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3.0 hypermedia presentation software that supported text, audio, video, and
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differences and similarities between the younger (6-7) and older (8-9)
children. Younger children preferred to create linear hypermedia stories
(beginning, middle, and end), whereas older children preferred nonlinear
programming. Additionally, younger children were less comfortable drafting on
the computer, choosing instead to use concrete materials (paper, crayons,
scissors, watercolors, and markers). Older children overwhelmingly preferred
to draft on the computer in HyperStudio. In general, all participants
exhibited high motivation and intense focus in all aspects of the program,
particularly for their work on the computers. Findings indicate the need for
early childhood educators to evaluate the curriculum, instruction, and
assessment process for writing with hypermedia. (Contains 24 references.)
(Author/LLP)

The Synthesis of Writing Workshop and Hypermedia-Authoring: Grades 1-4

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Abstract

A process writing and hypermedia literacy program was designed, taught, and evaluated by early childhood teachers. The program, funded through a Goals 2000 grant, took place in a public school summer camp for children ($n=160$) ages 6-9 in a public school in rural northeast Mississippi. Reactive-participant data collection methods were used to enable the teachers to react to the needs of the children while collecting data on their experiences. Children experienced an 8-week process writing/hypermedia curriculum that required each learner to create a "hypermedia story" using HyperStudio 3.0. Process writing consisted of children engaging in writing using five discrete stages: (1) brainstorming, (2) drafting, (3) revising, (4) editing, and (5) publishing. Hypermedia-authoring took place through the use of HyperStudio 3.0 hypermedia presentation software that supported text, audio, video, and graphics tools. Field notes were analyzed using pattern matching and revealed differences and similarities between the younger (6-7) and older (8-9) children. Younger children preferred to create linear hypermedia stories (beginning, middle, and end), whereas older children preferred nonlinear programming. Additionally, younger children were less comfortable drafting on the computer, choosing instead to use concrete materials (paper, crayons, scissors, watercolors, and markers). Older children overwhelmingly preferred to draft on the computer in HyperStudio. In general, all participants exhibited high motivation and intense focus in all aspects of the program, particularly for their work on the computers. Results indicate the need for early childhood educators to evaluate the curriculum, instruction, and assessment process for writing with hypermedia.

Background

The current case study was conducted in a public school summer camp titled "Summer Art Integration: Reading and Writing through the Arts." The summer school was funded by a Goals 2000 grant to meet the needs of the children in grades 1-4 who were identified by their classroom teachers as performing poorly in literacy areas of the curriculum. The role of the authors of this study was to direct, teach, and evaluate the

11/20/01 6:13 PM

writing instruction of the camp by collecting data via field notes responding to students interacting with hypermedia software. The field notes included observations, interviews, and examinations of narrative samples. The writing program that we designed integrated the Writing Workshop approach (Graves, 1983; Calkins, 1983) (http://www.ncrel.org/sdrs/areas/issues/methods/instrctn/in5lk11.htm) and hypermedia-authoring[1] using HyperStudio 3.0 (Wagner, 1998) software (http://www.hyperstudio.com).

Process Writing: Writing Workshop[2]

Writing Workshop was first developed by Graves (1983) and structured the teaching of writing into five categories: (1) brainstorming, (2) drafting, (3) revising, (4) editing, and (5) publishing. Graves defined six key points inherent to the curriculum: (1) organize the classroom for writing by conducting group meetings; (2) inundate children with literature; (3) take the time to write while the children write in order to set the tone for a positive writing atmosphere; (4) conduct conferences with children at various stages of the writing process to empower the learner with skills to revise for meaning and edit for mechanics; (5) keep the mechanics of writing (usage, punctuation, and handwriting) separate from the construction of the content of writing; and (6) observe, assess, and record how your students develop as writers, through journaling and creation of record-keeping portfolios (collections of students' works). Graves (1983) derived these six parts to clarify the enacting of the process-oriented writing curriculum in his Writing Workshop curriculum model.

