A STUDY OF CHANGE: HOW DID A NETWORK OF INSTRUCTIONAL DESIGN TEAMS INFLUENCE IMPLEMENTATION OF AN INNOVATION?

by

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Data evolving from the research project: (1) established that engaging instructional design teams in staff development fabricates an energetic, resourceful, support network that facilitates diffusion of an innovation; (2) identified characteristics of instructional design teams likely to forge a viable diffusion network; (3) indicated that engaging instructional design teams in staff development creates a microcosm of the classroom that accelerates change; (4) demonstrated that instructional design teams, as organized in this study, foster modifications in instructional practices, learning processes and outcomes of students, and teacher beliefs; and (5) supported the premise that merging the expertise of two generations (i.e., teachers and students) expedites integration of technology into teaching and learning processes.

Four implications flow from the findings of this study. Effective staff development requires (1) nurturing of relationships with potential adopters, (2) customizing the staff development for potential adopters, (3) associating curricular supervisors with families of schools (i.e., elementary, middle, high), and (4) considering a network of instructional design teams as the vehicle for diffusing other innovations.

ACKNOWLEDGEMENTS

If ever I do anything
to be proud of,
my greatest happiness will be
that I can thank you for that,
as I may do
for all the good that is in me.
Louisa May Alcott

Thank you, David Parks and Wayne Worner, for conceptualizing and actualizing a program which engaged me in active learning that nurtured the courage and the curiosity, coupled with the knowledge and the skills, to become an inquisitive, independent thinker.

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Thank you, Mother, for all the words which encouraged me when the way was hard, the hours were late, and the words were a struggle.

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Abstract

"It is hard to be a lone innovator" (Fullan & Stiegelbauer, 1991, p. 316). Hence, this study of change involved a network of sidekicks that evolved from staff development sessions--sidekicks more formally defined as an instructional design team comprised of a teacher, five students, and another adult serving as a support person. As a team--teacher, students, and support person--participated in a series of staff development sessions devised to develop their expertise with applications of hypermedia via the software program "HyperStudio" (Wagner, 1988-1994). Re-entering the classroom, this design team conveyed to classmates the verbal, visual, and audio potential of hypermedia applications; taught classmates how to use "HyperStudio"; and coached classmates as they created hypermedia productions related to classroom studies.

This research was an investigation of the link between staff development and implementing change in teaching and learning processes. In this study three instructional design teams engaged in a series of staff development sessions. During staff development and upon re-entry into classrooms to transfer knowledge and skills, the research documented the teams' impact on teaching and learning processes.

A review of literature related to the structure, content, and intent of staff development; change theory; and hypertext yielded a pre-study theory of change in teaching and learning processes leading to diffusion of innovations which guided this research (see Figure 1).

Pre-Study Theory of Change

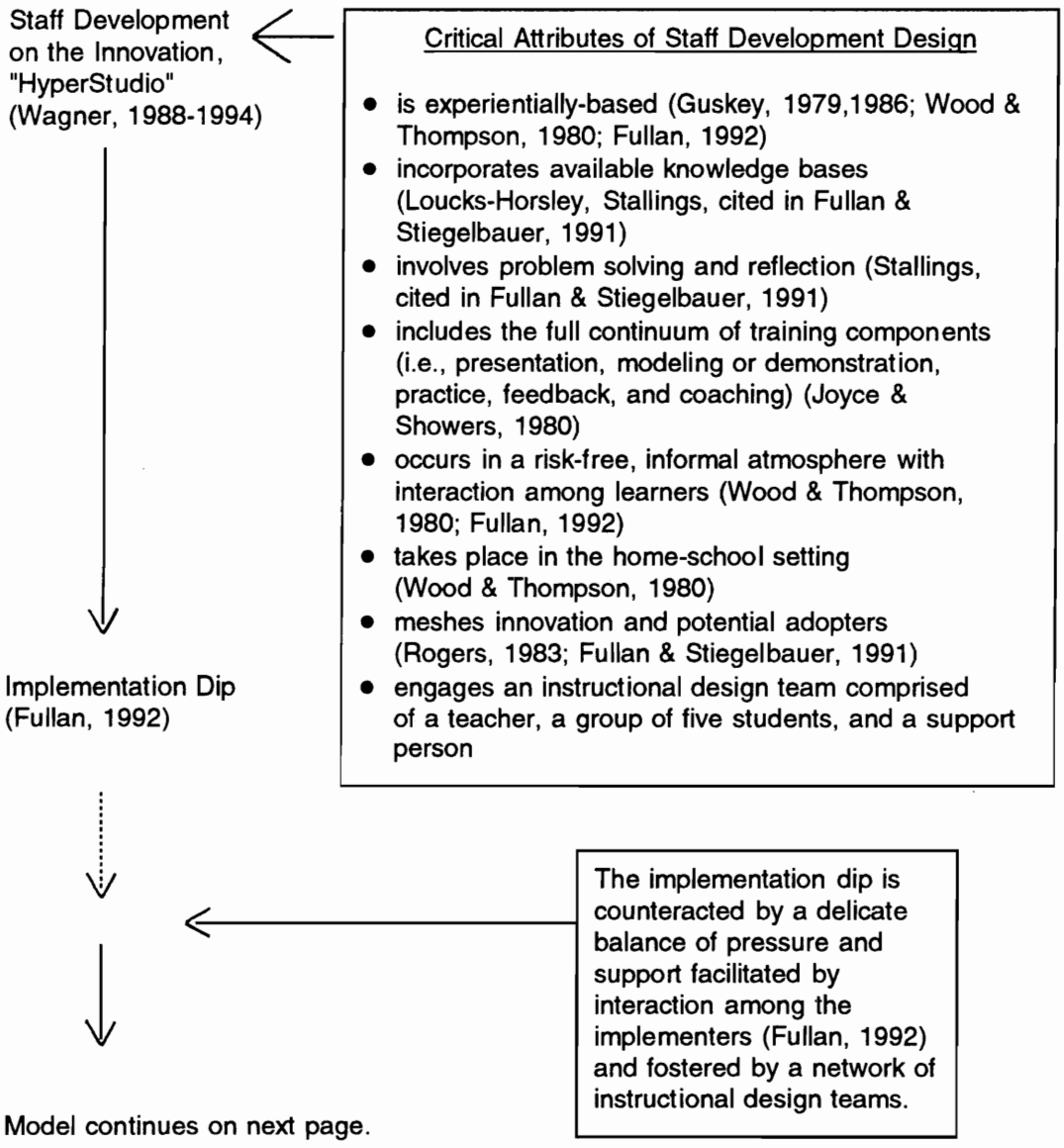


Figure 1. Pre-Study Theory of Change

Pre-Study Theory of Change

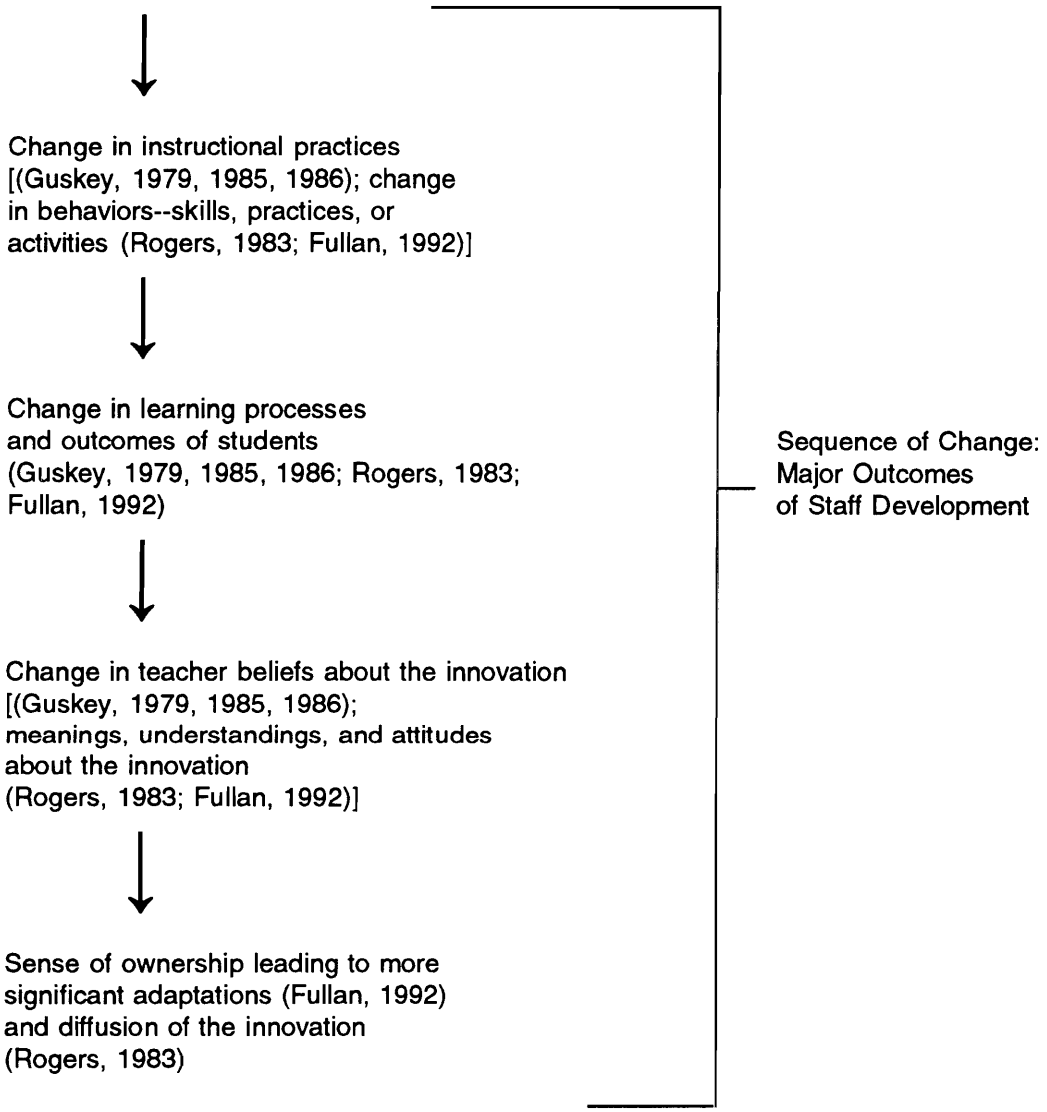


Figure 1 (continued). Pre-Study Theory of Change

Critical Attributes of Staff Development Design

This theory of change commences with a series of staff development activities; for in his research on change within an educational setting, Thomas Guskey (1979, 1985, 1986) asserted that staff development remains a critical component in nearly every proposal for initiating change in teaching and learning processes. For teachers, today, he maintained, remain in their positions for longer periods of time; and fewer new teachers enter the profession. Obviously, Guskey contended, fine tuning instructional skills or learning new strategies will require enhancement of the professional skills of present staff members rather than relying upon the infusion of innovative instructional theories and strategies via the tool kits of graduates entering the instructional environment.

> ***"the general endorsement of in-service education means nothing without an accompanying understanding of the characteristics of effective as compared with ineffective in-service education efforts" (Fullan & Stiegelbauer, 1991, p. 315).***

A review of salient research generated critical attributes of effective staff development, as featured in this theory, that contribute to adult learning which transforms classroom teaching and learning processes. Table 1 contains an elaboration of the critical attributes of effective staff development design with supporting sources.

Table 1
Validation of Critical Attributes of Effective Staff Development Design

	Critical Design Attributes		Validation
1.	Learn by doing. Engage in concrete experiences subsumed in available knowledge bases.	1.	Guskey, 1979, 1986; Wood & Thompson, 1980; Sparks, 1983; Stallings, Loucks-Horsley, cited in Fullan & Stiegelbauer, 1991
2.	Participate in problem-solving activities. Devote time to reflection during and following problem-solving activities.	2.	Sparks, 1983; Stallings, cited in Fullan & Stiegelbauer, 1991
3.	Engage in inservice activities which incorporate the full continuum of training components and levels of impact to maximize potential for application and transfer to the classroom (see Appendix A for summary of training components and levels of impact).	3.	Joyce & Showers, 1980, 1981; Sparks, 1983
4.	Work in a risk-free, informal atmosphere which promotes experimentation and interaction among learners.	4.	Wood & Thompson, 1980; Rogers, 1983; Sparks, 1983; Fullan, 1992; Little, cited in Fullan & Hargreaves, 1992

Table 1 (continued)
Validation of Critical Attributes of Effective Staff Development Design

	Critical Design Attributes		Validation
5.	Work within the home-school setting which accommodates the physical as well as psychological and sociological needs of adult learners.	5.	Wood & Thompson, 1980
6.	Mesh the innovation with the set of potential adopters. Filter the innovation to predict its likelihood of adoption by sifting through its relative advantages, compatibility, complexity, trialability, and observability for the potential adopters. Consider the conditions (i.e., readiness of potential adopters and their school's culture and resources) supporting the introduction of the innovation.	6.	Rogers, 1983; Fullan & Stiegelbauer, 1991
7.	It is the researcher's hypothesis that an instructional design team is a critical attribute of effective staff development design.	7.	The hypothesis is tested in this study.

The researcher concentrated upon the software program, "HyperStudio" (Wagner, 1988-1994), as the innovation--the focus of staff development. A software program for certain Macintosh and Apple computers, "HyperStudio" permits the author to create hypertext. Apt descriptions of hypertext include: nonlinear, multimedia, adaptive, and interactive. Via hypertext an author can convey meaning by "assembling abstract conceptual and case-specific components to stress the

interrelated nature of content" (Jacobson & Spiro, 1993, p. 3). Via hypertext the author can breathe meaning into text and arouse interest in content; for hypertext invites the infusion of audio and visual reality into otherwise traditional text. Hypertext is nonlinear text--text with a web-like system of navigation which grants the reader or consumer fingertip control of content, route of passage, and pace of movement within the parameters of the superstructure designed by the author of the hypertext selection (Spiro, Feltovich, Jacobson, & Coulson, 1991; Jacobson & Spiro, 1991, 1993).

> ***"Imagine a room piled full of index cards. Each card can hold not just a few scribbled notes, but many different things. A card can hold several windows of information, and each window might contain twenty pages of text. Also each card can have graphic information, pictures, placed anywhere on the card, or audio which plays when the card is retrieved. Most important of all, each card can have buttons placed anywhere on the card, and each button can connect that particular card to any other card or sequence of cards anywhere in that overflowing room" (Langthorne, 1988, p. 16).***

Consideration of criteria for selection of "HyperStudio" as the innovation (see Table 2) led the researcher to analyze the attributes of the innovation to predict its likelihood of adoption. Specifically, the analysis yielded the relative advantages of hypertext and revealed the

compatibility of the sophistication of the innovation and the technological know-how of the potential adopters. Additionally, the analysis of attributes indicated that the complexities of the software program could be mitigated by such strategies as hosting introductory, mini-sessions encouraging prospective team members to experiment with the software and employing visually-oriented instructional strategies during the introductory and staff development sessions (see Appendix B). A review of Alexander, Kulikowich, and Jetton's 1994 meta-analysis of hypertext studies yielded the effects of hypertext on acquisition of subject-matter knowledge and interest (see Appendix D).

Table 2
Criteria for Selection of Innovation

Criteria for Selection of Innovation	
1.	Via five characteristics, filter the innovation to predict its rate of adoption. Focus upon perceptions of: **relative advantage** (How much better is the innovation than the idea it supersedes?); **compatibility** (How consistent is the innovation with the existing values, past experiences, and needs of potential adopters?); **complexity** (To what degree is the innovation perceived as relatively difficult to understand?); **trialability** (Can the innovation be experimented with on a limited basis?); and **observability** (How visible are the results of the innovation to others?). (Rogers, 1983)
2.	Focus upon an innovation for which there is a state of **readiness** (characteristic of individual learners and the school's culture), with attributes that are **relevant** (a confluence of need, clarity, and utility), and **resources** (i.e., physical, financial, and psychological) which exist or are attainable. (Fullan & Stiegelbauer, 1991)

The researcher's analysis of conditions supporting the introduction of "HyperStudio" as the innovation appraised relevant prior experiences, understanding, commitment, and resources from the perspectives of key players (i.e., potential adopters, principal, significant others such as consultant and central office personnel) (see Appendix C).

These analyses supported the selection of "HyperStudio" (Wagner, 1988-1994) as an innovation which meshed with the characteristics of the potential adopters.

Unique to this staff development design were its participants--the potential adopters of the innovation. Contrary to a traditional audience of teachers assembled for staff development, participants in this research project comprised three, seven-member, instructional design teams which engaged in both the training and transfer segments of the research project.

Team one:	a grade four, classroom teacher; five of her students; and a second adult as a support person (aide in the computer lab and facilitator for the after-school technology club)
Team two:	a grade five, classroom teacher; five of her students; and a second adult as a support person (aide in the media center)

Team three: a grade six, classroom teacher; five of her students; and a second adult as a support person (reading specialist for the school)

Anticipation of the Implementation Dip

Despite keen attention to design attributes deemed critical to effective staff development, research supported the almost-without-fail occurrence of an "implementation dip" (Fullan, 1992, p. 25). Teachers, characteristically the target audience of staff development, typically return to their classrooms as lone innovators (Fullan & Stiegelbauer, 1991). Those courageous enough to experiment with implementation of the innovation are likely to encounter feelings of inadequacy, uncertainty, and insecurity engendered by gaps in burgeoning knowledge and concepts, unseasoned skills, and unanticipated problems associated with implementation.

> ***"The rhetoric of innovation underestimates, if it does not totally ignore, the real costs of attempting something new. Consider a few of them. Especially at the beginning, innovation is hard work. It can add significantly to the normal workload. As for increased competence on the job--another incentive--it is more likely that our competence actually decreases during first attempts at trying something new. Our tendency is to return to familiar ways of doing things, or to practice the new ways privately so as not to expose our inadequacies to peers and supervisors" (Fullan & Stiegelbauer, 1991, p. 318).***

Inherent in this project's training segment were research-based, design components specifically fashioned to counteract the peril of the implementation dip:

1. a home-school setting with a risk-free, informal atmosphere that encouraged interaction among learners (Wood & Thompson, 1980; Fullan, 1992)
2. experientially-based activities that incorporated available knowledge bases (Guskey, 1979, 1986; Wood & Thompson, 1980; Loucks-Horsley, Stallings, cited in Fullan & Stiegelbauer, 1991; Fullan, 1992)
3. problem solving and reflection (Stallings, cited in Fullan & Stiegelbauer, 1991)
4. the full continuum of training components (i.e., presentation, modeling or demonstration, practice, feedback, and coaching) (Joyce & Showers, 1980)

An additional design feature of staff development, incorporated to counteract the anticipated implementation dip, was the inclusion in staff development of the three, seven-member instructional design teams. This design attribute reflected the researcher's hypothesis that the three instructional teams would frame an infrastructure which maintained a delicate balance of pressure and support (Fullan, 1992) by weaving a peer network characterized by a high degree of interconnectedness (Rogers, 1983).

Sequence of Change: Major Outcomes of Staff Development

Guskey (1986) asserted that teachers were pragmatic people, willing to expend their time and effort in staff development sessions if they departed with "practical ideas that can be used efficiently to directly enhance desired learning outcomes in students" (p. 6). Fullan (cited in Fullan & Hargreaves, 1992) contended that "Educational change depends on what teachers think and do--it's as simple and as complex as that" (p. 38).

Change in instructional practice does not engender automatic change in teacher beliefs supporting sustained adoption and diffusion of an innovation. Intervening these two events, there must be convincing evidence of positive impact on learning processes and outcomes of students (Guskey, 1986; Fullan, 1992) or, as Rogers (1983) asserted, absolute evidence of relative advantage--proof that the innovation is more effective than the strategy that it supersedes. Once this evidence exists, the sequence of major outcomes of staff development coalesces into a sense of ownership by adopters leading to significant adaptations and diffusion of the innovation. The theoretical model for this research

project, designed to establish a diffusion network (Rogers, 1983) that initiated and sustained momentum of implementation and diffusion, reflected a research-driven, contemporary sequence for the major outcomes of staff development (see Figure 2).

