Introduction

Network-based classrooms are appearing for all age and grade levels of students, for all subject areas, and in all sorts of educational institutions. They hold the promise of transforming the traditional classroom by engaging students in more direct participation in their own learning. Their appearance raises exciting possibilities for education, but also important questions about how changes in education occur.

This book discusses an important class of network-based classrooms, those in which students use communications software on computer networks to converse in writing. The book explores how new technologies and new pedagogies transform and are transformed by existing institutions.

Electronic networks for interaction

We focus on an approach known as ENFI (Electronic Networks For Interaction), which was developed in 1985 at Gallaudet University, a well-known school for the deaf in Washington, DC. Trent Batson and Joy Kreeft Peyton, two of the editors of this book, were also developers of this approach to network-based classrooms.

Students at Gallaudet used communications software on a local-area computer network to converse in writing. Through the electronic medium they improved their abilities to write, read, and engage in collaborative problem solving. Since the development at Gallaudet, ENFI and similar approaches have spread to basic writing classes for hearing students and deaf students, classes for English as a second language, and advanced rhetoric classes, first through a small consortium of colleges and universities,* and later to at least 100 other institutions. Precollege versions are also in use.

ENFI, like hypertext, is a concept, not a particular software program. Several different types of software were used for ENFI work at the various consortium sites. The original software used at Gallaudet was the CB Utility,

* The consortium included Gallaudet University, Carnegie Mellon University, University of Minnesota, New York Institute of Technology, and Northern Virginia Community College. It was funded in part by the Annenberg/CPB Project.
which was bundled with a local-area network called 10-Net, then sold by Fox, now by DCA. Later, Realtime Learning Systems of Washington, DC, developed Realtime Writer (RTW) to support ENFI. Shortly after RTW appeared, the Daedalus Group of Austin, Texas, started marketing Interchange as part of the Daedalus Instructional System to support ENFI-like activities in college classrooms. On many campuses, people don’t talk about ENFI, but about “interchange,” the lower case recognizing its arrival as a generic descriptor. At about the same time, Carnegie Mellon University (CMU) developed CECE Talk, a program that works within CMU’s Andrew system. Contributors to this book all describe their ENFI experiences, but variously refer to RTW, Interchange, or CECE Talk.

**Network-based classrooms at Gallaudet**

With RTW, used at Gallaudet and three other sites, students and the teacher each sit at computer terminals and compose messages in a private window at the bottom of their computer screens. When they press a key, their message is immediately transmitted to all of the screens in the class. As users type and send messages, their messages scroll up the screen in a continuous dialogue tagged with the name of the sender (or whatever name the sender logged on with), as in the script of a play. While individuals are composing, the messages of the other class members continue to scroll visibly up the screen. Participants can scroll back to read previous messages they might have missed, but new messages continue to be received at the same time.

The computer stores the entire discussion, which can be reviewed at any point during the class session or printed out in its entirety at the end. Discussions occur on different network channels, each of which can include from two participants to the entire class. Using a video switch the teacher can at any time view the writing of an individual student or of a group of students on a channel, or can display the writing of one student to the entire class.

Figure I–1 shows a sample student screen, with a student’s privately visible message in the bottom window (“‘The Dead’ was one of the deadest stories I have ever read.”) and publicly visible teacher and student messages in the upper window.

This particular use of a local-area computer network was developed at Gallaudet to give deaf students opportunities to use written English in ways they would otherwise not have. The problems that deaf people have reading and writing in English are well documented (e.g., see Quigley & Paul, 1984), and at least part of this difficulty can be attributed to lack of opportunities to interact in English (Charrow, 1981). With a computer network and software that allows for interactive writing, deaf students can use written English not simply to complete grammar exercises or to produce compositions to be evaluated, but also to spontaneously communicate ideas that are meaningful
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to them with a community of other writers who are interested not in evaluating, but rather in understanding what they are saying. Written English can be used to joke and play with language, to discuss literature or serious social issues, to brainstorm ideas or collaboratively produce a draft for a paper, and to critique writing in progress. In short, written English can be used in many of the ways that oral English is used by hearing people, as well as for extended text production and critique. When a competent English user (such as the teacher) is writing on the network as well, correct forms and structures can be modeled immediately, in the context of genuine communication (see Peyton & Batson, 1986, for discussion).

