The Formative Evaluation of a University Videotext System

Richard T. Hezel
Karen R. Miller

Abstract: A university videotext system, INTERACT, was developed, and information and graphics were designed using a systematic multi-stage formative approach. An assessment of information providers' and subscribers' potential information needs was done anda pre-release test of the system was undertaken. An evaluation of INTERACT use during its first five weeks of operation was completed. The evaluation included unobtrusive observation, mall-intercept interviews of users and non-users to assess ease of using the system, enjoyment of the system, and flow analysis and frequency of frame access. Results of the evaluation are discussed.

In the explosive development of new electronic media during the past ten years we have witnessed marvelous successes among technologies that have promised to expand the traditional uses of television. Satellite and cable delivery systems, for example, have enjoyed healthy growth. The recent dramatic increases in VCR saturation in the USA represents perhaps the most rapid technology adoption since the arrival of television itself in the 1940s. Home use of videodiscs has plummeted, however, while corporate and educational use of videodiscs has expanded.

Teletext and videotext systems have experience moderate to high success in most nations: Canada, Great Britain and France appear to be developing successful teletext and videotext systems, though not entirely with clear purposes (Scrivens, 1982). In the USA, however, text services directed to the home market have not enjoyed such prosperity, and one can read nearly every month of the demise or diminuation of some teletext or videotext system.

The factors contributing to the success or failure of teletext and videotext systems are varied, but part of the problem in the USA is that teletext and videotext have been conceived as an extension or alternate use of standard television and targeted to the home consumer

Richard T. Hazel is Co-Director of INTERACT; Director of Public Communication Studies and Associate Professor of Television, Radio and Film in the S. I. Newhouse School of Public Communications, Syracuse University, Syracuse, NY. **Karen Miller** is a Syracuse graduate in Television, Radio and Film and is currently an independent instructional video designer/writer in Washington, DC. This article is based upon a paper presented at the Sixth International Conference on Television Research held at Concordia University, Montreal, PQ in June, 1988.

market (Greenberg, 1979). Teletext systems are one-way information systems that utilize television broadcast frequencies or cable for delivery, and the information is usually *piggy-backed* on the vertical blanking interval (VBI) of the standard television picture scan of a regular over-the-air television broadcast or transmitted as full-channel text. Teletext is not interactive, and VBI teletext has severe speed limitations. Videotext systems are two-way interactive, or transactional, systems delivered via telephone or cable, and generally videotext permits access to a far wider diversity of information than teletext (cf. Tydeman, Lipinski, Adler, Nyhan, & Zwimpfer, 1982).

Both teletext and videotext have relied on a home television set for the display of information, and that is both an advantage and a disadvantage of the systems. That reliance presents an advantage in that 98% of all homes in the USA have television sets and the technology uses existing equipment for reception, but it is a disadvantage in that the use of television sets is under increasing competitive demand for viewing broadcast and cable programs, as well as VCR programming, video games, and text services.

In the USA, CBS television has attempted to maximize the utilization of home TV sets and to supplement CBS television programming by offering *Extravision*, a teletext service carried on the VBI of the network signal. CBS envisioned a teletext service that would promote the network and its programs, returning higher program ratings to the network, but it also expected that consumers would be lured to the CBS network by Extravision providing national and international news, stock market reports, program information, and an array of local information. CBS recently scaled down its involvement in the service because of low consumer demand aggravated by high decoder costs and lack of commitment by affiliated stations.

Videotext services such as Viewtron and Gateway also attempted to serve the home market by offering a wide range of interactive and transactional services such as electronic banking, retail purchasing, and electronic mail. Both services have ceased functioning, despite initial highly favorable evaluation reports (cf. Silverstein, 1983).

Videotext services that have been directed toward specific user groups or businesses have been more successful than those aimed at general audiences (Changing priorities, 1985; Sigel, 1983). It is much more difficult to predict which information is central in importance to a general consumer market, and it is more difficult to design wide ranges of information to fit the broad needs of the general public than of specific, targetable groups (cf. Channel 2000, 1981). Furthermore, it appears that research on consumer text services may mislead developmental decisions because results overestimate positive consumer response to the systems (Moschis & Stanley, 1983).