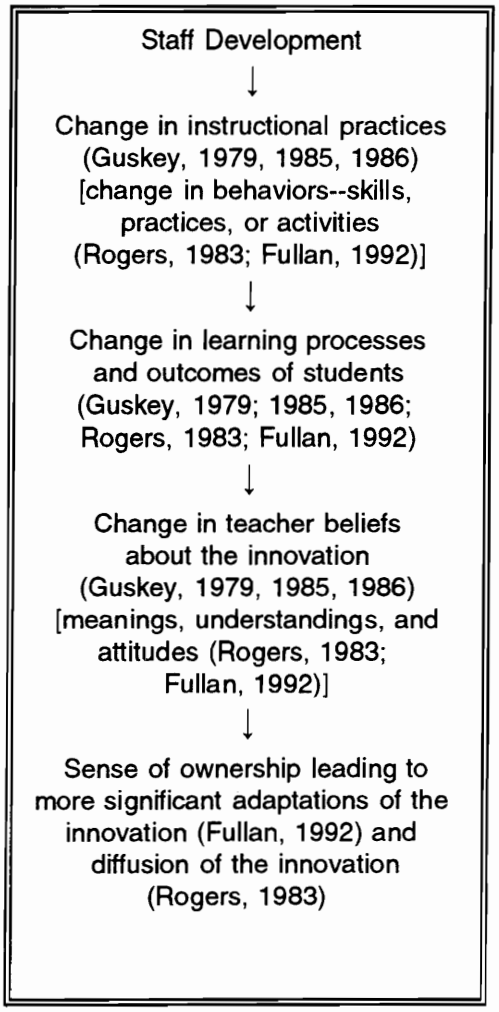


Figure 2.
Sequence of Change: Major Outcomes of Staff Development

Major Components of Research

Phase I: Training

Training was the first of two major components of this study. Figure 3 is an event flow network depicting the sequence of events which characterized the training phase of the study. Within the event flow network, the core elements of the training phase are identified by number and signified by bold outline. Table 3 contains a detailed description of each core element of the training phase, linked by number to the corresponding core element of the training event flow network. Additionally, Table 3 contains descriptions of the methodology used by the researcher to gather data about each core element.

Phase II: Transfer

Transfer constituted the second major component of this study. Figure 4 is an event flow network delineating the sequence of events which characterized the transfer phase of the study. Within the event flow network, each core element of the transfer phase is identified by number and signified by bold outline. Table 4 contains a detailed description of each of the core elements of the transfer phase, linked by

number to the corresponding core element of the Figure 4 event flow network. Table 4 also relates the methodology used by the researcher to gather data about each core element.

Note. Core elements of training bear thicker outlines. Numbers correspond to descriptive segments of Table 3.

Figure 3. Phase I: Training Event Flow Network

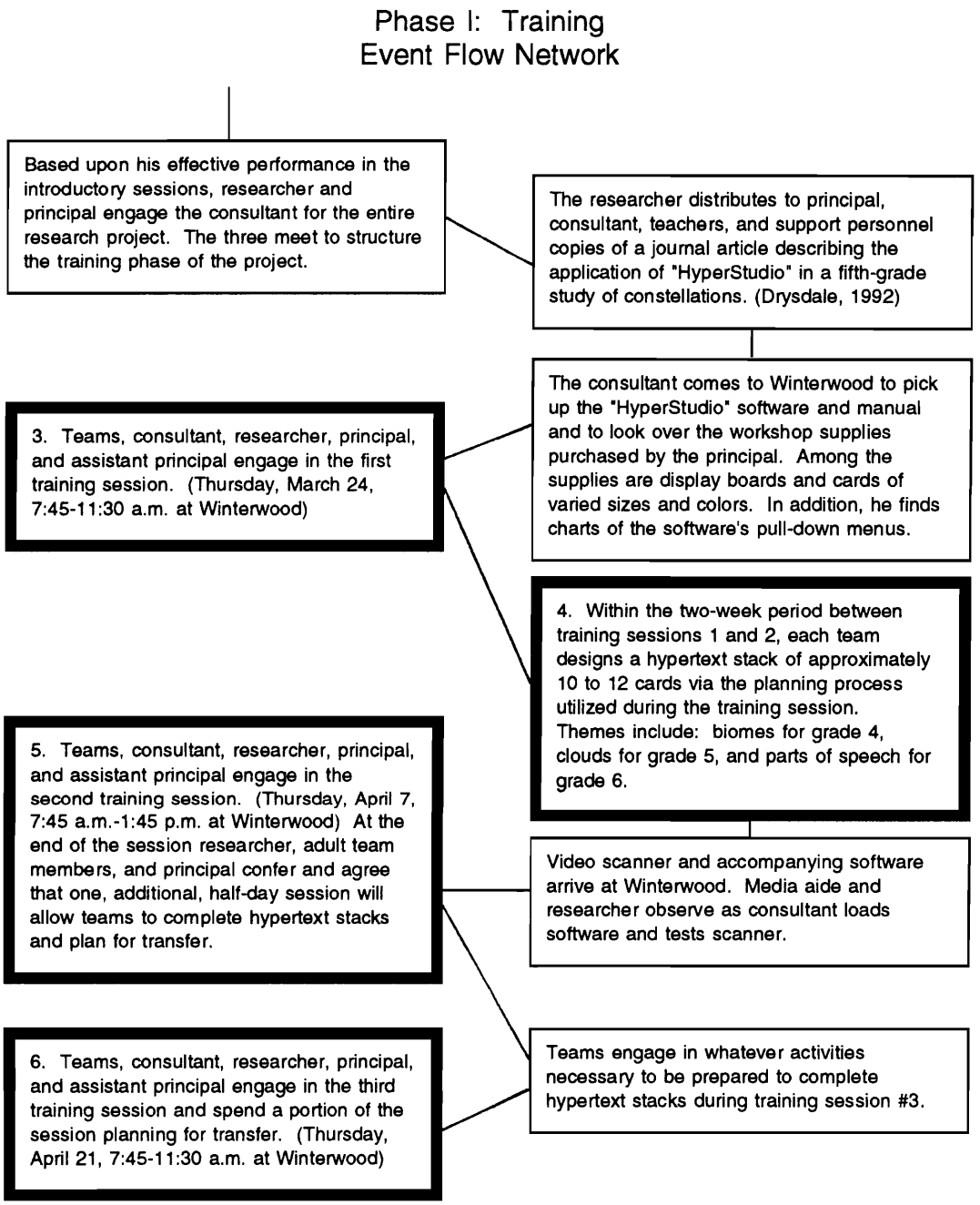


Figure 3 (continued). Phase I: Training Event Flow Network

Table 3
Description of Core Elements of the Training Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
1. two, after-school, introductory sessions on creating hypertext using "HyperStudio" a. audience: all interested teachers of grades 4, 5, and 6 and support personnel (i.e., teaching specialists and aides) b. schedule: February 16 and 23, 1994; scheduled from 2:30-3:30 p.m. but actually extended until 4:30 p.m. for those interested in staying c. facilitator: consultant with masters degree in English, teaching experience, and hypermedia design experience in academic and business environments d. content: introduced, via demonstration and hands-on experiences, concepts of multi-media and hypertext; specifically engaged participants in the production of a modest stack (at least two hypertext cards with connecting buttons) e. setting: groups of 3 to 4 adults working at each Macintosh computer in the school's media center	1. participation and observation by the researcher

(table continues)

Table 3 (continued)
Description of Core Elements of the Training Phase and Methodology for Gathering Data

	Description of Core Element	Methodology for Gathering Data
2.	one, pre-inservice, orientation session on "HyperStudio" a. audience: the fifteen students selected to participate as members of the three instructional design teams (five students from each of grades 4, 5, and 6) b. schedule: March 21, 1994; 1:00-1:50 p.m. c. facilitator: researcher and principal d. setting: clustering of 3 to 4 students at each of four Macintosh computers in the classroom of the reading specialist e. content: Via demonstration, discussion, and experiences centered around the "HyperStudio" preview disk, the facilitator acquainted students with hypertext and multi-media and introduced some of the specific components of hypertext (i.e., card, button, stack, transition effects, graphics, and animation).	2. a. video tape of the orientation session b. observation and participation by the researcher

(table continues)

Table 3 (continued)
Description of Core Elements of the Training Phase and Methodology for Gathering Data

	Description of Core Element	Methodology for Gathering Data
3.	first inservice session on "HyperStudio" for the three, instructional design teams audience: three, instructional design teams schedule: 7:45-11:30 a.m. 7:45-8:15 refreshments for all participants 8:15-8:45 introductions and opening remarks by the consultant 8:45-10:00 training 10:00-10:20 break and mid-morning snack 10:20-11:10 training 11:10-11:30 PMI (DeBono, cited in Beyer, 1987) session (Teams process and discuss plus, minus, and interesting or intriguing aspects of the day's training session.) c. facilitator: consultant d. setting: media center converted to a teaching lab for the day	3. a. personal characteristics of student team members, as well as behaviors reflecting these traits, rendered in written format by the classroom teacher who recommended the students for membership on the team (see Appendixes E, F, and G) b. personal and teaching characteristics of adult team members, as well as behaviors reflecting these traits, rendered in written format by the principal (see Appendix H) c. notes based upon observations of the researcher d. video tapes of the training session (three, stationary cameras--one focused on each team; one, roving camera, operated by the media technician for the school division) e. still photographs taken by the researcher

(table continues)

Table 3 (continued)
Description of Core Elements of the Training Phase and Methodology for Gathering Data

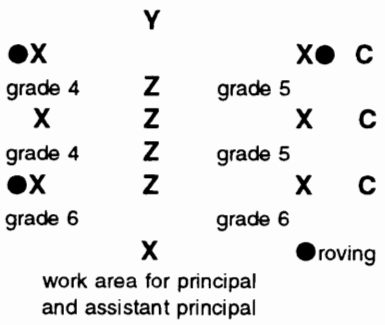
Description of Core Element	Methodology for Gathering Data
 **X=** cart with a Macintosh computer and a printer; one adult and two or three students per computer **Y=** work area for consultant; carts with computer, printer, LCD panel, and scanner **Z=** work tables with supplies (i.e., posterboard, tagboard of various colors and sizes, adhesive tabs, markers, scissors) **●=** stationary and roving video cameras **C=** charts with pull-down menus of "HyperStudio" e. content: The consultant begins with brief, introductory remarks about the nature of hypermedia and demonstrates a hypertext stack which illustrates fundamental concepts and basic vocabulary of card, navigation, button, and stack. The consultant guides participants through activities which acquaint them with fundamental skills needed to operate the Macintosh	(table continues)

Table 3 (continued)
Description of Core Elements of the Training Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
computer, critical components of the "HyperStudio" program (i.e., tool box, color palette, and options of the pull-down menus). He proceeds by introducing the intricacies of the "HyperStudio" program by leading teams through a color-coded planning process which generates the design of a five-card, hypertext stack on the theme of weather. Each of the six groups (two per grade level team) completes a planning board for the weather stack and, working at the computer, incorporates each component of the planning board into a hypertext stack. Teams assemble to discuss and record what members consider to be the PMI or plus, minus, and interesting or intriguing aspects of the day's session. The entire group re-assembles, and spokespersons for each team relate and explain the team's PMI responses. f. assignment: Before the second training session, two weeks hence, each team will design a hypertext stack (eight to ten cards) on its selected topic using the planning process employed during the training session. grade 4 topic: biomes	f. artifacts reflecting the outline of content for the weather stack and the details of the color-coded planning process (see Appendixes I and J) g. written feedback for the PMI process by teams (see Appendix K) and video footage of the sharing session h. written PMI feedback from adult team members following the training session (see Appendix K) i. PMI feedback, via follow-up interviews with researcher, from consultant and principal (see Appendix K)

(table continues)

Table 3 (continued)
Description of Core Elements of the Training Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
grade 5 topic: clouds grade 6 topic: parts of speech	
4. Planning phase: Within the two-week period between the first and second training sessions team members meet to design their hypertext stack via the planning board process introduced during the first training session. Grade four team members work together to design an eight-card stack reflected on one planning board. Grade five team members design one planning board displaying an eight-card stack. The grade six team splits into two sub-groups. Each sub-group designs a planning board comprised of ten cards.	4. a. video footage of portions of the planning process b. observation and notes by the researcher c. notes from conversations among team members and the researcher d. planning board for grade 4 hypertext stack on biomes
5. second inservice session on "HyperStudio" a. audience: three, instructional design teams b. schedule: 7:45 a.m. through 2:00 p.m. 7:45 a.m. refreshments for all participants 8:15-9:45 working session for teams and consultant 9:45-10:15 break with mid-morning snack 10:15-11:30 working session for teams and consultant	5. a. video footage of the session (three, stationary cameras--one focused on each team; one, roving camera--operated by the media technician for the school division) b. still photographs taken by the researcher c. notes based upon observations of the researcher d. written feedback for the PMI process by teams (see Appendix L) and video footage of the sharing session e. written PMI feedback, following the session, from adult members of the teams, consultant, and principal (see Appendix L)

(table continues)

Table 3 (continued)
Description of Core Elements of the Training Phase and Methodology for Gathering Data

	Description of Core Element	**Methodology for Gathering Data**
5.	11:30-12:15 lunch 12:15-1:30 working session for teams and consultant 1:30-2:00 PMI session c. facilitator: consultant d. setting: media center converted to a teaching lab for the day; same set-up as that for session one e. content: Each team spends the day converting the phases of its planning board into a hypertext stack. Two interpretations of the same planning board evolve from the two sub-groups of team four. Team five decides to "split" the conversion of its planning board, with each sub-group converting half of the cards, then merging the two stacks. The two sub-groups of team six proceed with the conversion of their two, separate planning boards. Consultation occurs, as needed, among members of a single team, across teams, and with the consultant. Team members work with the consultant, as needed, to incorporate sound via the microphone and image via the scanner. At the end of the day team members assemble to discuss and record what members consider to be plus, minus, and interesting or	

(table continues)

Table 3 (continued)
Description of Core Elements of the Training Phase and Methodology for Gathering Data

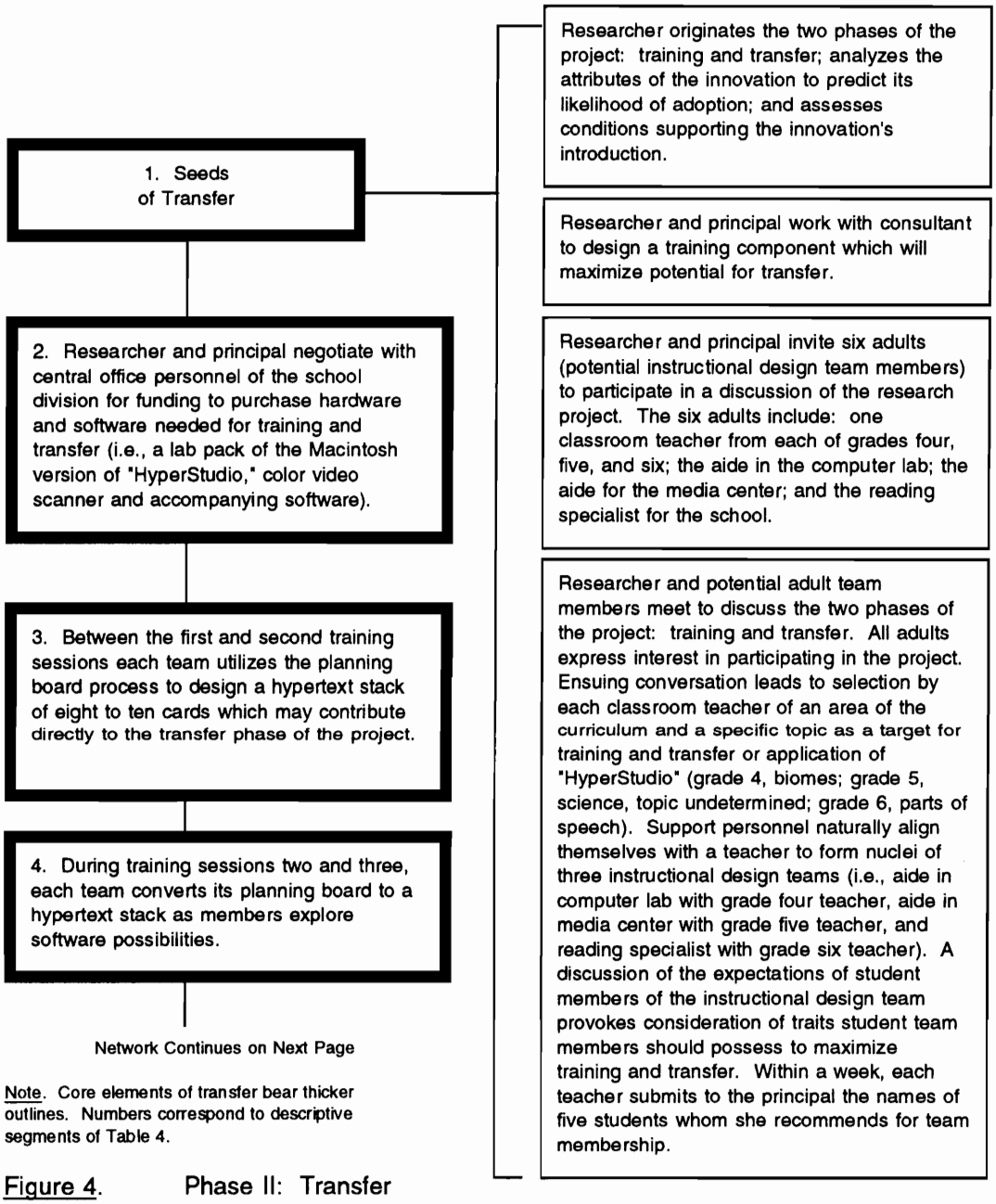
	Description of Core Element	Methodology for Gathering Data
	intriguing (PMI) aspects of the day's session. The entire group re-assembles, and spokespersons for each team relate the team's PMI responses.	
6.	third inservice session on "HyperStudio" a. audience: three, instructional design teams b. schedule: 7:45 a.m. through 12:00 noon 7:45-8:15 refreshments for all participants 8:15-10:00 working session for teams and consultant 10:00-10:20 break with mid-morning snack 10:20-11:15 working session for teams and consultant 11:15-11:45 individual team planning sessions for transfer of knowledge and skills to classmates 11:45-12:00 PMI session c. facilitator: consultant d. setting: media center converted to a teaching lab for the day; same set-up as that for sessions one and two e. content: Each team completes the conversion of its planning board design to hypertext. Consultation occurs, as needed, among members of	6. a. video footage of the session (three, stationary cameras--one focused on each team; one roving camera--operated y the media technician for the school division) b. still photographs taken by the researcher c. notes based upon observations of the researcher d. written feedback for the PMI process by teams (see Appendix M) e. written PMI feedback from adult members of each team, consultant, and principal following the session (see Appendix M) f. results of a forced-choice questionnaire completed by each team member during the week following the third (final) training session (see Appendix N) g. disk copies of the hypertext programs produced by the instructional design teams

(table continues)

Table 3 (continued)
Description of Core Elements of the Training Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
a single team, across teams, and with consultant. Each team shares its hypertext stack with other teams. Members of each team spend a period of time formulating plans for transferring their knowledge and skills of "HyperStudio" to classmates. At the end of the day team members assemble to discuss and record what they consider to be the plus, minus, and interesting or intriguing (PMI) aspects of the day's session. The entire group re-assembles, and spokespersons for each team relate the team's PMI responses.	

Phase II: Transfer
Event Flow Network



Note. Core elements of transfer bear thicker outlines. Numbers correspond to descriptive segments of Table 4.