As information about the Gallaudet project was disseminated, other colleges and universities became interested in the potential of real-time interactive writing for hearing students. A consortium of five colleges and universities was formed to implement and study network-based classrooms for both deaf and hearing students. As schools across the country set up these classrooms, the original technology assumed new forms. New software configurations were developed within the consortium; distance networking as well as local was implemented at one of the sites; and parallel efforts (such as Daedalus Interchange at the University of Texas at Austin) were begun.

A vision – New forms of writing in the classroom

Developers of ENFI clearly expressed their vision for how a “total immersion method” of teaching writing to college students (Batson, 1987, p. 4) would
transform and revolutionize the traditional writing classroom. This vision and its history are elaborated in Chapter 5. We discuss five major threads of the vision here.

New social dimensions in the classroom

An important premise of the original ENFI Project was that writing on a computer network would blur social distinctions in the classroom. This would result in “entirely new pedagogical dynamics” (Batson, 1988a, p. 32) and changing roles for both teachers and students. The role of the teacher would shift from lecturer and director of discussion to collaborator in writing, and student participation would be more equally distributed. In short, it was hoped and hypothesized that traditional classroom interaction patterns would be radically altered when classes began to communicate on a network, in writing.

Writing for authentic purposes

Whereas students previously wrote to a single audience – the teacher – now they would participate in a full-fledged writing community that included their peers. Whereas before their sole purpose in writing was to be evaluated, it would now include all the purposes of speech: “to inform and persuade, to entertain and enlighten, to develop social relationships, to explain experience (as much to ourselves as to others), and to create and develop ideas” (Batson, 1988a, p. 15). All communication would take place in writing — greetings and closings, procedural details, and requests for elaboration or clarification, as well as formal lessons and composition-related activities. Students would make and negotiate meanings through writing, and their classroom personalities and roles would be established in writing. Writing would therefore come alive for students; they would use writing for their own purposes and see it as an important means of lively communication, not simply as an evaluated performance for others (Peyton & Batson, 1986). In this context, writing would become less formal and more conversational, and students would move easily in writing from one type of communication to another. Conversation and composed text would merge (Langston & Batson, 1990).

Immersion in a writing community

Another goal was to immerse students in writing — their own, the teacher’s, and other students’; the classroom would become a writing community. It was hoped that this immersion in writing would change the nature of the writing class in a number of ways. Students would have many more opportunities to write than they do in other types of classes. Writing would be done for a present audience, and students would receive immediate feedback on
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their ideas. The writing process would be made visible to students; they would see their own writing mingled with that of the other students, the teacher could demonstrate various aspects of the writing process for students, and students and teachers could watch and comment on each others’ writing while it was being produced. Teachers would encourage freedom and variety in writing. As in speaking, students would “adopt different accents, throw in slang, include personal elements, think aloud, talk ... through tasks, and work out new ways of saying things” (Langston & Batson, 1990, pp. 13–14).

**Collaboration in writing**

The creation of a writing community can lead to new approaches to writing, especially increased collaboration in the act of writing:

Most collaborative learning classes stop short of actual group writing. They may think together and plan together and then, after they write individually, critique their writing together, but they probably won’t write together. They don’t observe each other’s writing process. ENFI makes this last step possible. (Batson, 1987, p. 26)

**Writing across the curriculum**

Although ENFI was first implemented in English classes, it was hoped that writing would be used to accomplish a range of purposes in other subject areas like mathematics, science, and history. Thus the vision included that ENFI would promote writing across the curriculum. Of the five threads, this was the one least realized in practice; the ENFI sites have so far involved only English classrooms.

**Realizations of the vision**

The five threads of the ENFI vision (new social dimensions in the classroom, writing for authentic purposes, immersion in a writing community, collaboration in writing, writing across the curriculum) point to a powerful context for writing, one that reflects much of current theory about writing pedagogy and development. A question naturally arises: To what extent were these visions for ENFI realized in the classrooms? In addressing this question, we came to see how the idealized version of ENFI was realized in different ways in different settings. It soon became clear that to understand ENFI it was necessary to look in detail at the writing practices within the different classroom discourse communities. Moreover, we needed a framework for analyzing these practices and the ways ENFI, as an innovation for change, was incorporated into them.

