the engagement of children, Children's Software Revue and the Educational Software Preview Guide are recommended review publications for parents and educators to guide them in their purchase of educational software. Children's Software Revue checks for the author's narrative by rating the gender and ethnicity content bias in software titles; however, the actual content bias ratings are obscured by the rolling of these ratings into the review's overall rating, and as a result they can't be known to the reader. For this reason, CRS receives a provisional recommendation. If CSR corrects this obscurity by publishing the actual gender and

ethnicity content ratings, it will take a tremendous step forward in providing more pertinent review data to parents and educators. The Education Software Preview Guide is an expansive list of educational software titles with unparalleled categorizations by genres, subjects, instructional modes, grade levels, and operating systems. ESPG does not publish any selection criteria because it states it not a buying guide, although there is a selection process for the list. For this reason, ESPG receives a provisional recommendation. If ESPG published its criteria, including narrative for educators and parents, it will become an unprecedented review publication -- providing reviews of importance and depth for a large number of titles. The Computer Museum's Guide to the Best Software for Kids is not recommended, as it does not check for narrative; and because it is a book, its opportunity to develop and publish new criteria with new software titles is eclipsed by the frequency of publication by CSR and ESPG.

There are presently great efforts being made in school reform, involving the assessment and standardization of teaching methods and measurement tools, which may not be enough. There must be understanding and concerted effort made by educators to evaluate software for narratives, as they would for literature, film, and television programs.

Implications for educational software in the future partially lies in the technology. Video games enjoyed high success because of its fast rate of animation, which is now possible in computer software. The demand to illustrate more complex imagery and faster action, and therefore narrative, fuels the need for faster technologies. We must all keep watch to make certain that the need for speed doesn't eclipse the need to check for narrative.

## Notes

Auteur is the present theory of authorship in filmmaking (Kracauer, 1960).

The word play is commonly used to describe the use of the software.

Agents are characters in the software through which the child takes action or gets direction for the software's use.

This description is from the SimCity box.

This example may not be seen in the updated SimCity 2000 program.

H&R Block, Nintendo, and Scholastic representing home productivity software, game software, and child education software developers, respectively.

Edutainment is a market term for software considered (usually by the manufacturer) both educational and entertainment. It is mentioned here because it is well known but it is not considered by this research as a measurable term, and the term is not used by review publications.

Digizines are magazines on cd-rom.

These publications' lack of review bias based on a relationship with the manufacturers did not eliminate other problems that impacted the review of the software, such as the lack of robust evaluation criteria and biases toward high level production values.<sup>9</sup> Selecting out review publications based on their relationship with software manufacturers was maintained, however,

to control for this bias and observe other biases more clearly, as discussed later.

Each publication was read fully for its content and stated purpose.

Boston, Massachusetts.

CSR also uses "children, and their parents and friends"; CMG "...consulted educational specialists, multimedia experts, developers of both software and hardware. And they've worked closely with children and parents"; ESPG states that "Compilation of the ..[guide]..was the major purpose of the Software Evaluation Forum, held at Lesley College, Cambridge, MA, on April

18-21, 1996."

This is true even for review publications not chosen.

Based on information from Educational Resources ([www.edresources.com](http://www.edresources.com)).

Software genres include, and are not limited to: Authoring System, Computer Programming, Presentation, Drill and Practice, Education Game, Entertainment, Exploration, Internet, Problem Solving, Reference, Simulation, Tool, and Tutorial (ESPG)

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