Figure 4. Phase II: Transfer Event Flow Network

Phase II: Transfer
Event Flow Network

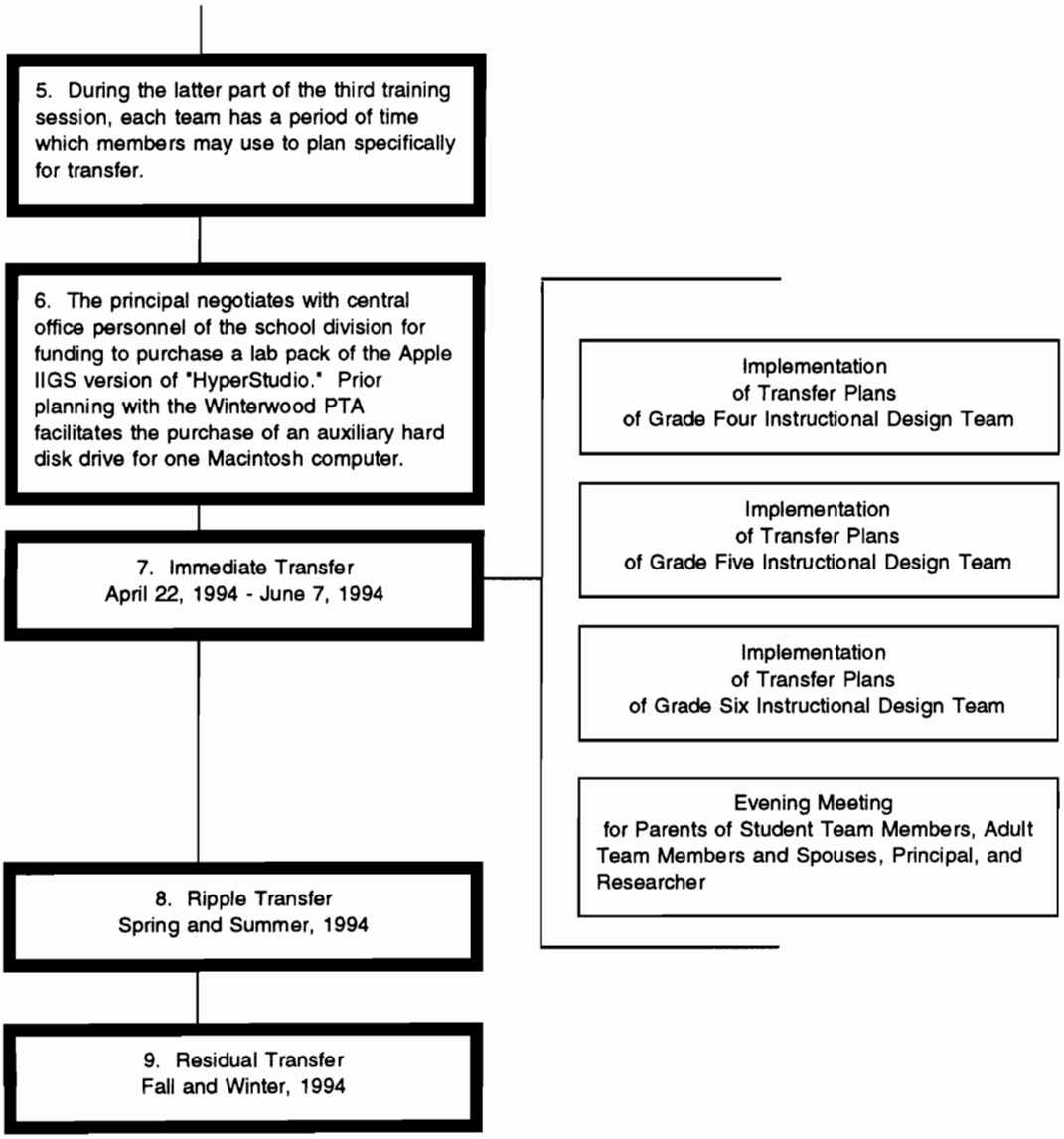


Figure 4 (continued). Phase II: Transfer
Event Flow Network

Table 4
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

	Description of Core Element	Methodology for Gathering Data
1.	Seeds of Transfer From its inception, design specifications for the research project included two phases: training and transfer. Thus, in their initial meetings, researcher, principal, and consultant concentrated on fashioning a training phase with design components which could maximize potential for transfer by instructional design teams upon re-entry to classrooms. Prominent among the design components were: (a) critical attributes of effective staff development design (see Table 1); (b) consideration of training components of effective staff development and concomitant levels of impact (see Appendix A); (c) formulation of three instructional design teams; (d) pre-assessment of the likelihood of adoption of the innovation, "HyperStudio," (see Appendix B); the conditions supporting the introduction of the innovation at Winterwood Elementary School (see Appendix C); and (e) visual representation of processes inherent in training (i.e., planning the content and	1. a. analysis of literature related to design components for staff development b. input from principal on personal and teaching characteristics as well teaching behaviors of potential, adult team members (see Appendix H) c. input from classroom teachers on characteristics and classroom behaviors of potential, student team members (see Appendixes E, F, and G) d. analysis of literature related to effects of hypertext on acquisition of subject-matter knowledge and interest (see Appendix D)

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

	Description of Core Element		Methodology for Gathering Data
	devising the navigational system of a hypertext stack) (see Appendixes I and J).		
2.	Researcher and principal negotiate for funding to accommodate acquisition of hardware (i.e., color scanner), software (i.e., lab pack of Macintosh version of "HyperStudio" software, software accompanying scanner), and consultant fees. Principal, via school staff development funds, defrays substitutes' pay to accommodate release time for adult team members during training sessions.	2.	notes on discussions among researcher, principal, consultant, computer representative, and various central office personnel of the school division (i.e., assistant superintendent, supervisor of media and technology, and director of staff development)
3.	Within the two-week period between the first and second training sessions, each instructional design team utilizes the planning board process introduced during the first training session to design a hypertext stack of eight to ten cards which may contribute directly to the transfer phase of the project. The grade four team designs an eight-card stack on five biomes--grassland, desert, aquatic, tundra, and forest. Initial plans for transfer involve teaching classmates to learn	3.	a. observations by researcher of the planning boards of the instructional design teams b. grade 4 planning board as an artifact of the design process c. video footage of portions of the grade 4 planning process

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
"HyperStudio" by adding cards which embellish information on each of the five biomes. The grade five team designs an eight-card stack on clouds incorporating original music, art, and poetry to illustrate types of clouds. Initial plans for transfer do not evolve at this stage of design. Each of the two sub-groups of the grade six team designs a planning board with ten cards related to the theme of parts of speech. Specifications for each card include the definition of the part of speech, a sentence using the part of speech, and a graphic illustrating the part of speech. Plans for transfer include using the stacks as examples of projects to be completed by each of the five groups of classmates who will be learning "HyperStudio" via the leadership of one of the student members of the grade six instructional design team.	

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

	Description of Core Element		Methodology for Gathering Data
4.	During training sessions two and three each team acclimates to the process of converting components of the planning board into a hypertext stack as team members explore the options of the "HyperStudio" software (i.e., various possibilities for graphics, animation, transitions, color, sound, and styles and sizes of fonts).	4.	a. video footage of training sessions b. disk copies of hypertext stacks c. notes based upon observations of researcher d. PMI (plus, minus, and interesting or intriguing aspects) data for the three training sessions rendered in written format by student and adult team members, consultant, and principal (see Appendixes K, L, and M)
5.	The latter portion of the third training session is set aside for teams to finalize plans for transferring knowledge and skills of "HyperStudio" to classmates. The grade four and grade six teams address such questions as: Who? What? Where? When? and How? of transfer, problems student leaders may encounter, and possibilities for direct application of "HyperStudio" (i.e., how to use the software as a tool for projects). The grade five team does not participate in this planning session. The grade five classroom teacher does not attend the third training session. With the assistance of the adult support person, the team completes its stack on clouds.	5.	a. video footage of portions of the processes of planning for transfer b. notes based upon observations of the researcher c. PMI data for the training session rendered in written format by student and adult team members, consultant, and principal (see Appendixes K, L, and M) d. written outline of transfer plans rendered by teachers of the three teams

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

	Description of Core Element		Methodology for Gathering Data
6.	Winterwood is equipped with nine Macintosh computers--one assigned to each grade level pod, K-6, and two assigned to the media center. There is a networked lab of 32 Apple IIGS computers. Because each team is transferring knowledge and skills of "HyperStudio" to approximately twenty classmates, the principal and adult team members decide to purchase a lab pack of the Apple IIGS version of "HyperStudio" software. The principal negotiates the funding for the purchase. Upon its arrival, the aide in the computer lab (support person for the grade four instructional design team) becomes familiar with the Apple IIGS version.	6.	notes based upon observations and conversations of researcher with adult team members and principal
7.	Immediate Transfer •grade 4 team: Each student team member leads a group of four classmates to design one card, via the planning board process, to be added to the biome stack produced during the transfer sessions. Using a Macintosh computer in the classroom, a group works approximately thirty minutes daily to convert the elements of the planning board into a	7.	a. video footage of portions of the transfer sessions b. still photographs of transfer process taken by the researcher c. results of forced-choice questionnaire completed by student and adult team members (see Appendix N) d. focus interview with all adult team members

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
hypertext card. While two groups work in the classroom at the Macintosh computers (one belonging to the grade four pod and one borrowed for the period), eight students and two student coaches work with the computer lab aide (support person for the grade four instructional design team) to learn to use the Apple IIGS version of "HyperStudio." They work their way through a hypertext format for a simulated state report--one application of "HyperStudio" which students may pursue as fifth graders. As the aide guides the group of eight students, the two student coaches render individual assistance to their four team members. (Prior to the lab sessions, student coaches have spent time in the lab with the aide during lunch periods and early morning learning the Apple IIGS version by working through the format for the simulated state report.)	e. focus interview with a representative group of the student team members f. focus interview with a representative group of the parents of student team members g. interview with principal h. disk copies of portions of hypertext produced during transfer phase
•grade 5 team: Catalysts for transfer for the grade five team evolve to be the computer lab aide and the media center aide (support personnel for the grade 4 and grade 5 teams).	

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
The computer lab aide negotiates with the teacher of the grade five team for the five student coaches to come into the lab during their lunch period for five to seven days to become familiar with the Apple IIGS version of "HyperStudio." Subsequently, ten classmates come to the lab for approximately thirty minutes per day for five days. Working with the aide and the five student coaches (two students per coach), students experiment with the Apple IIGS version of "HyperStudio" by working through the format for a state report fashioned in hypertext. Actual text for the report originates from data collected earlier in the year by each student. Negotiating for release time with the grade five teacher, the media center aide works with a limited number of the grade five classmates, approximately one hour a day for two days, to experiment with the Macintosh version of "HyperStudio" via a similar template for a state report.	

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
•grade 6 team: Each of the five student coaches assumes leadership of a group of three to four classmates with the assignment of the design and the creation of a hypertext stack on eight parts of speech. Specifications for the stack, devised by teacher and coaches, include: (a) title card, one card for each part of speech, and a credits card; (b) on each card related to a part of speech, include the definition of the part of speech, the part of speech in a sentence, and incorporate a graphic related to the theme of the card; (c) within the stack include at least one example of animation, sound incorporated via the microphone, graphic imported via the scanner, and graphic imported via clip art; and (d) examples of visible and invisible buttons. Initially, the teacher and coaches plan to use the Apple lab and the IIGS version of "HyperStudio." Frustration with the more limited options of the Apple version nurtures a plan B by the coaches and the teacher.	

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
Beginning with day two of transfer, the five coaches bring five Macintosh computers into their classroom (retrieved from other grade levels) and set up work stations in five areas while the teacher is taking care of morning activities (i.e., roll, lunch count). Initially, coaches work with teams to design and create hypertext stacks approximately thirty minutes a day. Eventually, teams are using any and all extra time (i.e., early in the morning, when they have time at the end of a class, leaving lunch early) to create their hypertext stacks. The two aides (i.e., computer lab and media center) are available for technical assistance and help with scanning. In the classroom of the reading specialist (support person for the grade six instructional design team) the five coaches are members of one of two teams participating in a simulation of two advertising agencies vying for the contract for a particular product. During the simulation, each team originates a product and devises an advertising campaign comprised of a billboard, a TV commercial, and a magazine advertisement.	

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
Members of the original grade six instructional design team teach ad agency team members to use the Macintosh version of "HyperStudio." Subsequently, ad agency team members use "HyperStudio" to create the magazine advertisement. Ultimately, an outside panel of judges scrutinizes the components of each campaign and awards contracts for the most ingenious advertisements.	
•evening parent meeting: All team members, parents of students, spouses of adult team members, principal, and consultant attend an evening meeting at Winterwood Elementary on May 31 from 6:00-9:30 p.m. setting: cafeteria and media center facilitators: students, principal, and researcher schedule: 6:00-7:00 p.m. dinner 7:00-7:20 p.m. introductions by principal and overview of the project by the researcher 7:20-8:30 p.m. explanations and presentations of stacks by students who created them in training and transfer sessions 8:30-9:30 p.m. discussion of	participation and observation by the researcher

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

	Description of Core Element	Methodology for Gathering Data
	project with individual adults and discussion of application of planning and team approaches in the business and collegiate environments; children working with parents at Macintosh computers to illustrate hypertext via "HyperStudio"	
8.	Ripple Transfer Spring and Summer, 1994 • April: author of "HyperStudio," visits Winterwood for a few hours to view stacks and talk with some of the team members; author uses two of the stacks (clouds--grade five and biomes--grade four) as illustrations during a keynote address and a "HyperStudio" training session at a state technology conference scheduled the weekend following his visit to Winterwood • May: A teacher from one of the division's high schools meets with the media center aide (support person for grade five instructional design team) to view the stacks produced by the students and to explore possibilities for application of "HyperStudio" in his classes. • July: The aide in the computer lab (support person for the grade four instructional	8. a. notes of researcher based upon observations and conversations b. researcher's attendance at the technology conference

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
design team) teaches "HyperStudio" during the division's two-week, summer enrichment program for approximately thirty-five, fourth and fifth grade students identified as gifted and talented. Students, engaged in a unit of study on international studies, learn to use "HyperStudio" and produce individual stacks on selected countries. • August: The aide in the computer lab (support person for the grade four instructional design team) teaches "HyperStudio" for two weeks to interested teachers participating in the division's summer technology lab. Among the participants is one Winterwood teacher who will be moving from grade three to grade five for the 1994-1995 school year. • September: At the middle school receiving the students and teachers who comprised the grade five and six instructional design teams, authors of the school's technology plan include the acquisition of "HyperStudio" software.	
9. Residual Transfer at Winterwood Elementary Fall and Winter, 1994	9. notes of researcher based upon observations and conversations

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
• During back-to-school night for parents in September at Winterwood, the teacher new to grade five (i.e., learned "HyperStudio" from the computer lab aide during the summer technology lab) presented a hypertext stack which she had produced on the Macintosh computer. She used the stack to convey to parents the nature of "HyperStudio" software and potential uses of the software by her students during the 1994-1995 school year. Student members of the grade four instructional design team, moving to grade five, participated in the presentation. • Principal facilitates release time for grade four and five classroom teachers for two, half-day sessions. Teachers spend the release time with the aide in the computer lab exploring "HyperStudio" software for the Macintosh and Apple IIGS computers. • Assistant principal and aide in the computer lab work with recommended fourth and fifth grade students to introduce them to the Apple IIGs version, then the Macintosh counterpart, of "HyperStudio." • Subsequently, a teacher and student members form a	

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Element	Methodology for Gathering Data
team which participates, during scheduled computer lab time, in "HyperStudio" training sessions facilitated by the support people of the three, original instructional design teams. Upon re-entry to the classroom, the teams transfer knowledge and skills of "HyperStudio" to classmates. • Via a divisionwide allotment per school (i.e., $60.00 per child) at the beginning of the 1994-1995 school year for the purchase of hardware, the Winterwood staff will acquire additional Macintosh computers, additional printers, and a camera to use with the computers for direct video input. Adjacent to the existing Apple IIGS lab, the staff will establish a Macintosh lab which will be arrayed as the media center was arranged during the initial "HyperStudio" training sessions. Training teams will have the option of moving multiple numbers of Macintosh computers from the lab into the classroom for transfer sessions. • With school funds, the Winterwood staff purchases software which adds to the clip art and clip sounds options of the Apple IIGS version of	

(table continues)

Table 4 (continued)
Description of Core Elements of the Transfer Phase and Methodology for Gathering Data

Description of Core Elements	Methodology for Gathering Data
"HyperStudio." • The author of the software requests permission to distribute the clouds stack, produced by the grade five instructional design team during the initial training sessions, as an example of a hypertext stack evolving from "HyperStudio."	

Findings and Conclusions

Refer to Figure 5, Post-Study Theory of Change, for visual representation and verbal interpretation of findings from which conclusions and implications evolve.

Conclusion #1: Among the critical attributes of the staff development design were seeds of transfer which facilitated meticulous pre-planning for the training and transfer phases of this study.

Elaboration:

a. The researcher came to know the attributes of potential adopters and their environment (i.e., personal characteristics, areas of interest and expertise, assortment and level of sophistication of teaching and learning strategies, cultural and physical aspects of the school) via observation of classroom activities and interaction with administrators, staff, and students (see Appendices C, E, F, G, and H).

b. The researcher pre-assessed the conditions supporting the introduction of the innovation, "HyperStudio," by considering relevant prior experiences, understanding, commitment, and resources--from the perspectives of key players in the change effort (i.e., potential adopters, principal, significant others such as consultant and central office personnel) (see Appendix C).

Post-Study Theory of Change

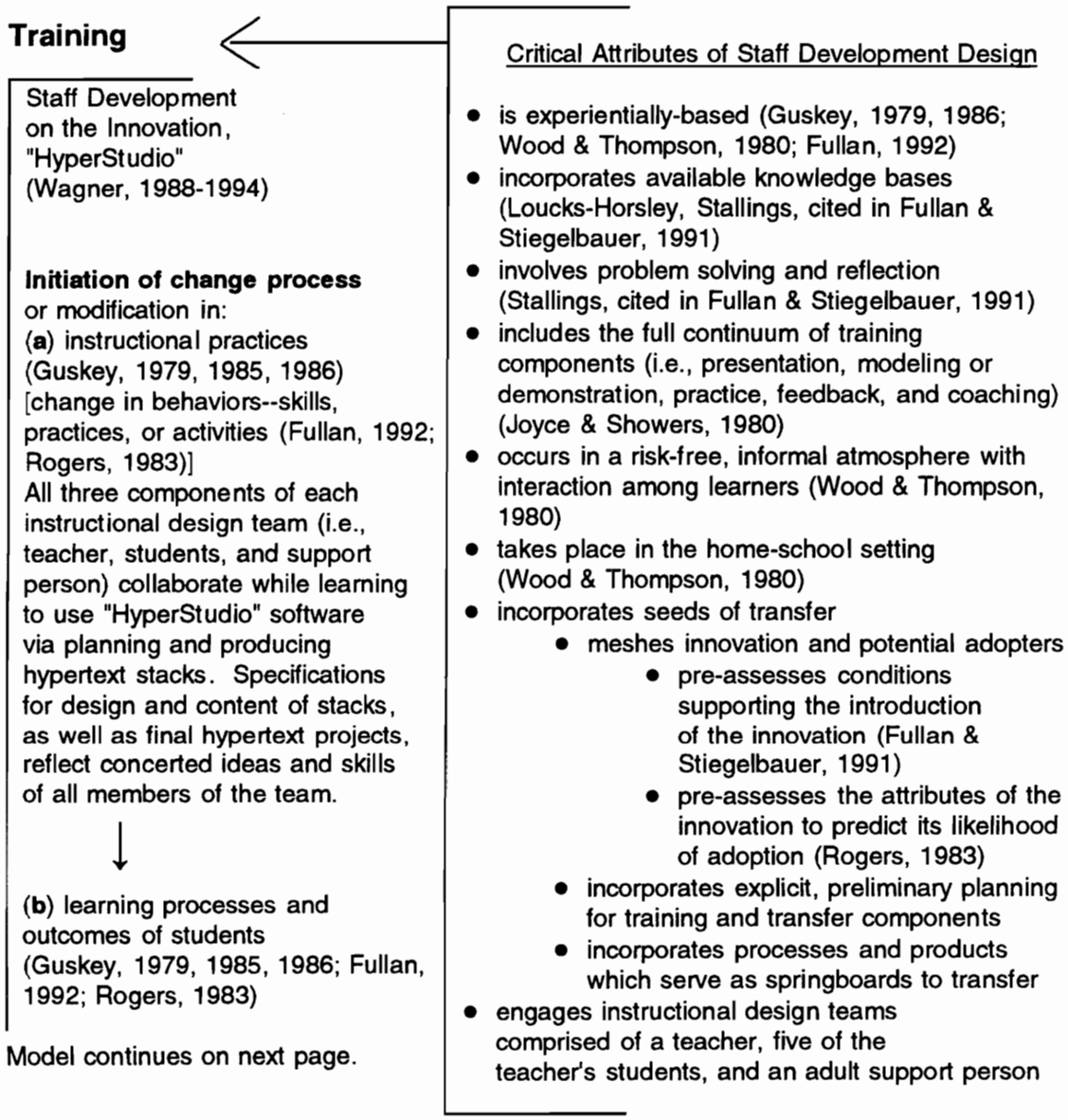


Figure 5. Post-Study Theory of Change

Post-Study Theory of Change

Motivation, perseverance, experimentation, and visual representation of processes such as planning of and navigation through hypertext stacks characterize learning processes. Verbal explanations of processes and products relate facility of students and adults with software and students' perceptions of content.