The framework we adopted is situated evaluation, a detailed examination
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of the different ways the ENFI vision was re-created through use. Through stories of individual classrooms we see that adopting an innovation is a creative process involving critical analysis of the institutional context, student needs, and pedagogical goals. This process of re-creation of innovations is not only unavoidable, but a vital part of the process of educational change. Although the book focuses on one educational innovation, we believe that the processes, stories, and general patterns we report are applicable to educational innovations in general, and that they have important implications for program evaluators, teacher educators, curriculum developers, and teachers.

In Part I we present a view of innovation and change flexible enough to do justice to the wide varieties of realizations of ENFI. We discuss there general themes and issues of the ENFI experiences. In Part II we present the ENFI theory and technology, or the idealization. We also explore specific stories of how network-based classrooms developed in different settings. Part III complements the situated evaluation with summative analyses of students’ writing. The analyses of the writing samples serve to characterize more fully the ENFI realizations. At the same time, the site-based reports in Part II provide a basis for interpreting the analyses of writing samples in Part III.
Part I

Studying the re-creation of innovations

As we began to examine the writing practices associated with ENFI use in diverse settings, a key definitional problem arose: What was ENFI? The variety of practices we observed suggested that the concept was too broad to be viewed as a single innovation, yet not broad enough to be equated with the educational use of electronic networks in general.

One way to resolve the definitional problem was to return to the ENFI source documents, such as the Annenberg/CPB (Corporation for Public Broadcasting) Proposal and various articles about ENFI, or to the ENFI developers themselves to articulate a criterial definition. Following this path we would then identify archetypical ENFI practices to focus on, attaching labels such as semi-ENFI, part ENFI, similar to ENFI, or non-ENFI to other practices that nevertheless used the ENFI name.

The difficulty with this approach was that from the beginning, people doing ENFI had valued experimentation and diversity in teaching approaches. There seemed to be no precise definition of ENFI in terms of technological tools and little value attached to promoting or fixing on a single piece of software or hardware. Nor was there a precise set of pedagogical goals and activities beyond the threads we outlined in the Introduction. Thus, devising some ex post facto criterial definition was arbitrary and not reflective of actual ENFI practice. Moreover, it would serve only to exclude some of the ongoing ENFI activities that were valued highly by the ENFI community.

An alternative approach was to view ENFI quite broadly, such as “using electronic networks to enhance education.” The difficulty with this approach was immediately apparent: The range of educational uses of electronic networks was much broader than that exhibited within the ENFI community. People within the community had a shared sense of “ENFI” that had a strong shape, if not sharp boundaries.

That shared sense of purpose and community posed a quandary. Newcomers to the ENFI community, such as the outside evaluators Bruce, Bartholomae, and Fowles, and even those within the community who might attempt to take an outsider perspective, such as Peyton and Batson, saw a community of teachers and researchers who viewed themselves as implementing
ENFI in the classroom, doing ENFI research, and participating in the ENFI community. Yet defining ENFI independent of the community seemed problematic.

We are accustomed to thinking of innovations, particularly those built on new information technologies, as having rather solid and precise definitions or specifications. But in this case, the meaning of ENFI seemed not only to be fluid, but to be defined more by a community of practice than by some specific tools or tenets. We were thus in the position that Michelle Rosaldo describes in her book, Knowledge and Passion (1980). She finds that the Ilongot people in the Philippines use the term liget to describe activities ranging from gardening to killing other people in war. How can this one term have such a range of meanings, without losing all meaning for those in the community? Rosaldo realizes that no lexicon will provide the answer. It is only by immersing herself in the set of practices associated with the use of liget that she can begin to uncover its meaning for the Ilongot.

As we studied the set of practices associated with the use of ENFI, we came to see that the community-of-practice definition of meaning for the innovation resolved the quandary of defining ENFI. Moreover, we began to see that this situation was not unique, but rather exemplifies a general pattern. Comparisons to other innovations (e.g., Quill, as reported in Bruce & Rubin, 1993; Rubin & Bruce, 1990) show that practice-based conceptions of innovations are needed.