Against this background we made the decision to develop a videotext service, INTERACT, for a closed-user group comprised of students, faculty, and staff of Syracuse University. Not at all coincidental to the decision was AT&T's beneficent donation of a videotext management system, several frame creation systems, and Sceptre terminals to Syracuse University. During the planning stages, the university opened a new student center, which would be the focus of student activity. It was decided that during the pilot project, INTERACT would initially serve student information needs through a single terminal in the student center. The terminal was to be located adjacent to an information desk in the middle of the student center's main lobby, where pedestrian traffic flow was projected to exceed 8000 per week. As a consequence of its physical location, INTERACT was designed, in large part, to convey student life information.

INTERACT Goals

The system was designed for the benefit of several university constituencies, whose needs are reflected in the goals established to guide the development of INTERACT. The goals were also used as the basis for more specific objectives of the system and as the milestones against which progress in the development of the system could be assessed. The goals of INTERACT were:

1) to provide SU students, faculty, and staff with a simple, convenient, pleasant, efficient, attractive, and adaptable system for obtaining needed information;

2) to act as a gateway among information providers, advertisers, and Syracuse University users;

3) to provide an interactive channel and services among information providers, advertisers, and users;

4) to provide faculty and students with a system for carrying out research about electronic media and human behavior;

5) to provide faculty and staff with a system for the electronic delivery of text and graphics for instructional purposes;

6) to reach breakeven point by the third year of operation; and

7) to provide an educational laboratory experience for students in preparation for future careers in electronic media.

The database structure and page were designed through a marketing-systems design approach with evaluation stages built into the developmental phases. Such an approach requires a) a market study to determine demand for the variety of information considered for inclusion in the system; b) diagnostic testing of a prototype system and its contents; and c) assessment of perceptions and uses of an on-line system. A videotext system, as an alternative form of television, could be evaluated applying many of the same staging processes used in the formative evaluation of television programs and in the development of new teletext and videotext services (cf. Cox Research, 1980). Such an evaluation model seems particularly appropriate to technological systems that have both information providing, or purposive, and profit-making, or commercial, orientations.

There were several aspects of the INTERACT system whose development needed to be guided by formative evaluation: the structure and organization of information on the system through the use of menus (cf. Elton, Harris, Thompson, & Zimmerbaum, 1983); the design of pages, legibility of text, and aesthetics of graphics (cf. Godfrey & Chang, 1981; Reynolds, 1979); and the efficiency and usefulness of the system.

The following phases constituted the stages of system development that pertained to evaluation: 1) information needs assessment; 2) information provider survey; 3) pretest of system; and 4) field evaluation of system.

Information Needs Assessment

Information needs of Syracuse University students were first determined by mall intercept interviews with 100 undergraduate and graduate students at various locations on campus. Students expressed interest in news, weather, entertainment (e.g., movies, plays, theatre), campus events, and academic information (e.g., financial aid, placement service). These information categories became part of a general guide by which designers could create an information structure or menu for the system.

To avoid the duplication of information services already available, to get an understanding of students' current information sources and information-seeking behavior, and to identify competition, students were asked about their media use. The majority of students reported that they obtained their information about the most-needed topics from daily and weekly campus newspapers. Radio and television were cited as secondary media for the needed information, and the local daily newspapers were least important. In fact, a majority of respondents (85%) reported that they are not regular readers of the local daily newspapers.