↓

(**c**) teacher beliefs about the innovation (Guskey, 1979, 1985, 1986) [meanings, understandings, and attitudes (Fullan, 1992; Rogers, 1983)] Teachers experience applications of hypertext via practical, viable processes for planning and producing hypertext stacks. Teachers acknowledge the capability and self-sufficiency of an individual instructional design team as well as the vitality and collective expertise of the support network engendered by the three instructional design teams.

↓

Transfer

↓

Burgeoning of change process
or modification in:
(**a**) instructional practices (i.e., change in behaviors--skills, practices, or activities) All three components of the instructional design team (i.e., teacher, students, and support person) engage in designing and implementing instructional strategies for transferring knowledge and skills of "HyperStudio" to classmates. Teachers are satisfied to assume roles of facilitator and content specialist

Model continues on next page.

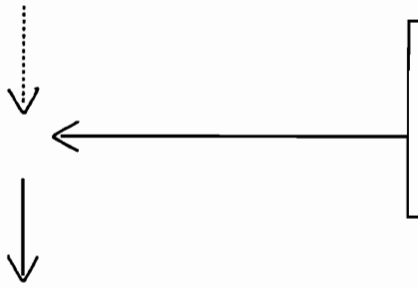
Figure 5 (continued). Post-Study Theory of Change

Post-Study Theory of Change

while entrusting primary responsibility for coaching classmates to students and adult support persons on the teams.

↓

Implementation Dip
(Fullan, 1992) threatens to occur because of technical problems with hardware and software, preliminary perceptions of lack of time and inflexibility of schedule, and lack of hardware and software



The implementation dip is counteracted by a delicate balance of pressure and support facilitated by interaction among the implementers (Fullan, 1992) and fostered by a network of instructional design teams.

Burgeoning of change process
or modification in:
(**b**) learning processes and outcomes of students
Motivation, perseverance, experimentation, collaboration, and visual representation of processes such as planning of and navigation through hypertext stacks characterize coaching and learning processes. Verbal interpretation of processes and products relate facility of students (i.e., student coaches and classmates) with hardware and software and students' perceptions of content.

↓

(**c**) teacher beliefs about the innovation (i.e., meanings, understandings, and attitudes) Teachers recognize the relative advantages of the innovation, visualize applications, and have confidence that the network can support applications of the innovation.

↓

(**d**) sense of ownership leading to more significant adaptations
(Fullan, 1992) and diffusion of the innovation (Rogers, 1983)

Figure 5 (continued). Post-Study Theory of Change

c. The researcher filtered the attributes of the proposed innovation, "HyperStudio," by assessing its relative advantages, compatibility, complexity, trialability, and observability for the particular set of potential adopters within their school's culture and physical environment (see Appendix B).
d. The researcher and principal cultivated a relationship with the consultant by engaging in earnest conversations about strengths and needs which potential adopters would bring to the staff development sessions. The three discussed specific strategies which: (1) were developmentally appropriate or meshed with readiness and resources of learners, school climate, and physical environment; (2) would incorporate a full continuum of training components (i.e., presentation, modeling or demonstration, practice, feedback, and coaching) that would likely cultivate self-sufficient instructional design teams, nurture a support network among teams, and wean teams away from the consultant; and (3) would be directly applicable to the transfer or coaching phase of the project.

Analysis of video footage of training and transfer sessions, forced-choice questionnaire data, PMI reflection data, and focus interview comments highlighted effective teaching and learning strategies applicable to training and transfer:

a. concrete or hands-on learning experiences;
b. visual representation of processes (i.e., storyboard or flowchart approach to designing hypertext stack, color-coded elements of storyboard or flowchart, charts of pull-down menus of software) (see Box 1);
c. verbal interpretation of processes and products;
d. time to experiment with software for various interpretations of planning boards;
e. creation of hypertext stacks which could be used during the transfer phase;

f. a flexible training schedule that could and did bend and bulge to encourage participants to ponder thought-provoking events or to accommodate twinges of curiosity;

g. time for reflection and suggestions which resulted in adjustments in scheduling and modifications of teaching strategies;

h. a relaxed learning environment which encouraged interaction within and among teams for troubleshooting and coaching; and

i. a task challenging enough to warrant the efforts of collective or shared inquiry (see Box 2).

interview comments by grade four teacher (1) and adult support person for grade four team (2):
--(2) ***In fourth grade the planning cards really helped.***
--(1) ***They would have never gotten anywhere without planning.***
--(2) ***They picked their pictures ahead of time; they knew what they were doing. They went through, found their pictures, and up on their planning cards wrote, "This is 'Writing Center,' group two, mammal." I mean, they had it down so they knew exactly where to go. So they had everything planned.***
--(1) ***And then that got any arguing out of the way—indecision—before they actually had the computers—***
--(2) ***They had all of that planned out on the cards so when they sat down—***
--(1) ***It saved a lot of time.***

comments by interviewer (I), grade four support person (2), and grade six teacher (3):
--(I) ***And then the planning approach. He used the color coding to help you all see it.***
--(2) ***Oh, yea, that was excellent. Otherwise, you could just sit there and not know what to do.***
--(3) ***I thought that was really good. He did a really good job with that. Even with the buttons, it showed me what the buttons were supposed to do.***
-- (1) ***with the arrows?***
-- (3) ***It showed me that the button takes you to this next card, and you can kind of see, "Oh, the cards are sort of like pages in a notebook."***

Box 1

Conclusion #2: Engaging students, support person, and teacher as a team in staff development activities created a microcosm of the classroom which accelerated the change process. Instead of discrete, linear events postponed until the

teacher returned to the classroom and lived the route and impact of transfer, major outcomes of staff development (i.e., change in instructional practices, learning processes and outcomes of students, and teacher beliefs) tended to be evolutionary and incremental in nature. The major outcomes originated or incubated within staff development activities, then burgeoned upon the team's re-entry to the classroom to transfer and apply knowledge and skills (see Figure 5).

I think everybody caught on a lot faster because you could go around from each pod and like if they had already done something that you hadn't, you could ask someone about that; and then they would ask you about something that you had done.
(comments by one of the student coaches)

Well, what was really interesting to me--and then when they got into working with their groups, they pretty much knew all the different, creative things they could use and they could pull out those things because they had messed with them enough.
(comments by grade six teacher on student coaches transferring knowledge and skills to classmates)

Even when they were showing their stacks to parents, they were showing them in a teaching way--not well, you just do this and this and this. They would show where you could go to get all this information.
(comments by grade six teacher on student coaches sharing stacks with parents during the evening meeting)

Box 2

Elaboration:

Within the staff development sessions the teacher actually experienced or observed:

a. the simplification of complex tasks like planning and creating a hypertext stack via such instructional strategies

as experimentation, interaction, visual representation, and verbal interpretation.

b. the simplification of a complex software program via the efforts of collective or shared inquiry.

c. sophisticated learning processes and products reflecting concerted ideas and skills of all team members.

> ***It feels good to be puzzled with another teacher because they don't know what you're doing, and you don't know what they're doing; and it is fun to be puzzled with the teacher. Teachers are always teaching you, and you're the one that is puzzled.***
> (comments by a student member of the grade four team)

d. intense motivation and perseverance which characterized student behavior during the learning processes.

e. the evolution of a self-sufficient instructional design team within a reliable support network reinforced by individuals who evolved from staff development with heightened levels of understanding or areas of expertise (see Box 3).

By the transfer phase of the research project teachers:

a. worked with other components of the network (i.e., student coaches, support persons, and principal) to design and implement strategies for transferring knowledge and skills of "HyperStudio" to classmates. Teachers were satisfied to assume roles of facilitator and content specialist while entrusting primary responsibility for coaching and troubleshooting to students and adult support persons on the teams.

b. observed that learning processes of visual representation of design and navigation through hypertext stacks, experimentation, collaboration, and verbal interpretation characterized coaching and learning. Simultaneously, teachers observed that these processes reduced the complexity of the task and heightened motivation, perseverance, and enthusiasm.

c. observed that verbal explanations of processes and products conveyed proficiency of students (i.e., coaches and their classmates) with software and acquisition of subject-matter knowledge (see Box 4).

d. were confident that the various components of the network could support applications of the innovation.

My kids caught on to it, I thought, much more rapidly than I did. Jimmy, if I ever run into any problems, I just usually go get Jimmy. I can put stuff on the screen and not know how to erase it or do anything, and they just go ahead and do it. They remember how to click and do all that. And I didn't have any problem with that; I thought that was really good. In fact, that is one of the things, with the high motivation that you mentioned, they liked being able to teach the teacher and show those kinds of things. They felt really good about that. . . I always felt like it was their project and their creativity, and I just came when there were problems and kind of helped with the problems.
(grade six teacher)

One thing that I think is interesting is how they interact when they are not in the program–when they are not as a group. They talk among themselves, and they compare notes on "HyperStudio." They interact outside of class.
(parent of one of the student team members)

So when my sixth graders came back and worked with the other ones who hadn't had it, maybe twice in probably–I don't know how many weeks we worked on their AD AGENCY magazine piece–maybe twice they asked a question. And the rest of the time they did not, and they did a great job showing the other people; but they didn't need my help. I thought it went well.
(reading specialist, support person for the grade six team)

Box 3

Conclusion #3: An energetic, resourceful, support network counteracted implementation dips which threatened transfer because of technical problems with hardware and software, preliminary perceptions of lack of time for coaching and inflexibility of schedule, and limited quantities of hardware and software.

Elaboration:

Numerous incidents conveyed how interaction within and among members of the instructional design teams balanced pressure and

support to thwart the implementation dips which threatened transfer.

a. A full disk and a temporarily locked stack stymied the classroom teacher and the five student coaches of the grade four instructional design team during the initial stages of transfer. They turned to two other members of the network (i.e., support persons for the grade four and grade five teams) to help them troubleshoot and regain momentum for transfer.

b. Because some of the initial plans for transfer engaged Winterwood's networked lab of 32 Apple IIGS computers, the principal negotiated with central office personnel to purchase a lab pack of the Apple IIGS version of "HyperStudio." The principal utilized school funds to enrich the Apple IIGS version of "HyperStudio" with additional clip art and sound software. To accommodate storage of hypertext selections, the principal

. . .but I still really do think that they understand better these parts of speech because they had to type it in twenty million times to get it right on their cards. So, at least, they know the definitions; and I think they are even recognizing them better.
(grade six teacher)

You get stuck on the test and then you kind of have a flashback of what was on the screen and how you wrote that screen up and the definition comes up with it, too.
(grade six student)

Actually watching children at work and listening to their verbal interaction—as you say they are talking about this among themselves—you can get a tremendous amount of information about what they know by just listening to them. And that's probably a more valid assessment of their knowledge level than giving them a multiple-choice test and getting a numerical grade so I see lots of possibilities. I see them being required to do these things in the very near future, and these children will have a tool to provide alternative assessment.
(principal)

Box 4

--working with the PTA--purchased an auxiliary hard drive for one of the school's Macintosh computers.

c. To accelerate an apparently stalled transfer process for the grade five instructional design team, the support persons for the grade four and grade five teams negotiated with the grade five classroom teacher for release time for the five student coaches. Together, the two support persons and the five students learned to use the Apple IIGS version of "HyperStudio" via a template for a state report designed by the support person for the grade four team. Subsequently, the teacher released grade five classmates to come into the computer lab and experiment with the Apple IIGS version of "HyperStudio." Student coaches and the grade four support person facilitated the training sessions using the same state report template. The grade five support person designed a similar template for the Macintosh version of "HyperStudio" and gained permission from the grade five classroom teacher to work with other classmates of the five coaches. Ultimately convinced of the potential for "HyperStudio" to enhance a major segment of her grade five curriculum, a study of the individual states of the United States, the fall of the 1994-1995 school year finds this same teacher's students working in the Apple and Macintosh computer labs as they learn to use "HyperStudio." Subsequently, students will add hypertext to their alternatives for formats for reports on individual states.

d. Start-stall could have characterized transfer for the grade six instructional design team had not the pressure and support of the network negated the threatened implementation dips. Day one of initial transfer plans involved the Apple IIGS computers in the lab, the accompanying version of "HyperStudio," and one-to-one coaching of classmates by student members of the instructional design team. Because the student coaches preferred the greater variety of options and more streamlined operating procedures (i.e., additional graphic, sound, animation, and design capabilities and fewer

When I started, I was going to have the kids work one on one. I was going to have one of the teachers teach one of the new students. I had to go--I was doing the Apple II one on one, and my kids did not like it at all. Being sixth graders they didn't want to have to change; they wanted all of the things available to them, all of the choices and everything so I went back to getting the Macs and pulled those in. I put them in a group to start with, and I found out in a group they did better because after the student teacher, or the child, would teach in the group and then they had to go back and do something again, somebody would remember it whereas somebody else might not. . . .Also, when I did it not only did the five students that had been trained how to do "HyperStudio" help their individual groups, but they came over and helped other groups. If we couldn't remember how to do something, then we would go get someone else. Now we got _____ (support person for the grade four team) *a few times when we couldn't remember how to do something; and I think* _____ (support person for the grade five team) *a couple of times. And* _____ (support person for the grade five team) *helped with the scanning and things like that that the kids couldn't remember how to do. We had to do it in groups, and we took them in groups to do that. But pretty much the kids just taught themselves. I would rotate around sometimes to help them, but pretty much they were on their own; and they worked really well. After the first--it took them about a week, I worked from 8:00-8:30--after about that first week they knew exactly how to go in there and do it.*
(grade six teacher)

Box 5

changes of disks) of the Macintosh version of "HyperStudio," plan B for transfer evolved on day two. Reflections by the grade six teacher, validated by analysis of video footage and coaches' reflections, revealed a plan B for day two of transfer which replicated the group approach originated in the staff development design and activated various aspects of the network (see Box 5).

Conclusion #4: Data emerging from this study (a) validated previous research on critical attributes of staff development designed for adults, (b) established that engaging instructional design teams in

staff development fabricates a resourceful support network, and (c) generated guidelines for assembling instructional design teams likely to forge a viable network.

Elaboration:

Responding to two, separate sets of items on a forced-choice questionnaire, adults ranked attributes of a personally productive learning environment (see Table 5).

Table 5
Adult Members of Instructional Design Teams Rank Critical Attributes of a Personally Productive Learning Environment

Rank	Design Attribute	
	Instructional Design	People Involved
#1	active, hands-on learning activities	learning with support people
#2	school time	learning with students on my team
#3	home-school setting; risk-free, experimentation; learning by interacting with others	learning with teachers

Comments gleaned from the focus interview with adult team members substantiated the data derived from the forced-choice questionnaire (see Box 6).

Forced-choice questionnaire data--secured at the conclusion of the training phase of the project and substantiated by analysis of video footage of training and transfer phases--reflected the confidence and competence exhibited by members of the support network. Every team

member responded "very well" or "pretty well" when asked if members of the team could design a stack of cards using the planning board or flowchart approach, use pull-down menus of the software, create text on a card, add a graphic or a sound to a card, connect cards with visible or invisible buttons, and save a stack of cards on a disk. When asked, following the training sessions, "Can members of your instructional design team locate someone at Winterwood who can assist if your team members need help using the scanner to add a graphic like a photograph to a card or need help with troubleshooting when a "snag" or problem arises with a card in a stack?," six of six adult team members responded with an answer in category A, "very well." One hundred percent of student team members marked the "very well" or "pretty well" response categories when asked if their teams could find someone at Winterwood to assist if problems arose with scanning images onto cards; 95% percent of student team members marked the responses "very well" or "pretty well" when asked if members could locate someone at Winterwood to assist with troubleshooting "snags" or problems with a stack.

comments by (1) grade four support person and (2) grade five support person:

--(2) ***hands-on***
--(1) ***Yea, I liked that!***
--(2) ***I think that's the best way to go!***
--(1) ***Yea!***

comments by grade six teacher:
I very much liked having it during the school day. If you have it after school, I am just exhausted at the end of the afternoon with these kids all day long. You know, I sit through and listen or appear to be listening or whatever--but I don't have any creativity or anything left to give so I very much liked doing it during the school day when we had training sessions. When we had the students here I very much liked having at least four hours with them or whatever--the morning thing--because they were experimenting and just learning to do things and to do all of that stuff. So I hope that really came across through those forms that we filled in as opposed to--I liked having some people I felt I could go to, you know, if I ran into problems and I knew they knew a little bit more than I did. . . .In fact, when we go into the middle school next year, I won't have____ and ____ (support people for teams four and five) ***there, gosh, I guess I'll have to go and get Jimmy.***

comments by grade five teacher:
My comfort zone was really high because _____ (support person for the grade five team) ***was over there with me. . . .Had we not had the back-ups of the people helping us, I would have felt very uncomfortable.***

Box 6

On the same forced-choice questionnaire, 100% of the student coaches responded that they were successfully coaching their

classmates to use "HyperStudio." Adult team members substantiated these perceptions of student coaches; for on the same questionnaire, 100% of the adult team members responded that the children selected for the instructional design teams were meeting expectations as they transferred their knowledge and skills of the innovation to other classmates.

Guidelines for assembling teams evolved from analysis of video footage of training and transfer phases, PMI reflections, and focus interview comments:

1. Whet the appetites of any and all interested, prospective, adult team members. Engage interested adults (i.e., teachers and support staff) in orientation sessions which introduce the language of the innovation, demonstrate some of the innovation's applications and capabilities, and encourage experimentation with the innovation.

2. Consider the readiness and resources of prospective, adult team members (i.e., personal and teaching characteristics coupled with teaching experiences and areas of interest and expertise) for training and transfer phases of the project.

3. Engage prospective, adult team members (i.e., teachers and support persons) in earnest discussion of training and transfer phases of the project. Give them time to question every aspect; to ponder roles of students and concomitant, desirable traits and skills; to consider ideas for transfer; and to consider natural alignments for teams (i.e., Based on experiences, interests, and expertise, which support person will align with which teacher?).

4. Provide think time. Give adults a period of time to make a final decision about commitment to training and transfer. Ask them to consider readiness and resources of students whom they will select as team members. Prominent among

the attributes of successful student coaches in this research project were: ability to interact with students and adults; degree to which other students respected or looked up to and listened to prospective coaches; levels of confidence, creativity, perseverance, and enthusiasm; ability; and computer experience (see Box 7).

grade five teacher:
When I picked mine, it was with the idea of, 'who can work with whom? . . .Can we each work with each other to get this done?' . . .I probably had no student that I would consider computer literate.

grade six teacher:
Well, I picked mine because of those who were computer literate so that they could help me. But, also, they were really mature students; and they were able to give up their power as far as just do it, explain it, and then sit back until the other students had problems.

Box 7

5. Whet the appetites of student team members for the innovation and nurture a state of readiness that permits students to enter staff development sessions with fundamental, prior knowledge of the innovation. Engage the students in an orientation session which introduces the "language of the innovation" by demonstrating some of the applications and capabilities of the innovation, schedule time for groups of students to tinker at the computer with the innovation, and provide time for questions.

Conclusion #5: Although hypertext was the vehicle, not the focus, of this study, data emerged which validated research on the relative advantages of hypertext.