While Graves (1983) generally discussed the transformation of an entire classroom into a Writing Workshop, Calkins (1983) provided the practitioner, in *Lessons from a Child,* with the perspective of the individual child's experience as a developing writer in a Writing Workshop environment. Two main points were emphasized by Calkins within the Writing Workshop curriculum model: (1) after a period of time in a Writing Workshop, the student internalizes methods such as revision, as well as processes inherent in the other writing stages; and (2) conferencing, or the method of communication between teacher and child during Writing Workshop, can occur at any Writing Workshop stage and, more importantly, can be effectively accomplished via peer conferencing. Thus, Calkins and Harwayne (1991) and Atwell (1998) extended the concept of Writing Workshop to include a student-centered approach via peer conferencing, as opposed to a solely teacher-directed approach, for the organization and practice of writing in the classroom (Strech, 1994).

Rationale for Hypermedia Writing Instruction[3]

Research from the late 1980s to present conducted on hypermedia writing curriculum revealed that writing instruction was facilitated in the following ways: (1) student cultural learning styles needs were met, (2) narrative and episodic story structure was enhanced, and (3) motivation to write was increased. Smith (1992) engaged Navajo elementary boarding school children (grades 3-6) in the implementation of the hypermedia authoring software Linkway, which supported the integration of text, audio,

video, and graphics for IBM-compatible computers, similar to HyperStudio (Wagner, 1998) for Macintosh and IBM operating environments. The children were led through the creation of stories and were encouraged to integrate familiar images in picture form into their documents. Results of the study indicated three benefits of hypermedia writing: (1) different cultural learning styles were met, (2) a student's lack of background experience was addressed in a meaningful way through the use of multimedia images, and (3) motivation was increased as evidenced by the children's fascination with the hypermedia writing environment. Daiute and Morse (1994) conducted an in-depth case study of eight children (grades 3-4) identified as reluctant writers. The study utilized Personal Media Studio, a multimedia writing program. Results of extensive narrative data indicated that, for both high-ability and low-ability participants, the learning of written language can be enhanced by multimedia environments. Students were highly motivated, particularly when they integrated pictures and sounds into their stories.

McLellan (1992), in case study research of a hypermedia writing curriculum, investigated how elementary students (grade 5) would excel in narrative writing in the HyperCard environment. Students developed their own stories and manipulated the nonlinear hypertextual features of the software. The level of details were strengthened in both narrative and episodic story structures, and McLellan noted that the children quickly adapted to the hypermedia environment.

Swan and Meskill (1996) found hypermedia to be a potentially suitable environment for literacy learning that included support for (1) independent learning, (2) cooperative learning, (3) nonlinear representations of knowledge, (4) a wide array of learning styles, and (5) enabling teachers to evaluate their own ideas of the role of text in the teaching of writing and reading. According to Ayersman (1996), constructivist theory supports the use of student-created hypermedia documents containing presentations with any combination of text, hypertext, graphics, audio, and video. Hypermedia attributes (text, hypertext, graphics, audio, and video) were identified as features conducive to the teaching of writing by examining the combination of writing with hypermedia elements (Takayoshi, 1996; Ayersman, 1996). Hypermedia documents contain hypertext, which was defined by Palumbo and Prater (1993) as dynamic text that allows the writer to connect text to another hyperdocument which in turn could also be connected or linked to other hyperdocuments. Thus, hypertext was thought to support learner-created, nonlinear formats as well as linear formats. Nonlinear hypertext is text not sequenced in the usual straight line consisting of a beginning, middle, and end. It was considered to be advantageous because it mirrored the associative manner in which people think (Takayoshi, 1996).

Additional reasons for hypermedia enhancing and supporting writing instruction were conveyed by Yang (1996), who stated that hypermedia writing environments can support a variety of cognitive processes conducive to the learning of writing by facilitating the processes of organizing, selecting, and connecting. These three processes identified by Yang were thought to enhance what Charney (1994) referred to as "idea manipulation" or discourse synthesis in writing (p. 239). Palumbo and Prater (1993) defined discourse synthesis as the hybrid act of reading and writing that occurs as information from a variety of sources is organized with hypertext.

Finally, the multimedia features inherent in hypermedia learning environments were identified by Daiute and Morse (1994) as conducive to the enhancement of young

children's writing. Daiute and Morse also found that student manipulation of sounds and images in the form of concrete cultural symbols may aid in the learning of text. They further rationalized that:

> Since some of the functions of written language, like providing information and means of expression, can be served by other symbols systems, it is worth exploring children's use of a variety of symbol systems and relationships between visual systems, aural systems, and text. (p. 221)

The fertile ground that hypermedia composing can support dictated that the writing/hypermedia program use a flexible, simple, yet powerful software environment.