Information Provider Survey

The development of the videotext system required an assessment of potential information providers' communication needs and their commitment to using INTERACT for the transmission of messages and announcements to the Syracuse University community. Attempting to serve the information needs of students would be futile without the maintenance of a steady stream of information from the individuals and groups that have the information. A survey questionnaire was developed for approximately 50 targeted potential information providers, among whom were the registrar's office, placement, admissions, athletics, the music school, student organizations, and the theater department. Information providers were asked about the kinds of information they provide, which information channels they use to reach the student body, which information channel they feel is most effective, and whether they felt that videotext could enable them to reach their target groups more efficiently. Not surprisingly, most of the information providers (89%) felt that videotex could help supplement their current information channels. Furthermore, 63% of the information provers said that a system that featured graphics could help convey their message. Approximately 55% of the information providers were currently relying on letters, staffed tables, personal contact, and word of mouth to convey their messages. The rest relied on campus newspapers or posters to inform the students.

The information needs assessment and the information providers survey results guided the development of a menu structure for INTERACT. Through a process of logical categorization and intuitive judgments, all information was divided among six areas, which constituted the main menu choices:

1) academic calendar/deadlines;
2) entertainment;
3) news headlines;
4) Schine Student Center information;
5) sports and recreation; and
6) student services.

Each of the choices offered a submenu with two or more alternative frame selections that contained information from information providers.

System Pretest

The pretest of the system prepared designers for what might occur during the actual operation of the system. In order to assess the design of INTERACT before making it public, the system was pretested with undergraduate communication students. Three methods were used in the pretest: a questionnaire, a path analysis, and the collection of encouraged verbal comments by students while using the system. The comments gave indicators of trouble spots in the design of the graphics, text, or database structure. The follow-up questionnaire obtained subjective judgments of enjoyability, annoyance, speed of information access, completeness of information, ease or difficulty in using INTERACT, and ease or difficulty of locating the function keys needed to operate the system. The questionnaire also obtained measures of frame aesthetics (readability of text, attractiveness of graphics), frequency of student center use by the student, and his/her expected use of INTERACT.

Path analysis. The path analysis traced the student's path from the entry point of the main menu through each submenu and subsequent information frames on the system. In the path analysis an observer recorded the sequence of frames selected by pretest subjects in order to verify the information needs assessment results regarding priorities of information categories to be included in INTERACT. The assumption of the path analysis is that the order in which the student selects frames is indicative of the importance and centrality the student assigns to the frame's information, but the analysis also provides critical information about potential problems or confusion the user might experience in switching from one submenu to another.

As expected, the highest percentage of students selected the entertainment submenu first (39%), whereas 26% chose sports and recreation, and academic calendar/deadlines and news headlines were each chosen first by 13% of students. Student services and Schine Student Center information submenus were each selected by only 4% of students, perhaps because the pretest was not carried out in the Schine Center, and the need for that particular information was not salient to the pretest subjects.

Questionnaire and verbal comments. Students ranked the submenus they found most useful, and in contrast with the path analysis, the most students (45%) stated that academic calendar/deadlines was most useful, while somewhat fewer (36%) reported entertainment as most useful. Schine information (15%), news headlines (10%), student services (5%), and sports and recreation (0%) were ranked as most useful by fewer students. The rank ordering, when compared with the path analysis, gave us valuable information about whether students' needs would be met by INTERACT in its developmental stage. We judged that INTERACT was on target in academic calendar and entertainment, and therefore would remain on the main menu, but that sports and recreation, student services, and news headlines needed to be improved or removed from the system, depending on further evaluations. It was also determined that the structure of certain sections could be improved in order to facilitate users' flow through INTERACT.

An overwhelming majority (94%) of the respondents found INTERACT above average in enjoyability. No students found the experience *very annoying,* and only 13% reported the experience *somewhat annoying.* Students who commented on the annoyance of the service said that slow building graphics that appeared prior to the text were most annoying. A great majority (82%) of the respondents felt they could access information either very *quickly* or *somewhat quickly.* However, students commented that the information provided was either incomplete or could be obtained more easily from a newspaper. Approximately 99% of the

respondents reported that it was either *somewhat easy* or very *easy* to use the system, and 17% reported that it was *somewhat easy* to locate the appropriate function keys on the Sceptre keyboard to use the system. Most (82%) found it very *easy* to locate the keys. One slight problem among respondents was confusion as to which function keys to press. The confusion was later resolved by the placement of brief keyboard instructions on each frame: A small standard banner was inserted into each page instructing the user to press a numeric key to proceed for further information, F1 to return to the main menu, or F3 to return to the previous menu.