Elaboration:

PMI reflections; comments from focus interviews; and analysis of video footage of training and transfer phases revealed relative advantages of hypertext which emerged during this study:

1. Hypertext altered the learning environment by arousing interest and, thus, enhancing ability to acquire not only subject-matter knowledge but to construct networks of relationships (see Box 8).
2. Hypertext was dynamic, malleable, and adaptable to individual needs and interests, yet encouraged joint thinking and reflection which engendered shared versus individual cognition (see Box 9).
3. Hypertext nurtured, via ease of facilitation and expression, *interdomain referencing* (Alexander, Kulikowich, & Jetton, 1994, p. 217) or interdisciplinary networking as designers focused on accessing

From an educational point of view, I think it's interesting that all the children were excited about this; and it was probably one of the highlights of their day each day. Now why is that? I think that's something that should be addressed because what we've done is we've given them a tool and said, 'Okay, here's a tool; now find ways to use it.' There's one thing about reading about knowledge, but how much of that goes into a person's head? But when you're actually creating the material yourself, you've got that positive, intermittent reinforcement type mechanism working where you try something and it doesn't work, try something else that doesn't work, then you try and it works--and you go OKAY! It's the challenge of it--they're actually doing it themselves and to me that relates to other aspects of their education. I mean, you can learn things just by reading; but how much of that really stays with you? What drove them to be so excited about it--it's the challenge of problem solving, that's what it comes down to. . . .I think the kids need to be doing things with their hands and be experimenting all the time--really not reading so much but actually having challenges and doing them. This is just another example in support of that argument that you need to give them a challenge and let them go solve that problem, and it produces good results. --a parent's comments

Box 8

and combining resources to embellish content and design of individual cards related to an overall theme.

4. Hypertext subsumed microprocessing into macroprocessing, for users tended to absorb subject-matter knowledge as they moved away from analyzing discrete bits of information and focused on the design attributes and content of a stack (see Box 10).

> ***It was incredibly interesting to me how the three groups approached their materials and the "HyperStudio" program differently. The fourth grade focused on how the program could be used to make a non-linear text. The fifth grade group focused on how they could add creative elements of their own creation to personalize a science text. The sixth grade group approached a difficult topic with the goal to make it fun and educational as well. Therefore, they utilized as many pictures and sounds that they could. I really think the nature of the program encourages collaboration and individuality.***
> --comments by the consultant

Box 9

In their meta-analysis, "The Role of Subject-Matter Knowledge and Interest in the Processing of Linear and Nonlinear Text," Alexander, Kulikowich, & Jetton (1994) concurred with the relative advantages of hypertext which characterized the teaching and learning processes of this study.

The meta-analysis of Alexander, Kulikowich, and Jetton (1994) included a sparse number of studies engaging younger students (i.e., elementary school age students) in the processing of non-linear texts. The authors speculated that difficulty with navigation might have accounted for the dearth of studies engaging younger students in the processing of hypertext:

> It is likely that the demands of navigating through the computer-based system, particularly hypertext, is too challenging for younger learners, restricting the applicability of such programs. . . .By navigation, we are referring to the readers' movement from one segment of text to another or

> from the text proper to other screens, tools, or options, such as supporting videos, maps, and commercial movie clips. (p. 207)

Interestingly, evolving from this study were planning processes which rendered not only visual representations of design attributes and contextual linkages, but also specified navigation routes among the various components of the hypertext stack. For the elementary students and adults of this research project, such visual representation expedited conceptualization of the overall network of the stack and minimized--practically eliminated--occurrences of authors being lost in hyperspace.

Well, I found that if we made a mistake and just went back and tried it again to see what we had done wrong--I found that since we had so much time we could just keep going back and forth until we found out what we had done wrong until we got it right. . . .Well, I thought it was a fun way to learn because I'm not very good at English. I'm okay, but it's not my strong point. I've never been able to memorize like preposition, interjection but doing this--without even realizing it, I've memorized all eight and what they mean. I used to do okay on tests, but now I can do these tests easy. I didn't even realize how much I learned about it.
--a grade six student

It's the same thing with me. The group is doing a card say on adjective, and they will ask me an adjective; and I'll give the definition out of the book, word for word, because I am used to typing it up and everything. It's like I'm even surprising myself when I do that.
--a grade six student

Box 10

Implications

Emerging from the data of this research project were implications for those who engage in change efforts, via staff development, to enhance teaching and learning processes.

To be an effective facilitator of staff development, nurture relationships with a potential set of adopters--students, teachers, support staff, and administrators within a particular school. Live in their environment--spend time in their school and their world of schooling. Come to know their attributes (i.e., characteristics of personality and areas of interest and expertise). Become familiar with the assortment and level of sophistication of teaching and learning strategies.

Customize or adapt staff development for a particular set of learners. Analyze conditions supporting the introduction of an innovation--relevant prior experiences, understanding, commitment, and resources--from the perspectives of key players (i.e., potential adopters, principal, and significant others such as consultant and central office personnel). Filter the attributes of the proposed innovation. Assess its

relative advantages, compatibility, complexity, trialability, and observability (Rogers, 1983) for the particular set of potential adopters within the context of their attributes, classroom and school climate, and physical environment.

> *staff developers are changing from 'experts' to facilitators who help stakeholders by consulting and planning with them.*
>
> Dennis Sparks, Executive Director of National Staff Development Council (Modrak, 1994, p. 6)

To accommodate adaptation of a change initiative emerging from an insightful working relationship among facilitator and potential adopters, encourage an alignment of curriculum supervisors which associates a supervisor with a family of schools (i.e., a system of feeder schools--elementary, middle, and high schools--within a larger division) rather than a particular discipline or domain (i.e., subject area) for all schools within a division. With a focus attuned to a family of schools and away from a specific domain, a facilitator of staff development can work with potential adopters to focus on innovations that interface disciplines and strategies whenever possible and, concomitantly, enhance specific disciplines. Just as importantly, the

facilitator can follow the development of the innovation and adapt its maturation process to accommodate various levels of sophistication defined by readiness of students, teachers, and support staff. For example, introductory or rudimentary applications of "HyperStudio" at the elementary level can blossom into more complex applications of hypertext via the same or more sophisticated software at the middle school, then the high school level. As the innovation spirals upward, successful strategies and applications can be transmitted to the next set of potential adopters via in-house consultants emerging at previous levels or feeder schools. Thus, what begins as an innovation within a single school for a particular set of potential adopters can burgeon into a reform permeating the family of feeder schools.

Consider a network of instructional design teams (i.e., teachers, students, and support staff) as a staff development strategy for introducing and diffusing other innovations. Data emerging from this research project validate that a carefully fabricated support network of instructional design teams can capitalize on the expertise of two generations: (1) adults who preceded computers but can serve as content specialists and facilitators with a stock of

organizational and instructional strategies and (2) students, growing up with and typically inundated and captivated by technology, who can translate content and teaching and learning processes into the language of their peers. It seems an optimum combination for integrating various forms of hardware and software into teaching and learning processes. The question spurring further research is, "What other types of innovations, technology-oriented or otherwise, lend themselves to diffusion via a support network of instructional design teams?"

I know, I know--they didn't have computers when you were growing up!

Adeptly maneuvering the mouse and working with the options of the tool box, grade four David jokes with his teacher as they experiment with the design of a hypertext stack.

References

Alexander, P. A., Kulikowich, J. M., & Jetton, T. L. (1994). The role of subject-matter knowledge and interest in the processing of linear and nonlinear texts. Review of Educational Research, 64(2), 201-252.

Beyer, B. K. (1987). Practical strategies for the teaching of thinking. Boston: Allyn and Bacon.

Drysdale, J. (1992). Constellations and hyperstudio: A great solution to the questions of computer integration. The Writing Notebook, 10(2), 4-6.

Fullan, M. G. (1992). Successful school improvement. Bristol, PA: Open University Press.

Fullan, M., & Hargreaves, A. (Eds.). (1992). Teacher development and educational change. Washington, DC: The Falmer Press.

Fullan, M. G., & Stiegelbauer, S. (1991). The new meaning of educational change. New York: Teachers College Press.

Fulton, J. L. Cognitive teaching schools: Design for America 2000 schools. New American Schools Development Corporation Proposal #1674 (Available from The Developmental Skills Institute, 5407 Patterson Avenue, Suite 206, Richmond, Virginia 23226, Fax: 804-285-3120, Phone: 804-285-0670)

Guskey, T. R. (1979). Inservice education, classroom results, and teacher change. (Unpublished doctoral dissertation, University of Chicago) Dissertation Abstracts International, 40(6), 3241A. (University Microfilms No. T27430)

Guskey, T. R. (1985). Staff development and teacher change. Educational Leadership, 42(7), 57-60.

Guskey, T. R. (1986). Staff development and the process of teacher change. Educational Researcher, 15(5), 5-12.

Jacobson, M. J., & Spiro, R. J. (1991). A framework for the contextual analysis of computer-based learning environments (Tech. Rep. No. 527). Champaign, IL: University of Illinois at Urbana-Champaign, Center for the Study of Reading.

Jacobson, M. J., & Spiro, R. J. (1993). Hypertext learning environments, cognitive flexibility, and the transfer of complex knowledge: An empirical investigation (Tech. Rep. No. 573). Champaign, IL: University of Illinois at Urbana-Champaign, Center for the Study of Reading.

Joyce, B., & Showers, B. (1980). Improving inservice training: The messages of research. Educational Leadership, 37(5), 379-385.

Joyce, B., & Showers, B. (1981). Transfer of training: The contribution of "coaching." Journal of Education, 163(2), 163-172.

Langthorne, M. (1988). It's a hyper new world. Tech Trends, 33(6), 16-17.

Modrak, N. Staff development focuses on performance. (1994, May). ASCD Update, p. 6.

Rogers, E. M. (1983). Diffusion of innovations (3rd ed.). New York: Free Press.

Sparks, G. M. (1983). Synthesis of research on staff development for effective teaching. Educational Leadership, 40(3), 65-72.

Spiro, R. J., Feltovich, P. J., Jacobson, M. J., & Coulson, R. L. (1991). Knowledge representation, content specification, and the development of skills in situation-specific knowledge assembly: Some constructivist issues as they relate to cognitive flexibility theory and hypertext. Educational Technology, 31(9), 22-25.

Wagner, R. (1988-1994). HyperStudio [Computer program]. El Cajon, CA: Roger Wagner Publishing. (Version 2.0 for Macintosh Computer)

Wagner, R., & O'Keefe, M. HyperStudio [Computer program manual]. El Cajon, CA: Roger Wagner Publishing. (Version 2.0 for Macintosh Computer)

Wood, F. H., & Thompson, S. R. (1980). Guidelines for better staff development. Educational Leadership, 37(5), 374-378.

Appendices

APPENDIX A

Effective Staff Development Design:
Matrix of Training Components
and Concomitant Levels of Impact

Appendix A

Effective Staff Development Design: Matrix of Training Components and Concomitant Levels of Impact (Joyce & Showers, 1980)

	Training Components	Levels of Impact: Awareness	Concepts and Organized Knowledge	Principles and Skills	Application and Problem Solving (Transfer)
1	presentation of theory or description of skills	✔+	✔	✘	✘
2	modeling or demonstration	✔+	✔	✘	✘
3	practice under simulated conditions	✔+	✔+	✔	✔- (begin to transfer)
4	structured feedback (systematic process for observation and feedback)	✔+	✔+	✔+	✔- (few permanent changes)
5	coaching for application (specific planning for content, approach, and student adaptation)	✔+	✔+	✔+	✔+

Note. Symbols reflect degree of impact of training component on potential adopter.
✘ = no impact; ✔- = little impact; ✔ = some impact; ✔+ = strong impact

APPENDIX B

"Filtering" the Innovation, "HyperStudio,"
to Pre-Assess Likelihood of Adoption

Appendix B
"Filtering" the Innovation, "HyperStudio," to Pre-Assess Likelihood of Adoption

Relative Advantage

Hypertext alters the learning environment, arousing interest and, thus, enhancing ability to acquire not only subject-matter knowledge but to construct networks of relationships. Hypertext is dynamic, malleable, and adaptable to individual needs; encourages joint thinking and reflection which engenders shared versus individual cognition; subsumes microprocessing into macroprocessing, for users (i.e., authors and readers) tend to focus on accessing and combining resources as they make sense of the big picture rather than analyzing discrete bits of information; and nurtures, via ease of facilitation and expression, "interdomain referencing" (Alexander, Kulikowich, & Jetton, 1994, p. 217) or interdisciplinary networking. (Alexander, Kulikowich, & Jetton, 1994)

Compatibility

This project's process for pre-planning of hypertext segments resembles a detailed flowchart (i.e., color-coded materials specify content, sources of content, and navigation routes through hyperspace) which serves as a road map to creation of hypertext when authors sit at computers and work with "HyperStudio." This planning process parallels CPOI, Cognitive Process of Instruction (Fulton), strategies for constructing knowledge and storing and retrieving information. Potential adopters--students, teachers, and support personnel--are experienced users of CPOI strategies.

The majority of potential adopters, to varying degrees, have interlaced technology with teaching and learning processes using: (a) traditional software for drill and practice; (b) semi-structured software for enhancing strategies for array and analysis of data, reading fluency and comprehension, and writing style and fluency; (c) software engaging telecommunications; and (d) software interfacing Lego construction with LOGO programming.

Complexity

Introductory, pre-staff development, mini-sessions, designed to acquaint potential adopters--students, teachers, and support personnel--with the user-friendly format of "HyperStudio," mitigate anxieties associated with the complexity of the software program and whet appetites for further experimentation.

Trialability

Introductory, pre-staff development, mini-sessions with experienced consultants encourage potential adopters to tinker with the various components of the program, "HyperStudio," and produce novice hypertext selections (i.e., production of two or more cards connected by buttons). Thus, potential adopters experiment with the innovation on a limited basis.

Observability

Even limited experiences with "HyperStudio" result in novice hypertext selections which offer instant visibility of results and awareness of potential, generating curiosity about other possibilities for design, content, and application.

APPENDIX C

Conditions Supporting the Introduction
of "HyperStudio" as the Innovation

Appendix C
Conditions Supporting the Introduction of "HyperStudio" as the Innovation

Condition	Potential Adopters (Students, Teachers, and Support Personnel)	Principal	Significant Others	School's Culture, Facilities, and Personnel
1. Relevant Prior Experience	The majority of adopters have interlaced technology with teaching and learning experiences and are accustomed to the design for pre-planning of hypertext segments (see Appendix B, Compatibility). Among the three, support personnel are the aide in the media center and the aide facilitating the computer lab and the after-school technology club. Both serve as computer coordinators for the school at the division level.	The principal has a history of experiences reflecting commitment to instruction: (a) emphasizing CPOI, Cognitive Process of Instruction (Fulton), teaching and learning strategies which now permeate the majority of classrooms; (b) securing a grant, with the researcher, to underwrite an Apple computer lab and access to telecommunications activities; (c) initiating on-going, fund-raising efforts to network the Apple lab and secure other hardware and software;	Consultant: Masters degree in English with a concentration in applications of hypermedia software; experience with applications of hypermedia in business Assistant Superintendent: participated in an orientation session with the researcher summarizing the attributes of the innovation, its potential impact on teaching and learning processes, and plans for staff development and infusion into classrooms	Networked, Apple lab; twelve Macintosh computers; and peripherals such as printers and a laser disc player

Appendix C--continued
Conditions Supporting the Introduction of "HyperStudio" as the Innovation

Condition	Potential Adopters (Students, Teachers, and Support Personnel)	Principal	Significant Others	School's Culture, Facilities, and Personnel
1. Relevant Prior Experience (continued)		and (d) reading and attending conferences, singly or with the researcher, to remain in touch with up-to-date applications of technology for teaching and learning processes.	Researcher: participated in course work and seminars related to various approaches to creating hypertext and to integrating hypertext into teaching and learning processes; secured a grant, with the principal, to underwrite an Apple computer lab and access to telecommunications; read and attended conferences, singly or with the principal, to remain in touch with up-to-date applications of technology for teaching and learning processes	

Appendix C--continued
Conditions Supporting the Introduction of "HyperStudio" as the Innovation

Condition	Potential Adopters (Students, Teachers, and Support Personnel)	Principal	Significant Others	School's Culture, Facilities, and Personnel
2. Understanding	Introductory, pre-service, mini-sessions for teachers, students, and support personnel introduced the concepts of hypertext and hypermedia, permitted experimentation with "HyperStudio," and illustrated several completed stacks. Discussion of the research project with the researcher led each teacher to select five students whom she considered capable of fulfilling the roles of coaches to classmates.	The principal engaged in conversations with the researcher about hypertext, hypermedia, and "HyperStudio"; attended conference sessions, singly and with the researcher, illustrating applications of hypermedia; previewed "HyperStudio" with the researcher and a sales representative; and participated in the introductory, pre-service, mini-sessions for students, teachers, and support personnel.	Researcher: attained first-hand experience with "HyperStudio" via a personal copy of the software and a personal Macintosh computer; conducted the introductory, mini-session for students and principal; and participated in the introductory, pre-service, mini-sessions for teachers and support personnel Consultant: experimented with "HyperStudio" software and discussed thoroughly the research project with the researcher and the principal	

Appendix C--continued
Conditions Supporting the Introduction of "HyperStudio" as the Innovation

Condition	Potential Adopters (Students, Teacher, and Support Personnel)	Principal	Significant Others	School's Culture, Facilities, and Personnel
3. Commitment	Three classroom teachers (representing grades four, five, and six); 15 students, five from each of the three grade levels (with parental permission); and three support personnel (two aides and the reading specialist) commit to participate in the research project.	The principal commits to total involvement in the research project (i.e., participation in all staff development activities, planning sessions, and any other activities associated with the project), use of school facilities and equipment, and commitment of limited funding.	Consultant: commits to conduct introductory, pre-inservice, mini-sessions for teachers and support personnel and two days of staff development for the three teams as well as interim and subsequent consultation. Assistant Superintendent: gives permission for principal and team members to engage in the research project and grants use of school equipment and facilities Researcher: commits to intensive involvement in all phases of the research project	Other teachers in the school agree to share grade-level Macintosh computers and printers and to accommodate changes in schedules that might occur during the research project. The media specialist agrees to accommodate schedule changes and re-location of activities while staff development sessions are occurring in the media center.

Appendix C--continued
Conditions Supporting the Introduction of "HyperStudio" as the Innovation

Condition	Potential Adopters (Students, Teachers, and Support Personnel)	Principal	Significant Others	School's Culture, Facilities, and Personnel
4. Resources (i.e., physical, psychological, and financial)	Adults contribute after-school time to two, introductory, pre-inservice, mini-sessions on "HyperStudio" and commit to devoting release time during three school days for staff development activities as well as subsequent class time to the transfer phase of the research project. Teams of students participate in a mini-session which introduces them to "HyperStudio" prior to staff development activities. Students commit to staff development activities and coaching roles.	The principal works with the researcher to negotiate with a consultant to conduct two, pre-service, introductory, mini-sessions on "HyperStudio" for adults among the potential adopters. The principal facilitates release time for potential adopters during the school day to participate in staff development activities; provides funds for workshop materials (i.e., paper supplies and disks); works with the researcher and consultant to plan content, format, and instructional strategies of staff development	Researcher, Consultant, and Apple Computer Sales Representative: contribute time, expertise, and technical and psychological support Assistant Superintendent: provides financial support to facilitate purchase of a color scanner with accompanying software and a lab pack of the Macintosh version of "HyperStudio" software Other Central Office Personnel: provide funding to defray costs of salaries for substitutes	No other major change efforts are occurring concurrently; thus, facilities, personnel, and students are not spread too thinly among multiple change efforts. An open-space media center will be converted to a Macintosh computer lab and work area for teams, consultant, principal, assistant principal, and researcher on days set aside for staff development activities. Other teachers and the media specialist will adjust schedules to accommodate staff

Appendix C--continued
Conditions Supporting the Introduction of "HyperStudio" as the Innovation

Condition	Potential Adopters (Students, Teachers, and Support Personnel)	Principal	Significant Others	School's Culture, Facilities, and Personnel
4. Resources (i.e., physical, psychological, and financial) (continued)	Teachers, support persons on each of the teams, principal, and consultant read an article, distributed by the researcher, which relates a concrete example of the application of hypermedia to a fifth-grade study of constellations. (Drysdale, 1992) Incorporated within the design of the staff development activities is time for intra- and inter-team consultation and reflection on the staff development activities. In addition, there is scheduled time for team planning for the transfer phase	sessions; negotiates with central office personnel for financial support of the research project; sets aside time to participate in the staff development activities; encourages flexibility of scheduling to support staff development activities as well as that phase of the research project involving transfer; and commits to an end-of-project, evening session for students, parents, adult participants and their spouses.	for classroom teachers during release time and the purchase of a lab pack of the Apple version of "HyperStudio" software	development activities.

Appendix C--continued
Conditions Supporting the Introduction of "HyperStudio" as the Innovation

Conditions	Potential Adopters (Students, Teachers, and Support Personnel)	Principal	Significant Others	School's Culture, Facilities, and Personnel
4. Resources (i.e., physical, psychological, and financial) (continued)	of the project--transferring knowledge and skills to classmates and applying "HyperStudio" to classroom studies.			