HyperStudio 3.0 Hypermedia-Authoring Environment

HyperStudio offers a child-friendly, icon-driven, hypermedia-authoring environment. Children can create hypermedia (text, audio, video, and graphics) "pages" that can be simply programmed to allow the reader to travel from one chunk of information to another through the creation of nodes. A node is a piece of hypermedia programming that dictates the direction the reader of the document can move within a screen. This mode of travel, "hypertravel," allows the author to create linear or nonlinear travel within a document. The researcher/instructor of the current study used the Writing Workshop process to guide children through the curriculum. The mini-lesson (Atwell, 1998) served as a primary instructional method through which the children were guided through the writing process.

Mini-Lessons

For writing on paper, and learning and writing on HyperStudio, children took part in a series of mini-lessons (Atwell, 1998) designed to scaffold writing and computer skills through student-directed inquiry (Barrows, as cited in Checkley, 1997). During the initial stages (brainstorming and drafting) of creating stories in HyperStudio, students were assigned the task of using all tools in the HyperStudio Tool area to design their title card (a card being equivalent to a page in a book). Students then experimented with the Tool Box[4] by manipulating tools with the mouse and keyboard as they designed their cards. While no "right" answer existed for this problem-solving exercise, children discovered, as they created, the sophisticated functions of the tools as they needed them.

Each work session concluded with a summary meeting where teachers asked the children about their experimentation and creation on HyperStudio or paper. Teachers transcribed children's answers onto chart paper mounted on the wall. Taking dictation on chart paper served to focus the collective understandings of the children and disseminate knowledge learned by individuals to the group. Following the summary meeting, children engaged in reflective writing before making the transition to their next class. Children navigated the six stages of writing using both paper and pencil and HyperStudio in different combinations of transitions. Transitions called for children to either work on paper and make the transition to a computer, work entirely on the computer, or work entirely on paper.

Children were provided with several days of writing and HyperStudio open-ended exercises. Writing stages and methods for manipulating the numerous functions and

tools available in HyperStudio were discussed with the whole group, small groups, and individuals. Sessions consisted of a variety of problem-solving exercises. For writing, children were guided through Writing Workshop stages and asked to reflect on what worked well and what could have worked better.

In sessions for learning HyperStudio, the whole group as well as small groups participated in brief discussions of tool use, function examples, and interesting features via a television screen connected to a computer with a television-to-monitor adapter. The television was utilized to enhance discussions and demonstrations in the same manner a blackboard is used, affording children the opportunity to receive verbal and visual instructions during meetings before proceeding to the computers.

Assumptions of the Study

Based on this history, four assumptions guided this study. First, the teaching of narrative writing provides learning opportunity for analysis and reflection (Gearhart, Herman, Baker, & Whittaker, 1992). Second, the Writing Workshop approach represents an effective method for the teaching of narrative writing (Graves, 1983; Calkins & Harwayne, 1991). Third, appropriate integration of computers into the curriculum can enhance teaching and learning (Campbell, 1996). Fourth, teaching that provides children with ill-structured problems,[5] as opposed to well-structured problems,[6] offers child-centered problem-solving opportunities that enable children to apply knowledge (Barrows as cited in Checkley, 1997).

Questions of the Study

The question for this study was previously voiced by Takayoshi (1996) concerning writing in current computer environments: What will happen to the roles and processes of writers as they engage in hypermedia and hypertextual writing in a Writing Workshop environment? Three additional questions emanate from this primary question. First, at what Writing Workshop stage (inventing/brainstorming, drafting/composing, revising/conferencing, and editing/publishing) are children most comfortable and productive in making the transition from paper to computer? Second, how do children prefer to manipulate hypermedia and linearity in their narratives? Hypermedia, as referred to here, contains information from a variety of media including text, video, sound, and graphics (Palumbo & Prater, 1993). Linearity, for HyperStudio-created narratives, represents the linking of HyperStudio cards (or pages) in linear or nonlinear order. Third, if children write a story on paper and then transcribe it onto HyperStudio, are certain hypermedia elements (video, graphics, and audio) utilized by the children to replace text where meaning would be understandably equivalent, or are hypermedia elements utilized to add to the narrative without replacing text?