Part I develops the practice-based conception of innovations. In Chapter 1 we explore different notions of innovation and social change, progressing toward a model that integrates ideas about communities of practice with the specifics of the technologies employed. In Chapter 2 we discuss the implications of this view of innovation for evaluation and, in particular, the various approaches we took to the evaluation of ENFI. We present situated evaluation as a type of evaluation that takes into account the varieties of ways that innovations are realized in practice. In Chapter 3 we examine multiple realizations of the ENFI vision and in Chapter 4 the common threads among these realizations.
1 Innovation and Social Change

Bertram C. Bruce

When educators attempt to implement an innovation, they typically face a complex challenge of meshing new ideas with well-established beliefs and practices. As a result, they often realize the innovation in a way that reflects situation-specific compromises between the old and the new ways of doing things (Bruce & Peyton, 1990; Bruce & Rubin, 1993; Rubin & Bruce, 1990). A major goal of this book is to explore this process of realizing innovations and to consider the implications for models of educational change, for the evaluation of innovations (Cronbach, 1982), for the role of teachers in implementing innovations (Hord, Rutherford, Huling-Austin, & Hall, 1987), and even for the basic notion of what an innovation is.

The linking of new technologies to a vision of transformed pedagogy is a distinguishing feature in many proposed innovations in education. It is rare that the developer of an innovation would adopt the goal of simply facilitating current practices with a new technology. The reification of the developers’ pedagogical theories is viewed as vital to achieving their pedagogical goals, and the argument is made that the expense of adopting new methods and tools is justified by the major improvements that will occur. Conversely, proposals to transform teaching practices often incorporate new technologies, which might include new media, computers, curricula, kits of manipulatives, or step-by-step procedures for teaching or learning.

Thus, new technologies are commonly linked to visions of educational change. Sometimes the new technology is viewed as sufficient unto itself to effect the desired changes. In that case, we succumb to technocentrism (Papert, 1987), the tendency to conceive technology independent of its contexts of use. With this mindset, we assume that if only teachers and students had access to the power of the new technology, all aspects of the wonderful vision would be realized.

Studies of the process of educational change (e.g., Fullon, 1982) show that access to new information, procedures, or tools alone rarely leads to change. One reason is that the same technology has different meanings in different settings. The already functioning social system and traditional practices in which the technology is placed shape the ways the technology is understood.
and used. In fact, those who do adopt innovations are typically faced with a challenging task of resolving conflicts between old practices that derive from powerful situational constraints and imperatives of the new technology. As these conflicts are resolved by different people in different settings, the original technology takes on multiple forms; the it becomes them.

In this book we examine the process by which ENFI was realized in many classrooms. But the general form of the process recurs for the introduction of any innovation, whatever the domain. The parameters, constraints, and issues related to change are in large part the same across settings; accordingly, the examples in this chapter come from a variety of fields. Many of the examples pertain to innovations that incorporate new technologies, but the essential points apply to all innovations, even those built around older technologies such as books, paper, and pencil, or the blackboard.

We view an innovation as the manifestation of a set of beliefs and values about change. Thus when we refer to the innovation, we include not only pieces of software or hardware, but also all of those documents and practices that define and support its intended uses. At a minimum these include user’s guides, documented examples of previous use, training for users, and texts describing the innovation. But in the final analysis, we see an innovation as a process – the meeting ground of various interests and practices. What we need to investigate is the meaning of this broader sense of the innovation for the social systems in which the innovation is used.

This view raises some broad questions: Under what circumstances will a social system change, resist change, or change in unexpected ways? What is the role of innovations in producing change? What institutional factors promote or inhibit change? How can we best analyze the process of change when it does occur? What are the implications of these issues for the evaluation of innovations?

**Discourses on social change**

Discourse is a useful construct for describing differing approaches to the study of innovation and social change. For the purposes here, we conceive a discourse as a socially, culturally, and historically defined set of social relations, manifested in large part, though not exclusively, through language use (Gee, 1990).

We begin this chapter by looking at two conflicting discourses on innovation and social change. One is innovation focused; it talks of changes in social systems brought about by an innovation. Within this discourse, these changes are seen as significant and positive. The second discourse is social system focused; it emphasizes underlying social, cultural, economic, or political processes that undermine innovations, resulting in negative outcomes or, more often, precluding any change at all.