APPENDIX D

A Meta-Analysis: Effects of Hypertext (Nonlinear Text)
on Acquisition of Subject-Matter Knowledge
and Interest

Appendix D

A Meta-analysis: Effects of Hypertext (Nonlinear Text) on Acquisition of Subject-Matter Knowledge and Interest (Alexander, Kulikowich, & Jetton, 1994, pp. 201-252)

Note. The contents of this table are excerpted from the 1994 study, "The Role of Subject-Matter Knowledge and Interest in the Processing of Linear and Nonlinear Text," by Alexander, Kulikowich, & Jetton. The authors include 66 studies, all of which are empirical (quantitative or qualitative) in nature; relate to a particular academic domain; involve connected discourse (as opposed to isolated words or sentences) that is either in traditional, written form or computer-based; and incorporate some measure of both knowledge and interest. Their analysis of each study yields: the domain, subject, and academic level selected; the number of students engaged; the type and description of text; whether knowledge and interest are pre- or post-tested and methodology; and outcomes. Twenty seven of the 66 studies--appearing since 1989--involve nonlinear text; and 14 of the 27 specify hypertext as the type of nonlinear text. An intense review of the authors' analyses of the 14 studies employing hypertext yields outcomes revealing hypertext's effects on the acquisition of subject-matter knowledge and interest.

Study #1

Author (date):	Beeman, Anderson, Bader, Larkin, McClard, McQuillan, & Shields (1987)
Domain:	English literature and plant biology
Subjects (academic level):	41 undergraduates in English and biology
Text type:	nonlinear hypertext
Text description:	intermedia: a hypertext tool for promoting non-linear thought (exposition); two goals: connectivity of materials and visualization of concepts and ideas. Materials can be linked, annotated, and navigated.
Knowledge (pretest or posttest and how measured):	posttest; observation done on classes, students are interviewed and asked to keep time and task diaries, grades recorded

Appendix D--continued

A Meta-analysis: Effects of Hypertext (Nonlinear Text) on Acquisition of Subject-Matter Knowledge and Interest (Alexander, Kulikowich, & Jetton, 1994, pp. 201-252)

Interest (pretest or posttest and measured):	pretest; Hypertext documents are aligned with students' avocational and vocational interests
Outcomes:	1. For English, five students received final grades on essays in excess of the maximum for the examination. These five students used intermedia most often. 2. More As in biology as compared to year before: 44% vs. 34%. 3. 100% of students felt that they learned "more" or "much more" than in an average course at their university.

Study #2

Author (date):	Egan, Remde, Landauer, Lochbaum, & Gomez (1989)
Domain:	Statistics
Subjects (academic level):	20 university students who had experience in statistics
Text type:	linear and nonlinear, traditional text vs. hypertext
Text description:	562-page text on data analysis and graphics
Knowledge (pretest or posttest and how measured):	posttest; 1. search performance, 2. open-book essays, 3. incidental learning and recall of headings
Interest (pretest or posttest and how measured):	posttest; subjective ratings toward use of hypertext and interest toward science
Outcomes:	1. Students using Superbook text significantly answered more search questions correctly than students using linear text. 2. Essays of hypertext area judged to be better than essays of linear text users. 3. Superbook users were more interested in statistics following the experiment.

Study #3

Author (date):	Dillon (1991)
Domain:	Human factors

Appendix D--continued

A Meta-analysis: Effects of Hypertext (Nonlinear Text) on Acquisition of Subject-Matter Knowledge and Interest (Alexander, Kulikowich, & Jetton, 1994, pp. 201-252)

Subjects (academic level):	1. 12 professional researchers 2. eight professional researchers
Text type:	linear and nonlinear; traditional text and hypertext
Text description:	two articles selected from one journal in the field of relevance to the researchers
Knowledge (pretest or posttest and how measured):	posttest; 1. text assessment according to the structure, 2. time; 3. error types
Interest (pretest or posttest and how measured):	pretest; passages selected based on individuals' vocational interest area
Outcomes:	1. Researchers had a clear sense of introduction, method, results, and discussion format. 2. Researchers could assemble faster without heading than with headings. 3. Error types: confusion about introduction and discussion distinction 4. Subjects had little comprehension of text's meaning. 5. Time with paper journals faster than computer screen. 6. Experiment 2: 6/8 performed better or as well with electronic text, suggesting a possible time/accuracy trade-off

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Study #4

Author (date):	Gray, Barber, & Shasha (1991)
Domain:	social studies
Subjects (academic level):	80 undergraduate students
Text type:	linear and nonlinear; traditional text and hypertext
Text description:	dynamic text on laws and tax shelters which enabled students to select topics of interest
Knowledge (pretest or posttest and how measured):	pretest and posttest; 1. search task; find correct information, 2. search time, 3. grade point average
Interest (pretest or posttest and how measured):	pretest; 1. Rotter's interest locus of control, 2. assignment to dynamic text which is individual-interest-focused

Appendix D--continued

A Meta-analysis: Effects of Hypertext (Nonlinear Text) on Acquisition of Subject-Matter Knowledge and Interest (Alexander, Kulikowich, & Jetton, 1994, pp. 201-252)

Outcomes:

1. Dynamic text users found more correct information.
2. GPA correlated with the number of correct answers.
3. Internal locus of control people were faster than external locus of control for both dynamic text and paper text.

Study #5

Author (date): Lanza & Roselli (1991)
Domain: computer science
Subjects (academic level): 60 undergraduate students
Text type: nonlinear hypertext and CBI (computer-based instruction)
Text description: Text was based on two units, procedures and function, needed in Pascal programming. Expository text included graphics.
Knowledge (pretest or posttest and how measured): posttest; 10 questions with 5 per topic
Interest (pretest or posttest and how measured): posttest; Likert scale attitude scale measured: attractiveness, enjoyableness, and stimulation
Outcomes:

1. no significant difference on learning measure
2. more variability in hypertext groups, suggesting greater individual variation
3. 63% of control (CBI) students found CBI boring and unattractive.
4. 76% of hypertext found program stimulating and attractive, although 40% suffered from being disoriented.

Study #6

Author (date): van der Berg & Watt (1991)
Domain: statistics and hypothesis testing
Subjects (academic level): 88 juniors and seniors in the communication sciences
Text type: nonlinear, hypertext

Appendix D--continued

A Meta-analysis: Effects of Hypertext (Nonlinear Text) on Acquisition of Subject-Matter Knowledge and Interest (Alexander, Kulikowich, & Jetton, 1994, pp. 201-252)

Test description:	125-frame, 285-page hypertext document on statistics and hypothesis testing
Knowledge (pretest or posttest and how measured):	pretest: classroom examination; posttest: classroom examination
Interest (pretest or posttest and how measured):	posttest: questionnaire with fixed- and open-ended responses
Outcomes:	1. no consistent differences between those who use hypertext system and those who do not 2. replacement group did not like learning with hypertext materials the way that the supplementary group and control group did

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Study #7

Author (date):	Carver, Lehrer, Connell, & Erickson (1992)
Domain:	American history
Subjects (academic level):	20 ninth-grade students
Text type:	nonlinear hypertext
Text description:	text search and hyper author tool that consists of reflection tools to help students structure their ideas about topics associated with World War I or lifestyles
Knowledge (pretest or posttest and how measured):	during; observation of students
Interest (pretest or posttest and how measured):	pretest and posttest; Likert scale
Outcomes:	1. Students spend a great deal of time devoted to text and information design. 2. significant increases in mental effort, interest, collaboration, planning, and individualization 3. finding information was highly correlated with consideration as to how to present information 4. making graphics colorful was negative correlated with planning, understanding relationships, and developing representation

Study #8

Author (date):	Guthrie & McPherson (1992)
Domain:	biology
Subjects (academic level):	45 undergraduates
Text type:	linear and nonlinear; traditional text and hypertext
Text description:	six units on sport biomechanics
Knowledge (pretest or posttest and how measured):	posttests; format structure not mentioned
Interest (pretest or posttest and how measured):	posttests; semantic differential and interviews
Outcomes:	1. More than 80% of subjects gave a high positive response for how "encouraging" and "effective" hypertext was. 2. More than 80% of subjects gave a medium positive response for how "pleasant" and "interesting" hypertext was.

Study #9

Author (date):	McGrath (1992)
Domain:	mathematics
Subjects (academic level):	103 undergraduate students
Text type:	linear and nonlinear; hypertext/hypermedia as compared to paper text, menu-driven CAI, and no-menu CAI
Text description:	Hypertext had icon-based menu on every screen, designed for high user control.
Knowledge (pretest or posttest and how measured):	pretest and during posttest; survey of mathematics background and test for misconceptions in geometry; time on task; and test for misconceptions in geometry and three surface area problems

Appendix D--continued

A Meta-analysis: Effects of Hypertext (Nonlinear Text) on Acquisition of Subject-Matter Knowledge and Interest (Alexander, Kulikowich, & Jetton, 1994, pp. 201-252)

Interest (pretest or posttest and how measured):	posttest; Likert scale
Outcomes:	1. No significant differences found between groups on misconceptions test. 2. High spatial ability individuals in the paper text group took significantly more time to finish lesson than low spatial ability individuals in the hypertext group. 3. No significant differences were found for enjoyment of lessons, although the low spatial-no-menu group gave the most favorable rating while the high spatial-paper group gave the least favorable rating.

Study #10

Author (date):	Trumbull, Gay, & Mazur (1992)
Domain:	biology--specifically, cultural entomology
Subjects (academic level):	41 undergraduates
Text type:	nonlinear hypermedia
Text description:	"Bughouse" includes text, video, commercial movie clips, photographs, animation, and music about information associated with anthropology, art history, and entomology
Knowledge (pretest or posttest and how measured):	pretest: grade point average; posttest: questionnaire related to use of search strategies and finding information in hypermedia
Interest (pretest or posttest and how measured):	posttest: questionnaire about interest in topics students wished to explore further
Outcomes:	1. 12 students commented that "Bughouse" was interesting while another 10 were surprised with respect to the amount of material it contained. 2. Students of differing abilities used different search strategies. Those with the highest grade point averages used indexing strategies while those with lower grade point averages tended to be browsers.

Appendix D--continued
A Meta-analysis: Effects of Hypertext (Nonlinear Text) on Acquisition of Subject-Matter Knowledge and Interest
(Alexander, Kulikowich, & Jetton, 1994, pp. 201-252)

Study #11

Author (date):	Turner & Dipinto (1992)
Domain:	science
Subjects (academic level):	37 seventh-grade students
Text type:	nonlinear hypertext
Text description:	research reports about animals
Knowledge (pretest or posttest and how measured):	qualitative study with ongoing evaluation; observations, teacher interviews, student writings, and evaluations of student hypercard stacks
Interest (pretest or posttest and how measured):	ongoing evaluations; students' reflections in writing
Outcomes:	1. Students expressed enthusiasm about sharing their ideas. 2. Hypercard input into hypertext helped students organize information about animals in a schematic way. 3. Students enjoyed writing information on stacks.

Study #12

Author (date):	Anderson-Inman & Horney (1993)
Domain:	language arts
Subjects (academic level):	31 eighth-grade students
Text type:	nonlinear hypertext
Text description:	"Electrotext Authoring System": 44 pages of short stories, study focused on a story called "The Landlady"
Knowledge (pretest or posttest and how measured):	pretest: vocabulary knowledge, paper and pencil

Appendix D--continued

A Meta-analysis: Effects of Hypertext (Nonlinear Text) on Acquisition of Subject-Matter Knowledge and Interest (Alexander, Kulikowich, & Jetton, 1994, pp. 201-252)

Interest (pretest or posttest and how measured):	posttest During study: the material selected, "The Landlady," was considered interesting because of its surprise, suspense ending. Posttest: attitude questions about the use of hypertext
Outcomes:	1. Three basic profiles of hypertext users emerged (i.e., Book Lovers, Studiers, and Resource Junkies). 2. Book Lovers do not enjoy nonlinear text as they do linear text and do not recall a lot of information from hypertext. 3. Studiers used a lot of navigation strategies, enjoyed hypertext, and had high recall of story. 4. Resource Junkies were interested in the technology and not the story. They did not understand the story.

Study #13

Author (date):	Barrett (1993)
Domain:	computer science--specifically, interface design
Subjects (academic level):	senior undergraduates
Text type:	nonlinear hypertext
Text description:	"UID Tutorial" which describes interface design principles and shows good and bad examples of design
Knowledge (pretest or posttest and how measured):	during course in computer science: assignments and term projects
Interest (pretest or posttest and how measured):	during course in computer science: informal evaluation of the tutorial
Outcomes:	1. The interactive components of the hypertext were considered attention-getters by the students to the point of distracting them from the static components of the hypertext. 2. Term projects demonstrated understanding and inclusion of tutorial ideas.

Study #14

Author (date):	Christensen, Giamo, & Jones (1993)
Domain:	education: multimedia and instructional design
Subjects (academic level):	undergraduate and graduate students
Text type:	nonlinear hypertext
Text description:	hypertext as part of the "Drexel Multimedia Demo" shows Drexel 100 years ago as well as today
Knowledge (pretest or posttest and how measured):	during the course of study: questionnaires, interviews, and videotapes posttest: class projects and examinations
Interest (pretest or posttest and how measured):	during development: design of the multimedia system was done to "capture people's interest" to present an attractive image of Drexel to the public questionnaires, videotapes, user commentary, and interviews
Outcomes:	1. 94% of the users felt that the comprehensibility of the content was acceptable. 2. 39% of the users felt that the material was difficult to access. 3. Student projects and class examinations indicated that they had acquired sufficient knowledge of hypermedia. 4. Students frequently requested access to system after intital use of the system.

APPENDIX E

Characteristics of the Student Members
of the Grade Four Instructional Design Team
and Examples of Behaviors Reflecting Traits

Appendix E

Characteristics of the Student Members of the Grade **Four** Instructional Design Team and Examples of Behaviors Reflecting Traits

Note. Characteristics are rendered by the classroom teacher who selected the students to participate as members of the instructional design team.

	Sex	**Characteristics**	**Behaviors Reflecting Characteristics**
1.	female	1. self-confident; likes computers; gets along well with others; attentive; creative; exhibits self-control; thorough; enjoys reading (particularly novels)	1. serves as a cooperative group leader; follows rules and guidelines; completes assignments; scores high on "Accelerated Reader"
2.	male	2. creative; perfectionist; self-confident; high academic ability; leader	2. exhibits ability to encourage others in cooperative groups; is a leader respected by classmates and looked up to by classmates
3.	female	3. extremely creative; high academic ability; enjoys reading (particularly novels)	3. writes fantastic stories; is an avid reader in and out of class; has many friends even though she is new to the school this year
4.	male	4. quiet; high academic ability; leader; attentive; likes computers	4. is a leader respected by all classmates; never needs directions restated
5.	female	5. creative; dramatic; diplomatic; dependable; high energy; very focused; driven	5. is the only fourth grade member of the Odyssey of the Mind team; offers class presentations that are super; when running the mile she never gate up or quit

APPENDIX F

Characteristics of the Student Members
of the Grade Five Instructional Design Team
and Examples of Behaviors Reflecting Traits

Appendix F

Characteristics of the Student Members of the Grade **Five** Instructional Design Team and Examples of Behaviors Reflecting Traits

Note. Characteristics are rendered by the classroom teacher who selected the students to participate as members of the instructional design team.

	Sex	**Characteristics**	**Behaviors Reflecting Characteristics**
1.	female	1. enthusiastic; enjoys a challenge; gifted; comfortable with the computer; creative writer; good listener; and enjoys being the leader	1. gets excited when a new topic is introduced and wants to delve into it; enjoys learning; follows directions well and remembers details; writing skills are good examples of her creativity
2.	female	2. very creative; likes to be unique; works well with others; enjoys new challenges; gives her best to a task	2. is a good group worker; sees that everyone participates fairly; follows directions well and is not afraid to ask if she doesn't understand; is quite capable as her displays, demonstrations, and art work indicate
3.	female	3. very cooperative; listens well to peers as well as adults; comprehends quite readily, yet patient with peers; creative writer; intelligent	3. is rather quiet; very often has creative ideas but must be asked to express them; has talent for poetry and other forms of writing; is comfortable working on the computer; is a patient teacher

Appendix F (continued)
Characteristics of the Student Members of the Grade **Five** Instructional Design Team and Examples of Behaviors Reflecting Traits

Sex	Characteristics	Behaviors Reflecting Characteristics
4. female	4. enthusiastic; enjoys a new challenge; good sense of humor; comprehends well; writes creatively; gets along well with others; is creative with art work	4. an avid student who enjoys learning and trying new ideas and methods; her enthusiasm is contagious, and her considerate attitude makes her a positive force in a group situation; is creative with her art work as well as her written pieces
5. female	5. cooperative; considerate of others; likes to try new things; good listener; follows instructions	5. needs to be a member of this group for her own sake; is cooperative and willing to be an "Indian" and not always the "chief"; will give her best toward this effort

APPENDIX G

Characteristics of the Student Members
of the Grade Six Instructional Design Team
and Examples of Behaviors Reflecting Traits

Appendix G

Characteristics of the Student Members of the Grade **Six** Instructional Design Team and Examples of Behaviors Reflecting Traits

Note. Characteristics are rendered by the classroom teacher who selected the students to participate as members of the instructional design team.

	Sex	**Characteristics**	**Behaviors Reflecting Characteristics**
1.	male	1. likes to be challenged; eager to learn; attentive; good listener; has computer knowledge; mature; responsible; cooperative; gets along well with others; intelligent	1. reads all the time and has a vast storehouse of knowledge; works with a computer at home; is involved in Odyssey of the Mind (OM) so he works well as a team member and comes up with creative solutions to problems.
2.	male	2. enthusiastic; eager to learn; has computer knowledge; gets along well with others; intelligent; leader; mature; responsible; helpful	2. is an OM team member; is creative and responsible; has a computer at home; is able to lead other students because other students will listen to him; he is one of four team members who often group themselves together and are very considerate of each other
3.	female	3. enthusiastic; good listener; eager to learn; organized; hard working; has computer knowledge; intelligent; good role model; gets along well with others; keen observer	3. is a member of the OM team; is creative and hard working; when absent, makes up missed work quickly; has much to contribute to class; frequently brings in additional materials relating to class topics

Appendix G (continued)
Characteristics of the Student Members of the Grade **Six** Instructional Design Team and Examples of Behaviors Reflecting Traits

	Sex	**Characteristics**	**Behaviors Reflecting Characteristics**
4.	female	4. enthusiastic; responsible; good role model; eager to learn; organized; cooperative; gets along well with others; mature; intelligent; has computer knowledge; attentive; good listener	4. is extremely positive with everyone; is willing to help others and is very patient; handles responsibility very well; I can ask her to do anything and she will produce a creative, beautiful project; is hard working and enthusiastic; is a leader that other students admire
5.	male	5. eager to learn; keen observer; eager to please; has computer knowledge; good role model; gets along well with others	5. is extremely enthusiastic and interested in class; gets more out of discussion than most students; works well with other students and is a leader; has much to contribute to class

APPENDIX H

Personal Characteristics, Teaching Characteristics, and Teaching Behaviors Convincing the Principal that Each Adult Would be an Effective Member of an Instructional Design Team

Appendix H

Personal Characteristics, Teaching Characteristics, and Teaching Behaviors Convincing the Principal that Each Adult Would be an Effective Member of an Instructional Design Team

Note. This information is rendered by the principal of Winterwood Elementary School.

	Personal Characteristics	Teaching Characteristics	Teaching Experiences Witnessed by the Principal
1.	grade four teacher: intelligent, efficient, very organized, creative, and enjoys new materials and approaches	provides activities that actively involve students in the learning process; uses many hands-on materials in learning activities; serves well as a facilitator of learning	excellent cooperative learning activities; Math: A Way of Thinking; Kids' Network; ecosystems; plants (uses greenhouse and live plants for experiments)
2.	aide in the computer lab and support person for the grade four team: shows excitement and is energetic, willing to invest much personal time in learning, exhibits strong interest in technology, is assertive, perseveres, is very helpful and friendly, is a strong team worker	very sequential in presenting new material; well-prepared and well-organized; knowledgeable (in depth) of subject matter; great interest in computer software	facilitates programs for the after-school computer club: data bases, lego-logo interfacing, word processing programs, "Oregon Trail," "National Inspirer," and "International Inspirer"; provides excellent inservice for staff when new programs are purchased

Appendix H (continued)
Personal Characteristics, Teaching Characteristics, and Teaching Behaviors Convincing the Principal that Each Adult Would be an Effective Member of an Instructional Design Team

Note. This information is rendered by the principal of Winterwood Elementary School.