Most of the students found the graphics and text very attractive. Some students, however, reported that they had trouble reading the text due to its color combination with the background -- in one case cursive lettering was too thin to read, in another case the highly saturated background chroma bled into the text lettering.

The results of the questionnaire and comments offered during the pretest helped designers refine the system by changing the color combination of some frames, for example reducing the saturation of background colors to reduce bleed. Cursive lettering strokes were either broadened to increase legibility or replaced with block lettering. In order to reduce annoyance over the slow appearance of essential information, designers 'reversed the building sequence of frames such that essential information and menu choices appeared first, then non-essential information, decorative graphics followed. The reversed order permitted familiar users to search for information more rapidly, while still maintaining the attractive and entertaining graphics for new users. In response to the demand for more detailed information, the information gathering team broadened the scope and sources of information used for INTERACT. Given the information from the pretest, designers changed various elements of the structure as well as individual frames. For example, the Schine Center information submenu was temporarily removed for further development, and an electronic bulletin board was added for timely, if haphazardly organized, information.

Field Evaluation

The final stage of the formative evaluation of INTERACT began immediately after the opening of service in the Schine Center. The on-site evaluation comprised four elements: a frame frequency-of-access count, a path analysis, a user interview, and a non-user interview.

Frame access frequencies. The AT&T host computer permits frequency tabulations on frames by day and by hour of the day, enabling the system manager to evaluate gross access to the system in general and to each frame. The frequencies gave us behavioral field information about the use of the system and the popularity of each submenu and each of the 178 frames on the system. Frequencies were collected at. the end of week one and week two, and again at the end of week five, which roughly corresponded with the end of the school year. For brevity's sake, only the cumulative totals after five weeks are presented (See next page).

It is apparent that entertainment information continued to be the most accessed frames on INTERACT. News headlines were second, and sports and recreation, and academic calendar third and fourth, respectively. Actual use data followed quite closely the information needs assessment results, which had shown that entertainment. and news were students' top information priorities.

The frame access frequencies were analyzed, by day. of the week in order to determine the trends of use of INTERACT. Amount of use across days varied from week to week, In general, it was observed that INTERACT users tended to seek certain types of information

TABLE 1
INTERACT Frames Accessed First Five Weeks, Cumulative Frequencies

Menu	Access Frequency	Access Percentage
Main Menu	18,121	27
Entertainment	19,570	30
News Headlines	7,866	12
Sports and Recreation	4,987	8
Academic Calendar	4,180	6
Student Services	3,545	5
Bulletin Board	3,223	5
Graduation	2,513	4
Help	1,339	2
Schine Center Information	648	.1
Advertising	253	.004
Total Frames Accessed	66,245	100.0 %

Note: Graduation, Schine Center Information and Advertising submenus were added to INTERACT after three weeks of service, hence access frequency is comparatively low for each.

at different times of the week, reflecting their activities on those days. Users sought more academic information on Mondays, Tuesdays, and Wednesdays, and more entertainment information toward the end of the week. The day-by-day trends were used to determine the most effective frame up-date days. As a result, a management decision was made to assure that all academic information was updated by Friday for the following Monday, and all entertainment information was updated by Wednesday.

During the second through the fifth week of operation INTERACT expanded to meet the needs of important school events, such as graduation and a class reunion. The system acquired several advertising clients, and the Schine Center information submenu was reintroduced. The access frequency data revealed some novelty usage during the first week with a slight decline in the second week, suggesting some novelty wear-off. Nevertheless, users' clear preferences for entertainment-related information and news headlines became apparent during the second and third weeks of operation.

Path analysis. As in the pretest, observations were made of users' path or flow through the menus and frames. Of five submenus, news headlines were selected first by the most users (32%), followed closely by the academic calendar and entertainment (24%). Primary interest in student services (8%) and sports and recreation (2%) flagged by comparison, probably because the semester was ending.