Design

Participants

Student-participants (n=160) in this study were first- through fourth-grade children, from one elementary school in northeast-central Mississippi. The student body was predominantly African American, and students were selected for the study based upon their teachers' recognition of their literacy skill (reading, writing, and communicating) weaknesses. Permission for participants was retained by the teachers.

In addition to the two teacher-researchers, four teachers were selected based upon their agreement to teach the HyperStudio/writing curriculum. All four teachers were female (two African American and two European American). The four teachers participated in a summer technology and arts program and received HyperStudio and process-oriented writing curriculum training from the researcher. The teachers participated on a voluntary basis and signed a teacher consent form.

Action Research: Teacher as Researcher

Holistic single-case study design (Yin, 1994) was implemented in this study with the unit of analysis (Merriam, 1988) consisting of the children's experience in the curriculum. This design was selected to provide voice for unique situations such as the alternative curriculum examined here (Merriam, 1988). Additionally, this design allowed the teacher-researchers to avoid predetermined views of what data were "important" and what were "not important." This open-ended approach toward data collection was utilized to avoid teacher bias.[2] The subunits were the numerous transitions children experienced when writing on paper, paper and computer, and computer. For example, transitions from drafting to composing in HyperStudio or learning "Tools" in HyperStudio to publishing were observed because they defined the quality and organization of the experimental teaching and learning experience.

Data Collection

As participant-observers (teachers as researchers), the role of wearing two hats dictated that we employ reactive field-entry methods. Reactive field-entry methods call for the researcher to be available to children being studied, allowing the children to initiate contacts (Corsaro, as cited in Hatch, 1995). As a precaution against observer bias, when not teaching, teachers took advantage of free moments to engage in participant-observation methods of data collection. This data collection included run-and-write field notes, informal discussions, sample reflections, narratives, and child responses to questions regarding transitions from paper and pencil to HyperStudio software. These multiple sources of evidence were converged to insure the inclusion of as many perspectives as possible (Yin, 1994).

Analysis and Discussion

Roles and Processes of Writing

The roles and processes of writing with the addition of HyperStudio were affected in different ways. Children expressed pride and ownership in their paper and electronic narratives after engaging in the many weeks of problem solving required to create the narratives. Merely working on a computer at any Writing Workshop stage infused

excitement toward narrative writing. Child excitement and fascination with working in HyperStudio enveloped the Writing Workshop with a feverishly positive aura—perhaps, as Campbell (1996) relates, because intertextual experiences interweaving image, sound, and graphic forms mirror everyday environments. It is important to point out here, as did Kumpulainen (1994) in another study, that child excitement while using computers focused on the child's creation on the screen and not simply the computer itself, thus the effectiveness of the curriculum behind the computer use remains critically important. Many children viewed the computer as a facilitator of writing. Sarah, 8 years old, worked for an hour writing on HyperStudio and stated, "it's faster, you don't get tired, and you can erase easier." Bobby, a 6-year-old boy, commented about the benefits of writing on a computer, "it helped by giving me words and things like that." Whether real or imagined, the computer served as a comfortable and exciting environment for writing.

Transition Preferences in Creative Writing with HyperStudio

Older children preferred to avoid transitions from paper to computer, choosing instead to write in all Writing Workshop stages in HyperStudio. The drawback to this preference was that, as Takayoshi (1996) points out, discrete stages of writing so clearly demarcated on paper (brainstorming, drafting, revising, editing, and publishing) lose distinctiveness on the computer. Younger children tended to lose direction while creating their narratives in the beginning stages of Writing Workshop. For them, clearly demarcated stages of writing, so clearly evident on paper drafts, disappeared on the computer. Six-year-old Anthony, while working during the first draft stage of Writing Workshop, proudly answered the teacher's question of how his first draft was coming along, "I got to make my pictures, it was a dollhouse. I made bricks for my background. I started typing. My title was Hydraulics." Anthony, while undoubtedly engaging in worthwhile experimentation, lost focus that the five stages of process writing assuredly would have provided.