	Personal Characteristics	Teaching Characteristics	Teaching Experiences Witnessed by the Principal
3.	grade five teacher: very warm, caring person; wonderful relationships with students; very organized (sequential)	understands the goals and the steps to get there; very interactive with the students	engages students in telecommunications via Kids' Network by National Geographic, a weather unit involving the air quality index with equipment from EPA study and Virginia Air Pollution Control Board, a year-long recycling project resulting in purchases of trees for school property, studies of vertebrates, invertebrates, and body systems
4.	aide in the media center and support person for the grade five team: very willing to help, invests much time keeping materials and equipment well organized and fully functioning; warm and friendly	does very little teaching; expert manager; willingly gives individual help	works with students and teachers using word processing and MECC programs

Appendix H (continued)
Personal Characteristics, Teaching Characteristics, and Teaching Behaviors Convincing the Principal that Each Adult Would be an Effective Member of an Instructional Design Team

Note. This information is rendered by the principal of Winterwood Elementary School.

	Personal Characteristics	Teaching Characteristics	Teaching Experiences Witnessed by the Principal
5.	grade six teacher: witty; flexible; strong team member; easy-going, warm, and personable; seeks knowledge; very willing	creative and enjoys new ideas; adjusts easily to change; learns quickly	engages students in the learning processes; uses many hands-on activities in her classroom (e.g., science units); engages students in telecommunications via Kids' Network
6.	reading specialist and support person for grade six team: poised, astute, flexible, very professional, quietly efficient	excitedly embarks on new learning adventures; employs technology in instruction and production	provides creative, higher cognitive level learning experiences for students (i.e., Battle of the Books, Accelerated Reader, VCR Companion, and word processing programs)

APPENDIX I

Consultant's Outline for the Hypertext Demonstration Stack on Weather
Completed by Each Instructional Design Team
During the First Training Session

Appendix I

Consultant's Outline for the Hypertext Demonstration Stack on Weather Completed by Each Instructional Design Team During the First Training Session

CARD ONE

My Weather Forecast!
Written By:

CARD TWO

Everyday people talk about the weather. Throughout history weather has been a major concern for humans because it affects their lives so much. Let's look at how science and literature deal with weather.

CARD THREE

Weather forecasters predict the weather. They explain their predictions to people with maps and special symbols.

CARD FOUR

These symbols represent fronts. A front is a mass of air which moves across the earth; fronts can be either warm or cold.

CARD FIVE

William Wordsworth wrote this poem during the spring of 1802. Is Wordsworth concerned about the weather?

Weather in March

The cock is crowing,
The stream is flowing,
The small birds twitter,
The lake doth glitter,
The green field sleeps in the sun;
The oldest and the youngest
Are at work with the strongest;
The cattle are grazing,
Their heads never raising;
There are forty feeding like one!

Like an army defeated
The snow hath retreated,
And now doth fare ill
On the top of the bare hill;
The Ploughboy is whooping --anon --anon;
There's joy in the mountains;
There's life in the fountains;
Small clouds are sailing,
Blue sky prevailing;
The rain is over and gone!

BUTTONS

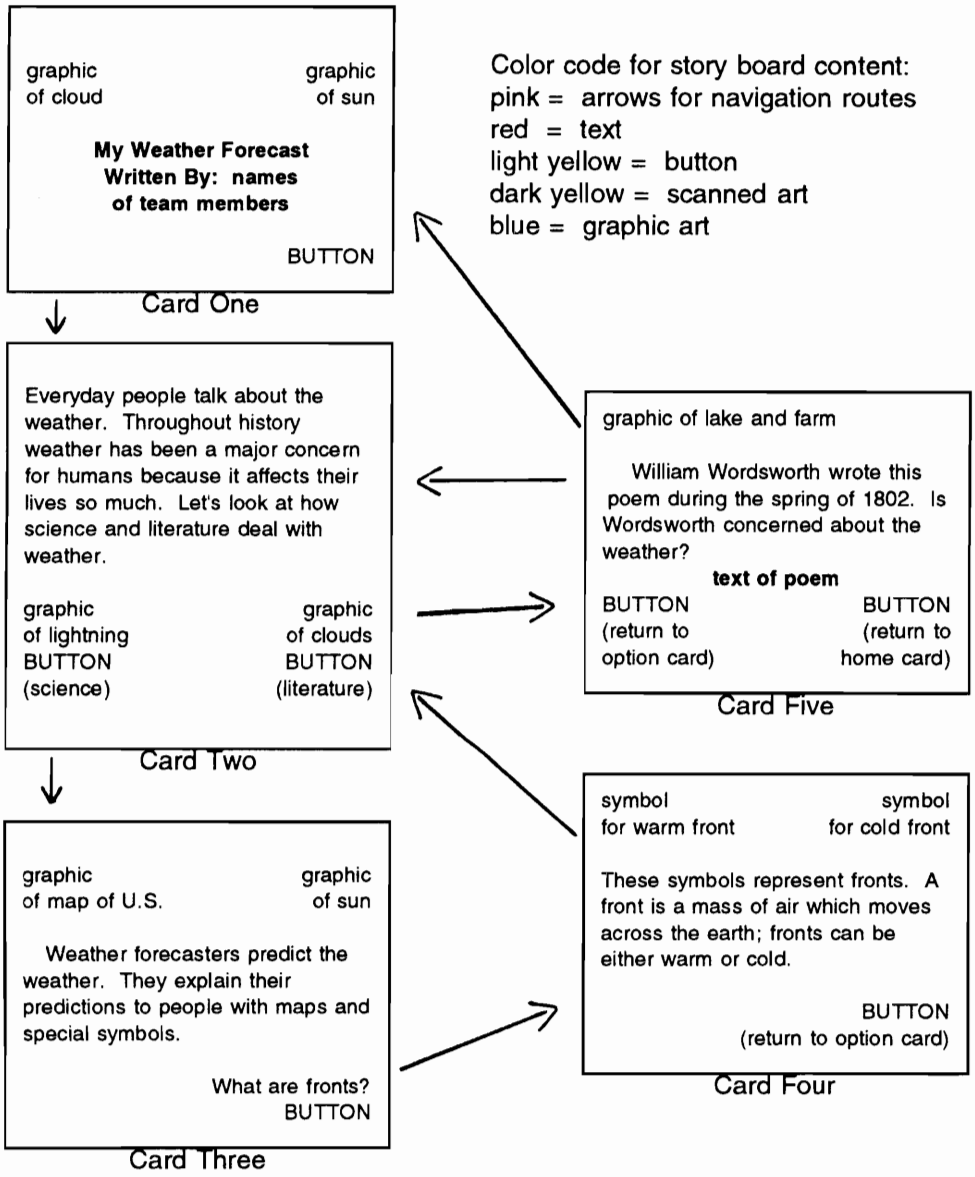
card 1 To learn about weather press here!
card 2 Press "literature" or "science" to learn more.
card 3 What are fronts?
card 4 Return to option screen. (ICON)
card 5 Return to option screen. (ICON) Return Home. (ICON)

APPENDIX J

Diagram of Color-Coded, Storyboard, Planning Process
Introduced by the Consultant
During the First Training Session

Appendix J

Diagram of Color-Coded, Storyboard, Planning Process Introduced by the Consultant During the First Training Session



APPENDIX K

Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the First "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members Consultant, and Principal

Appendix K

Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **First** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
grade four team members fun, food, breaks, buttons, audio, interesting, hands-on, lots of choices, moving stuff around on the screen, planning process, "stickies" used during the planning process, tools in the kit	grade four team members getting buttons, mouse wasn't working, made some mistakes, beginning was boring, flashing camera, added pressure of the video camera, volume on computer, "grabbing" edges of the neon box (moving or sizing an object)	grade four team members transitions and text, sounds and music (awesome), getting to use the tools, clip art, graphics, TV screen (could see better), tools (draw, paint, etc.), final product, main idea of the presentation or stack, lasso
grade five team members lots to eat; fun morning; will be fun to teach; if mistakes are made, you can correct	grade five team members taking tests during lunch	grade five team members icons, music and sounds, putting pictures on the screen, lasso
grade six team members learned how to work "HyperStudio" (background, sounds, drawings, moving from card to card with buttons, transitions, two ways to create text with special effects and size, adding graphics and icons),	grade six team members lack of time, going back through menu for clip art, didn't see how to use video, frustration when couldn't get something to work, hard to work in big groups	grade six team members how creative you can be in developing projects, capabilities of the program (i.e., graphics, sounds), to see how adults learned with children, tool box, good graphics and clip sounds, videotaping

Appendix K (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **First** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
grade six team members (continued) explained well, hands-on, very exciting, even enjoyed planning on chart, fun, liked all the new technology (i.e., computer image on the TV screen), small group at computer, refreshments, different and challenging, more teacher involvement, enjoyed helping adults, atmosphere and space, freedom, interesting, fun, organization of (color-coded) cards, so many things to do, educational but still fun, endless possibilities, and clip art		

Appendix K (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **First** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
adult team members grade four teacher: planning method, materials supplied, preview information presented to students on Monday, my group worked great; during the subsequent group planning process following session #1, the teacher reports positive aspects as plenty of time and materials, fun and laughter, and cooperative work	adult team members grade four teacher: time, complicated program	adult team members grade four teacher: scanner; during the subsequent group planning process following session #1, the teacher reports intriguing aspects as audio (even singing), picking a representative for each individual biome, thoughts of getting to use the scanner
grade five teacher: instructor is so very, very patient; colored paper for use with different aspects of stack; ample, as well as various, materials and supplies for good, hands-on experimentation;	grade five teacher: as always, not enough TIME to work deliberately	grade five teacher: many, many choices for each step toward completion of presentation; members of team enjoy the work and look forward to each session even though they have to make up classroom work which they missed

Appendix K (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **First** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
adult team members	adult team members	adult team members
grade five teacher (continued): only 2 or 3 students to each computer; help of technical person for specifics; large board to use as layout; an exciting way to learn this program		
grade six teacher: large TV image, visual representation of parts of a card, school time to work on project	grade six teacher: competition between groups, students jumping ahead and pushing buttons, lasso	grade six teacher: icons, clip sounds, fading from one card to another
support person for grade four team: children picked it up quickly, excited by creativity and uniqueness allowed in the program, planning board very helpful, enthusiasm of children and myself, children's creativity and enthusiasm; time for the children to work together	support person for grade four team: more time for children to explore, try out each option as taught, and to experiment; more knowledge of program [scanner, ways of doing things ("Can this be done?")] before planning to develop a more detailed scheme; more time	support person for grade four team: the auditory enhancements allowed, the personalization by authors' pictures and voices; the whole premise of the program, how well the kids picked it up and their ability to put it together

Appendix K (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **First** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
adult team members support person for grade five team: team work--I like seeing the children and the adults working together to create a finished product. instructor--Mr. Kidd did a very nice job teaching the children on a level they could understand. support person for grade six team: positive teacher and student interaction, fostering increased knowledge of technology, new format for students and teachers to use in place of typical reports, use of students as peer instructors	adult team members support person for grade five team: time--It would be nice to have more time to work with the children on the project. setting--It would be nice to have an enclosed area (lab type) to conduct this type of session. equipment--a lab of Macs (dreaming!) support person for grade six team: lack of time to go further and explore other capabilities of the program such as animation, no permanent site for Macs for classes to use for this program	support person for grade five team: interesting aspects--I feel there are many ways this program can be used by teachers and students to present many projects (i.e., science, social studies) in a new format. intriguing aspects--use of this program to highlight new books in the media center and put things in place so the children can get a quick report on new materials support person for grade six team: teachers and students learning together, incorporating several mediums into one format

Appendix K (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **First** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
consultant collaborative effort of kids, teachers, and support people channeled into productive competitiveness; success of the planning process, especially the visibility and flexibility of the process; the acquisition of theory and concepts by the students; little difference in conceptual understanding among fourth, fifth, and sixth grade students; the timing of the session went well--naturally occurring intervals for breaks; healthy for some mistakes to occur (i.e., the dysfunctional, invisible button in the demonstration program); incorporated interdisciplinary approaches into his demonstration stack	consultant should have been more precise with some directions (i.e., when to click or double click, when and how to drag and drop, when to use the lasso or when to use the square to select a graphic), disappointed that an invisible button with sound within the demonstration stack did not function; would involve the students more in his introductory remarks	consultant amazed how quickly and well the teams adopted the planning process, program aspects such as the tool kit and color palette were relatively simple for the students because they had encountered similar structures in other computer programs, students' comments during PMI sessions reflected the consultant's observations, curious to see the extent to which teams will combine their original work with information selected from other sources, curious to see the extent to which the teams will interweave content form different subject areas, intrigued by "devil may care" attitude of the students--"If something doesn't work the first go round, we will correct or change it."

Appendix K (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **First** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
principal working relationship between students and adults; consultant did an excellent job--presented information in a sequential, easy-to-understand manner and integrated visual representations of what he was doing and saying	principal lack of space--the space was tight; need to add an additional table for work space for teams	principal intrigued by the dynamics of the teams--the attentive, focused nature of the members, could have worked all day, were so anxious to integrate other aspects of media

APPENDIX L

Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the Second "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members Consultant, and Principal

Appendix L

Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Second** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
grade four team members a lot of time, friends, fun, interesting, cool microphone	grade four team members ran out of doughnuts again, make up missed school work, do more things on our own, Addy the dog (a character in the program)	grade four team members audio, scanning, recording sound, button noises
grade five team members did not complete the PMI reflection activity for this session	grade five team members did not complete the PMI reflection activity for this session	grade five team members did not complete the PMI reflection activity for this session
grade six team members fun, good refreshments, different rom a regular day, learned a lot more, enjoyed learning about scanning pictures, fun to do it on our own, doing what we wanted, clip art, cool backgrounds, got to eat lunch in library, get to do it again	grade six team members had to go through the whole desk top to get pictures and sound, can't try sounds in desk top, didn't get to finish stack, computer locked up	grade six team members want to learn how to do video, scanning

Appendix L (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Second** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
adult team members grade four teacher: completed most of the final product, everyone was very cooperative, scanner worked great, Mrs. Dawson--What would I do without her!	adult team members grade four teacher: When mistakes are made, it's hard to figure out how to correct the mistakes. There is no guide.	adult team members grade four teacher: scanner (worked quickly)
grade five teacher: as before, the instructor was extremely patient; group felt more confident as they prepared cards due to excellent instruction on previous session; presentation began to fall into place	grade five teacher: Children began to tire after about 2 hours.	grade five teacher: discovered more possibilities for enhancing the stack; group began to feel a sense of pride about their work
grade six teacher: using entire day to work, boys got more accomplished this week, finding variety of backgrounds (i.e., classroom, file cabinet), creativity of students	grade six teacher: We lost information when the computer jammed. We increased border and then found we couldn't put another picture on it. Finding difference between clip art and add graphics, having to	grade six teacher: scanning pictures, variety of sounds, taping voices

Appendix L (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Second** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
adult team members	adult team members	adult team members
grade six teacher	grade six teacher (continued): go back to menu to get clip art or sound	grade six teacher
support person for grade four team: children adapting and learning so quickly	support person for grade four team: time, time; more Mac computers	support person for grade four team: all of it!
support person for grade five team: team work--As time has passed this aspect has grown to other teams as well as our own. Sharing ideas with other groups has been most helpful. instructor--Mr. Kidd is still doing a good job! At this point I feel it might have been better if the	support person for grade five team: time--still a big factor in getting things completed; Time flies in the session and getting with the team later is a problem. setting--same, hope next year space will not be a negative factor	support person for grade five team: future use of program--looking forward to seeing what uses this program will have in the classroom; students teaching other students--I want to see how well this part of the project works. I think it will be great for all of the students! Apple IIGS--I want to see how well the students can transfer their knowledge of "HyperStudio" from Macs to IIGS

Appendix L (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Second** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
adult team members support person for grade six team: strong participation of both students and teachers, learning by exploration and experimentation, continued enthusiasm by both groups, amazing products being produced	adult team members support person for grade six team: some limitations of the program itself such as the round about way of adding sounds	adult team members support person for grade six team: technical ability of the scanner, students continued interest and high level of involvement, learning particular capabilities of different aspects of the program (i.e., whether to import graphics through "clip art" or "add a graphic")
consultant The groups worked diligently on their own and didn't feel inhibited to ask questions. They experienced the "thrill of victory" and the "agony (frustration) of defeat" because certain things worked and others didn't. They had done an excellent job preparing flowcharts for their stacks. Students used outside resources quite well, bringing in images to scan,	consultant We didn't get to experiment with the laser disc any. I think the kids are eager to mess with video and that may not happen. I would have liked to have had time in the initial session to complete my example stack. It probably would have given the students a bit more to work with and a greater level of comfort as they sat down to work on their own stacks.	consultant The level and depth of the students' flowcharts was exactly what needs to be done as preparation. The subject matter chosen by each group was interesting. I was a bit concerned about the sixth graders' topic, but they had an angle and really seemed to pull it off. Fourth grade's project really hit the nail on the head as far as how I see hypertext working.

Appendix L (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Second** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
consultant (continued) texts, sounds, and videos.	consultant (continued) I had hoped we would reach a high level of closure. I believe the third session will solve this issue.	consultant (continued) They made an infinitely expandable, non-linear, but logical text. I loved it. But the again, I am a biology major.
principal having a whole day to focus on the production and planning, students' grasp of the process and their risk-taking behavior to explore options, interactions between grade levels, leadership role of paraprofessionals, relationship between teachers and students, students' interest level remained high all day	principal not enough time to explore all possibilities, 3.5 disk not holding all of the sixth program (either presents a limitation or the sixth grade program either presents a limitation or presents a cumbersome task of using more than one disk	principal the students' total commitment to the project, the students' level of confidence with the program and the adults, the level of cognitive functioning that was evident

APPENDIX M

Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the Third "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members Consultant, and Principal

Appendix M

Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Third** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
grade four team members finished, had fun, learned to scan, a new way to do things, easy to change, group discussion about teaching	grade four team members ran out of room on the disk, missed other special classes, homework, Luke and Jason got too much sugar	grade four team members audio, graphics, animation, getting to teach
grade five team members learn stuff we never knew, get to teach classmates, worked as a group, had fun, know how to work "HyperStudio" now, We are smarter at working on computers especially "HyperStudio."	grade five team members buttons got out of control a lot, We had to keep recording our voices over and over a lot of times.	grade five team members icons, animation
grade six team members prior experience aided today's work, learned about "magic" buttons, learned about disk capacity, more cooperative, group cooperation, experiencing animation	grade six team members remember to save frequently/space, couldn't do video, time, last big group opportunity, more hardware (computers)	grade six team members what sixth graders can produce with this software, trying to share this knowledge with other students and seeing how this works

Appendix M (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Third** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
adult team members	adult team members	adult team members
grade four teacher: group cooperation, experiencing animation, group discussion on how to teach	grade four teacher	grade four teacher: animation, the students broad, long-range thinking concerning "HyperStudio"
grade five teacher: did not attend the third training session	grade five teacher: did not attend the third training session	grade five teacher: did not attend the third training session
grade six teacher: scanning, taping sounds, creativity, enjoyment students showed for parts of speech	grade six teacher: still need to complete buttons, boys want to continue making changes, competition between groups	grade six teacher: students were introduced to animation
support person for grade four team: being able to build on what was learned previously, learning animation, having Mr. Kidd available to help when glitches (not experienced before) occurred	support person for grade four team: time!--would like more so whole class or larger of students could be trained, need more Macs (maybe a small lab of them) to ease the lack of room and the borrowing	support person for grade four team: learning how to copy the stacks to new disks and what to do when the disk seems full

Appendix M (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Third** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
adult team members	adult team members	adult team members
support person for grade four team (continued): re-hooking up of computers which is "trying" for all involved (especially for Shelby--media center aide--and the teachers who must do without their pod computers for their classes)		
support person for grade five team: I have found most of the aspects of working on this project positive. Learning a new program as exciting as this has been great! Working with all of the adults and children added greatly to the learning process as we shared ideas and knowledge. I think the most positive aspect is seeing what imagination, a good program, and some hard work can produce!	support person for grade five team: I know I will be repeating myself as I write this. Negatives include time, space, and the number of computers as we move on through the project. Even though everything seemed to work, the above items might have helped. A higher powered Mac would have helped with using the Adobe Program for the scanner! (Hopefully, next year!) Even though these were negatives	support person for grade five team: For me learning how the program worked, how to use the scanner were most intriguing. Seeing how the children picked up the program and ran forward to produce their projects was great! I think we all have been greatly rewarded. Mr. Wagner dropping by and using one of our programs for his presentation was a real bonus!