The path observation included a measure of duration of user sessions. Users spent nearly four minutes using the system. Most users tended to browse through the information; very few appeared to have specific frames they were trying to access. The average number of frame accesses was 11 per session.

TABLE 2
Field Survey Results

Question 1 · How enjoyable was the experience?	
very enjoyable	36%
somewhat enjoyable	53%
not at all enjoyable	11%
Question 2 · How quickly do you feel you can get information using INTERACT?	
very quickly	30%
somewhat quickly	59%
somewhat slowly	11%
very slowly	0%
Question 3 · How complete do you feel the information on INTERACT is?	
very complete	0%
somewhat complete	62%
somewhat incomplete	19%
very incomplete	19%
Question 4 · How difficult or easy was the text to read?	
easy to read	94%
somewhat difficult to read	6%
very difficult to read	0%
Question 5 · Was the keyboard confusing?	
Yes	17%
No	63%

Note: N = 86

Users' survey. Interviewers intercepted 86 users immediately after they had completed their sessions on INTERACT. The survey was similar to the pretest questionnaire in its assessment of enjoyability, speed of access, completeness of information, clarity of the keyboard and system use instructions, frame access instructions, and text readability. In addition, users were asked about their use of the Schine Center, and they were asked to estimate how often they thought they would use INTERACT.

Responses were generally very favorable toward INTERACT. In particular, more users reported the experience as very enjoyable than not enjoyable, 89% of users felt they could get information very quickly or somewhat quickly, that the keyboard was not confusing

(83%). Keyboard confusion was reduced by placing a *help* frame into the system as well as more clear directions in the introductory cycling frames. Most users (94%) reported that the text was easy to read -- a manifestation of definite improvement over the pretest results. The completeness of the information appeared to be a continuing problem, as 38% of users found the information either somewhat complete or very incomplete.

Passers-by survey. In order to find out why some individuals were not using INTERACT, interviewers intercepted people who passed by the INTERACT kiosk. The interviewer asked whether passers-by had every used INTERACT, if so, their frequency of use; if not, their reasons for not using it. Despite nearly equal use of the Schine Center by males and females, observation had consistently revealed that about two-thirds of users were male, an observation made in other teletext and videotext trials. Hence, the passers-by survey deliberately oversampled women to obtain a better understanding as to why so few women were using INTERACT. The survey revealed that 47% of female passers-by had never used INTERACT, 43% of those who said they had not used INTERACT cited "do not know what INTERACT is" as their main reason for not using the system. The greatest number of males (33%) and females (38%) reported that they use INTERACT less than once a week. Approximately 42% of the females who had used INTERACT planned to use it again, whereas only 29% of the males who had used the system planned to use it again, a disturbing finding that merits further research, Of the passers-by who had used INTERACT, on!y 24% used the system l-4 times a week. Most (62%) of the passers-by who had used the system reported they use INTERACT less than once a week.

Summary and Conclusion

Through the process of formative evaluation designers were able to assess the problems in the INTERACT system, and then take corrective action. With each stage of evaluation designers learned more about the system and its main uses among students, faculty, and staff. INTERACT is mostly used as a source of information about entertainment and various timely events on campus. This conforms to the students stated needs assessed in the student information needs survey. The success of INTERACT will depend on its ability to continue to provide students, faculty and staff with the kinds of information they want, One way to insure this will be through continued evaluation of the system as it progresses.

The development of INTERACT, like any teletext or videotext service, demands consistent updating of information and improving the quality of information -- both text and graphics -- to its subscribers. The implication is that the system serves the information needs of its subscribers with new and different information, that those needs are assessed periodically, and that the use of the system is evaluated from time to time.

Clearly, needs assessment and evaluation are relatively simplified in a closed-user system such as INTERACT, particularly where only one kiosk is used. As the system expands to other campus locations and later to access by students and city residents who have personal computers, the challenge of evaluation will be greater, and the danger of failure due to misreading of needs will be greater.

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