Preferences for Manipulating Hypermedia and Linearity

Initially children preferred to apply only linear formats (cards, or pages, sequenced in a linear order) to their narratives, but as they gained experience, in both HyperStudio and Writing Workshop, children tended to introduce nonlinearity (cards sequenced in nonlinear form) as embellishments to their narratives. Children expressed excitement when, in reading a HyperStudio stack (narrative made up of cards), they could travel in a nonlinear fashion. Perhaps this preference for nonlinearity derives from, as Palumbo and Prater (1993) point out, the true nature of associative thinking, which is nonlinear.

Text in Paper Versus HyperStudio Narratives

Younger children neglected to include complete texts from their paper-produced texts when they made the transition to HyperStudio, choosing instead to concentrate on using art and design tools. On the other hand, older children transcribed their complete narrative texts from paper drafts to HyperStudio drafts and chose to integrate hypermedia elements of sound, images, and design to enhance their original narratives.

Understandably, younger children lacked patience when it came time to engage in the menial task of transcription, whereas older children were so infatuated with putting their narratives onto the computer that the task was not perceived as an obstacle. Thus, for younger children, guided writing on the computer for the first draft stage of Writing Workshop can serve to alleviate problems of transcription, albeit with an accompanying loss of awareness of the discrete stages of Writing Workshop.

Conclusions of the Study

This study addressed the integration of narrative writing with hypermedia software. Two learning environments exceedingly conducive to student-directed problem solving indicated that children were motivated to express themselves when text and hypermedia elements were integrated. For example, during a problem-solving challenge, 6-year-old Sammy responded, "I like creating writing because we get to go on the computers, like the time the teacher told me to do something and I did not understand and I did anything and I did it right." Sammy felt the anxiety, the challenge, and reward that the integrated curriculum afforded him.

The current study illuminated the developmental manner in which child preferences progressed from the use of concrete materials to the use of hypermedia elements. Children ages 6 through 7 preferred to use such materials as paper, crayons, scissors, watercolors, and markers through four of the five discrete narrative writing stages (brainstorming, drafting, revising, and editing). These children tended to make the transition to the hypermedia environment only upon final electronic publication of their story. On the other hand, children ages 8 through 9 demonstrated their comfort in using hypermedia elements throughout all stages of narrative writing. These findings suggest that early childhood teachers need to be sensitive to the transitions that children experience when navigating from concrete materials to hypermedia elements within the five stages of process writing. In general, these findings are important for teachers who plan on integrating process writing and hypermedia in their classrooms in a developmentally appropriate manner. Further research into curriculum that integrates literacy and hypermedia is needed to develop appropriate teaching practices:

- Does the integration of process writing and hypermedia elements improve writing skill?
- What definitions and emphases of literacy do early childhood teachers have for children: primarily verbal/textual or inclusive of other meaning-based symbols—pictures, sounds, video, etc.?
- Do children need to learn how to express themselves in hypermedia in a world moving toward increasingly electronic forms of expression?
- Who controls how teachers integrate instructional technology into their classrooms: school districts, technology trainers, school-based administrators, or teachers?

The current study, conducted by teachers, emphasized a teacher-created curriculum and instruction with a high degree of experimentalism. It is the view of the authors that teachers must experiment and evaluate their own teaching and learning environments. Campbell (1996) articulated a similar sentiment by stating that research must critically examine instructional technology uses in alternative curriculum (Campbell, 1996).

Notes

1. Hypermedia-authoring, hypermedia composing, and hypermedia writing are used interchangeably, and all refer to an integration of writing curriculum using a computer environment, that is, "hypermedia" that supports text, audio, video, and graphics.

2. Process Writing and Hypermedia-Authoring sections are adapted from Mott (1998), an unpublished dissertation.

3. The current section is based upon Mott and Hare (1999), which further investigates the relationship between the use of hypermedia software integrated with process writing.

4. See HyperStudio Version 3.0 Tools at http://www.hyperstudio.com/downloads/index.html.

5. Ill-structured problems allow the opportunity for multiple avenues of exploration.

6. Well-structured problems contain predetermined solutions thus inhibiting avenues of exploration.

7. The qualitative approach adopted in the current study was designed as much to raise and identify questions emanating from the experimental curriculum as it was to formally evaluate the entire experience.

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