Appendix M (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Third** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
adult team members	adult team members support person for grade five team (continued): --we created some positive projects!	adult team members
support person for grade six team: continued enthusiasm of students for the project, ability of students to build on prior knowledge, quality of the final products that the students can create	support person for grade six team: unable to use video clips, need Mac lab to enable large group work	support person for grade six team: ability of the students to transfer this knowledge to peers
consultant Some sort of closure was achieved by all groups. Each group had a product which they could demonstrate to their classmates. The students were experimenting with their projects, making changes and alterations on their own. The sum and substance of all my comments could be summed	consultant If time had permitted, it would have been beneficial to explore some advanced features of the program. We probably should have spent more time with the students discussing how they would teach their classmates. I think some students still felt hindered by working in groups instead of allowing it	consultant It was incredibly interesting to me how the three groups approached their materials and the "HyperStudio" program differently. The fourth grade focused on how the program could be used to make a non-linear text. The fifth grade group focused on how they could add creative elements of their own

Appendix M (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Third** "HyperStudio" Training Session Rendered by Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
consultant (continued) up by saying that I am not surprised by the students' abilities or "HyperStudio's" capabilities. I am amazed at the level of accomplishment the students achieved in such a short time and the intensity of their interest in the use of multimedia.	consultant (continued) to assist in development. This is a very strong paradigm that I cannot shed myself, but I think the sum is often greater than the parts and each of the projects benefited from the collaboration. Indeed, the projects never would have been completed if each student tried to work independently.	consultant (continued) creation to personalize a science text. The sixth grade group approached a difficult topic with the goal to make it fun and educational as well. Therefore, they utilized as many pictures and sounds that they could. I really think the nature of the program encourages collaboration and individuality.
principal the level of enthusiasm the students brought to the session at 7:30 a.m. continued until the end of the session at 11:30 a.m., the ease with which the students interacted and instructed the guests that were present, the cognitive storage of the language and the process as evidenced by the verbal	principal It was such a positive experience that I don't have any negative thoughts regarding the session.	principal the overall level of enthusiasm and productivity throughout the three workshops, the speed by which they learned the functions of the program, the confidence they exhibited during the planning session, the factors they considered during the planning session, the factors they considered during the planning session

Appendix M (continued)
Positive, Negative (Minus), and Interesting or Intriguing (PMI) Aspects of the **Third** "HyperStudio" Training Session Rendered by the Student Team Members, Adult Team Members, Consultant, and Principal

Positive Aspects	**Negative (Minus) Aspects**	**Interesting or Intriguing Aspects**
principal (continued) interaction among the team members (within grade level teams, with other teams, and with adults), the high level skills used in planning strategies for transfer/training sessions with classmates		principal (continued) (didn't want to come across as "smarter" or "know-it-alls," the team dynamics that emerged during the sessions--from each individual functioning as a separate and unique learner trying to grasp the information and processes to a unit of members working toward a finished product--which, if given time, may never be finished because their creative juices kept new ideas flowing

APPENDIX N

Results of Forced-Choice Questionnaire

Appendix N
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three instructional design teams during the week following the third and final staff development session on "HyperStudio."

#1 For each of the following pairs of items, place a check (✔) in the blank by the item which you feel more comfortable using since your participation in the training sessions.

Rank	Macintosh Computer	Planning Board	HyperStudio Software	Video Scanner
#1	a. grade 5 students		a. grade 4,6 students b. adults	
#2	a. adults b. grade 4, 6 students	a. grade 6 students	a. grade 5 students	
#3		a. grade 4, 5 students b. adults		
#4				a. all students b. adults

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three instructional design teams during the week following the third and final staff development session on "HyperStudio."

#2 For each of the following pairs of items, place a check (✔) in the blank by the item which describes the learning environment which is more comfortable for you.

Rank	Learning with Teachers	Learning with the group of students on my team	Learning with support people like (names of support people)	Learning with Mr. _____, our consultant
#1		a. grade 6 students	a. adults	a. grade 4, 5 students
#2	a. grade 4, 5 students	a. grade 5 students b. adults		a. grade 6 students
#3	a. grade 6 students b. adults		a. grade 4 students	
#4		a. grade 4 students	a. grade 5, 6 students	a. adults

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three instructional design teams during the week following the third and final staff development session on "HyperStudio."

#3 For each item, circle your response.
A = very well **B** = pretty well **C** = poorly or not at all

After our participation in the "HyperStudio" training sessions, our team can:

a. use pull-down menus of "HyperStudio"

	grade 4	grade 5	grade 6	adults
A=	*5/5	5/5	4/5	6/6
B=			1/5	
C=				

b. create text on a card

	grade 4	grade 5	grade 6	adults
A=	2/5	5/5	5/5	6/6
B=	3/5			
C=				

c. add a graphic to a card using the clip art or the add a graphic item from the menus of the "HyperStudio" program

	grade 4	grade 5	grade 6	adults
A=	4/5	5/5	3/5	5/6
B=	1/5		2/5	1/6
C=				

d. add a graphic to a card from another clip art program like THE WRITING CENTER

	grade 4	grade 5	grade 6	adults
A=	2/5	5/5	2/5	5/6
B=	3/5		3/5	1/5
C=				

*Note. The numerator of the ratio conveys the number of affirmative responses in the category (i.e., A, B, C); the denominator of the ratio equals the maximum or total number of responses for the group (i.e., grade 4, grade 5, grade 6, adults).

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three instructional design teams during the week following the third and final staff development session on "HyperStudio."

#3 For each item, circle your response.
A = very well **B** = pretty well **C** = poorly or not at all

After our participation in the "HyperStudio" training sessions, our team can:

e. add sound to a card using the microphone of the computer

	grade 4	grade 5	grade 6	adults
A=	5/5	5/5	4/5	5/6
B=			1/5	1/6
C=				

f. create animation

	grade 4	grade 5	grade 6	adults
A=	1/5			1/6
B=	4/5		3/5	3/6
C=		5/5	2/5	2/6

g. design a stack of cards using the planning board method

	grade 4	grade 5	grade 6	adults
A=	4/5	5/5	3/5	5/6
B=	1/5		2/5	1/6
C=				

h. create a visible button to connect two cards

	grade 4	grade 5	grade 6	adults
A=	4/5	5/5	4/5	5/6
B=	1/5		1/5	1/6
C=				

i. create an invisible button to connect two cards

	grade 4	grade 5	grade 6	adults
A=	4/5	5/5	4/5	6/6
B=	1/5		1/5	
C=				

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three instructional design teams during the week following the third and final staff development session on "HyperStudio."

#3 For each item, circle your response.
A = very well **B** = pretty well **C** = poorly or not at all

After our participation in the "HyperStudio" training sessions, our team can:

j. save a stack of cards on a disk using a Macintosh computer

	grade 4	grade 5	grade 6	adults
A=	3/5	5/5	5/5	5/6
B=	2/5			1/6
C=				

k. load a stack of cards from a disk into a Macintosh computer

	grade 4	grade 5	grade 6	adults
A=	5/5	4/5	1/5	3/6
B=			1/5	
C=		1/5	3/5	3/6

l. use the scanner to add a graphic like a photograph to a card

	grade 4	grade 5	grade 6	adults
A=			1/5	
B=	1/5		3/5	2/6
C=	4/5	5/5	1/5	4/6

m. locate someone at Glen Cove who can help our team use the scanner to add a graphic like a photograph to a card

	grade 4	grade 5	grade 6	adults
A=	3/5	5/5	4/5	6/6
B=	2/5		1/5	
C=				

n. locate someone at Glen Cove who can help with troubleshooting if our team has a "snag" or problem with a card in a stack

	grade 4	grade 5	grade 6	adults
A=	3/5	4/5	3/5	6/6
B=	2/5	1--no answer	2/5	
C=				

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three instructional design teams during the week following the third and final staff development session on "HyperStudio."

#4 For each of the following pairs of items, place a check (✔) in the blank by the item which describes the learning environment which is more comfortable for you.

Rank	at my home school	risk-free, experi-mentation	school time	active, hands-on activities	learning by interact-ing with others	learning as part of a team
#1			grade 4 students	adults	grade 5 and 6 students	grade 5 students
#2			grade 6 students and adults	grade 4 and 6 students		grade 6 students
#3	adults	grade 5 students and adults			adults	grade 4 students
#4			grade 5 students	grade 5 students	grade 4 students	
#5	grade 4 students	grade 4 and 6 students				
#6	grade 5 and 6 students					adults

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three, instructional design teams during the week following the third and final staff development session on "HyperStudio."

#5 (on students' questionnaire)

Indicate your answers to the following items by circling your choice.
A = agree **B** = disagree

a. My team participated in enough training sessions to learn to use "HyperStudio."

	grade 4	grade 5	grade 6
A=	*5/5	5/5	4/5
B=			1/5

Comments: We had three sessions which gave a lot of information on "HyperStudio." I was a little disappointed about how we didn't get to use the movie, but it was still very fun./ so fun that we wanted to keep going even though we knew already how to do it/ The shortage of time makes the participant hurry and not explore the program./I wish we had more time to learn more possibilities, but we learned the basics./It was adequate to learn "HyperStudio," but I wish I could have had more time to experiment with the program./All of us were there and that helped a lot./

b. My team had enough training sessions to complete our stack of cards.

	grade 4	grade 5	grade 6
A=	2/5	4/5	2/5
B=	3/5	1/5	3/5

Comments: There were enough training sessions, but there were so many choices we did not get done./ We had to finish during our lunch and other times that we were allowed to./The shortage of time makes the participant hurry and not explore the program./We did get out of class to buff it up./We needed about one more full day to make our stack./We almost didn't have enough time./We went after school sometimes. Mrs. Cassell took the disk home and worked on it on her free time./We only have a little bit of microphone work./We had to do the microphone after the session./We had to put some audio on our buttons.

*Note. The numerator of the ratio conveys the number of affirmative responses in the category (i.e., A, B); the denominator of the ratio equals the maximum or total number of responses for the group (i.e., grade 4, grade 5, grade 6).

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three, instructional design teams during the week following the third and final staff development session on "HyperStudio."

c. My team had enough time between the first and second training sessions to design our stack of cards.

	grade 4	grade 5	grade 6
A=	5/5	5/5	3/5
B=			2/5

. Comments: Mrs. Dawson pulled us out of class./We had to come in early one "HyperStudio" morning to glue onto our sheet./The participant almost has to learn the program over./It took one more session to completely finish./We skipped class with Mrs. Dawson./Mrs. Dawson helped us.

d. My team had the materials which we needed to produce our stack of cards.

	grade 4	grade 5	grade 6
A=	5/5	5/5	5/5
B=			

Comments: We had all the materials we needed except the movie equipment./We wanted to do the videos but didn't have the equipment./especially snacks/

e. My team has the following resources which we need to teach other students what we have learned about "HyperStudio."

(1) equipment

	grade 4	grade 5	grade 6
A=	1/5	5/5	5/5
B=	4/5		

(2) software

	grade 4	grade 5	grade 6
A=	5/5	5/5	5/5
B=			

(3) supplies for planning boards

	grade 4	grade 5	grade 6
A=	5/5	5/5	4/5
B=			1/5

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three, instructional design teams during the week following the third and final staff development session on "HyperStudio."

(4) support people in my class

	grade 4	grade 5	grade 6
A=	5/5	5/5	5/5
B=			

(5) support people in Winterwood

	grade 4	grade 5	grade 6
A=	4/5	5/5	4/5
B=	1/5		1/5

(6) flexibility of scheduling

	grade 4	grade 5	grade 6
A=	5/5	3/5	4/5
B=		2/5	1/5

(7) time

	grade 4	grade 5	grade 6
A=	3/5	2/5	2/5
B=	2/5	3/5	3/5

Comments: Don't have enough computers./wish we had more time; I feel very comfortable in teaching this because we are all learning at the same time./I think it was planned very well, but I think we needed more time because as soon as we were going we had to stop (We means the kids I'm coaching.)./Some had time; some didn't./not enough time/I think that a week won't teach them all of the stuff they need to know, but it will teach some stuff./If we had more time, we could add more detail.

f. I am successfully coaching my group of classmates.

	grade 4	grade 5	grade 6
A=	4/5	5/5	4/5
B=	1/5		1/5

Comments: I think they have learned a lot./I don't know. If the people help, yes./Nobody would pay attention for me to teach./It's kind of hard though because we're use to being taught, but now we're teaching to people. It's hard to teach them both at the same time. One is usually ahead of the other./This is

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three, instructional design teams during the week following the third and final staff development session on "HyperStudio."

a fun experience./I find it fun to teach my classmates. They think it is fun to learn "HyperStudio." They enjoy "HyperStudio."/The only drawback is that some of the kids don't listen very well, and they goof off. Some kids just can't understand "HyperStudio."/I think they are enjoying this program./I still have to give the people in my group step-by-step instructions instead of them doing it themselves./Most of the people can even do it without much help./They forget sometimes what they are supposed to do. They talked to people in the beginning who weren't in our group.

#5 (adults' questionnaire)

Indicate your answers to the following items by circling your choice.
A = agree **B** = disagree

a. The number of training sessions was adequate for our team to learn to use "HyperStudio."

	adults
A=	6/6
B=	

Comments: was enough for basics; not video importing and animation/ enough time to learn basics and intermediate; not enough for advanced techniques/I feel the basic elements were learned! Some things like animation, because of time, had to come later.

b. The number of training sessions was adequate for our team to complete our stack of cards.

	adults
A=	6/6
B=	

Comments: needed time to refine and expand original product/A basic, simple stack of cards could be completed. More time was needed to edit and "pretty up" the stacks.

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three, instructional design teams during the week following the third and final staff development session on "HyperStudio."

c. The time between the first and second training sessions was long enough to design our stack of cards.

	adults
A=	6/6
B=	

Comments: This time was needed to experiment and edit ideas and cards.

d. The children selected for our team met my expectations during the training sessions.

	adults
A=	6/6
B=	

Comments: exceeded expectations/This group was slow getting started. They seemed to have a hard time focusing on the big picture. I felt too much time was spent on minor items.

e. My team had the materials which we needed to produce our hypermedia program.

	adults
A=	6/6
B=	

Comments: Planning by the principal, the researcher, and the consultant put things in place for easy access.

f. My team has the following resources needed to transfer to other students what we have learned about "HyperStudio."

(1) equipment

	adults
A=	6/6
B=	

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three, instructional design teams during the week following the third and final staff development session on "HyperStudio."

(2) software

	adults
A=	6/6
B=	

(3) supplies for planning boards

	adults
A=	6/6
B=	

(4) support people within my class

	adults
A=	6/6
B=	

(5) support people within Winterwood

	adults
A=	6/6
B=	

(6) flexibility of scheduling

	adults
A=	3/6
B=	3/6

(7) time

	adults
A=	3/6
B=	3/6

Comments: With a pull-out group scheduling is rather fixed, but the slotted time span worked./need more computers and time allotted as part of curriculum to get full use/My team has not had the time to transfer to others on the Macs (just four children have had this). All of the children have or will have had this opportunity in the lab on IIGS.

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three, instructional design teams during the week following the third and final staff development session on "HyperStudio."

g. The children selected for our team are meeting my expectations as they transfer their "HyperStudio" knowledge and skills to other classmates.

adults
A= 6/6
B=
Comments: transfer to others very fast/with guidance from support person/exceeding expectations/I think they have done fairly well with time and schedule problems. Again I feel focus was a problem. Maybe it is the age of the group. (referring to grade 5)

#6 (students' questionnaire)

Do you have other comments about participating in the training sessions and returning to your classroom to coach a group of your classmates?

I thought that HyperStudio was very, very fun. I also think that it was something new and exciting./It was tough for them to learn in the beginning, like me; but now some of them can zoom through the program like a pro./I think it is very frustrating and tempting to take control and do the whole stack by myself./I enjoyed this activity a lot because I feel like I learned more this way than in the classroom./It was very fun, and I enjoy passing the information down./might use HyperStudio for projects, reports, state reports, Civil War reports, biographies/can use it (HyperStudio) to make reports like biographies, science reports, interviews, write a poem--you can use it to make your products/to learn how to scan so that we can teach the students how to scan a picture/I think it was fun teaching other people. I think we had plenty of time for HyperStudio and did pretty good. I like to train for it and try all the different things to do. Also, if they have it at the middle school next year I will be able to use it for typing and pictures. If I could have started at the beginning of the year, I could have gotten pictures of my state and written my report on the computer./ use it for book reports, normal reports, and projects/I think HyperStudio is a fun experience for kids and adults. I think HyperStudio should be taught for a couple of more years and if that goes good, then keep

Appendix N (continued)
Results of Forced-Choice Questionnaire

Note. This questionnaire was completed by all members (i.e., student team members, teachers, and support people) of the three, instructional design teams during the week following the third and final staff development session on "HyperStudio."

> teaching it./For some people who don't like computers, "HyperStudio" has made them love the computer. It would have been very helpful. I could have put projects on the computer like some stories.

#6 (adults' questionnaire)

> Other Comments:
> This had been a wonderful experience! The teams have been nice to work with. It has given me (when I could) the opportunity to help the other teams with some troubleshooting and also with scanning. It has been a great learning experience for me! I know I will continue to learn something each time I work with HyperStudio. Thank you for the opportunity to be a part of this project!!!

Vita

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EDUCATION

Virginia Polytechnic Institute & State University — 1991-1994
Blacksburg, Virginia 24060

Radford University
Radford, Virginia 24141 — 1985-1987
completed a series of courses
and a practicum leading to an endorsement
in gifted education

Radford University
Radford, Virginia 24141 — 1977-1979
Degree: Master of Science
Major: Educational Supervision
Minor: Educational Administration

Longwood College
Farmville, Virginia — 1965-1969
Degree: Bachelor of Science
Major: Elementary Education

EMPLOYMENT EXPERIENCE

Virginia Polytechnic Institute & State University
Blacksburg, Virginia 24060

- graduate research assistant to Dr. Larry Weber
  1994, spring and summer

- co-instructor for a Masters level course of a principal preparation program
  1994, summer

Roanoke County Schools
Salem, Virginia 24153

- divisionwide, curriculum supervisor
  1987-present
- divisionwide coordinator, programs for gifted and talented
  1981-1987
- resource teacher, programs for gifted and talented
  1976-1981
- classroom teacher
  1970-1976

Floyd County Schools
Floyd, Virginia

- classroom teacher
  1969-1970

PROFESSIONAL EXPERIENCES

- author, "Stepping into Research: Linking Theory and Practice." Design for Leadership, (Fall, 1993). Virginia: National Policy Board for Educational Administration.

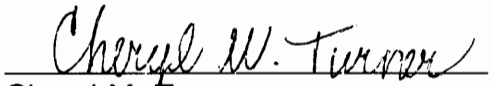
- co-author with Dr. Larry Weber of Virginia Tech, "Regional Research Consortium Survey and Results," paper presented at the American Educational Research Association annual conference, New Orleans, April, 1994.

- co-author of a grant awarded to Glen Cove Elementary School in Roanoke, Virginia, by the National Elfun Society of the General Electric Corporation; infusing technology and telecommunications into curricula

- author, facilitator, and evaluator of numerous instructional projects for Roanoke County Schools: curriculum development interweaving technology with integrated, thematic studies; use of manipulatives in the instruction of mathematics and science; integration of thinking skills into curricula; and annual, summer, enrichment programs for gifted and talented students ranging from grades three to nine

PROFESSIONAL AFFILIATIONS

- member of such state and national educational organizations as Phi Delta Kappa, AERA, ASCD, Delta Kappa Gamma, and Virginia Association for Education of the Gifted (VAEG)



Cheryl M. Turner
Date of Birth: 12/22/46