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ABSTRACT

A multi-year program, Project Homeroom, designed to introduce home-based computing to a select group of high school teachers, students, and their parents was recently conducted in three Chicago-area (Illinois) schools. The Technological Innovations in Educational Research Laboratory at Illinois State University (Normal) evaluated this program. Methods included periodic written surveys of all participants, who included 242 students and 242 parents. Prior research on survey techniques had identified areas of concern in enhancing response rates as follows: (1) sample size; (2) topic salience; (3) method of distribution; (4) instrument length; (5) coercion; (6) response bias; (7) socially desirable responding; (8) leniency bias; and (9) mathematical accommodations. In examining the responses in Project Homeroom, focus was on these concerns. Non-response was the single major controllable source of error encountered. Use of a multiple exposure methodology aided in developing response consistency. The topic was made salient by emphasizing the importance of the research. School authoritarian coercion, resorted to because of original low response, improved the response rate, although it raised the issue of response validity. Systematic coercion appears to be part of the U.S. public school culture, accepted by parents and students. Further research on the effects of respondent coercion is warranted. (SLD)

Issues in Surveying High School Students and their Parents

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Abstract

A multi-year program designed to introduce home-based computing to a select group of high school teachers, students, and their parents was recently conducted in three Chicago-area schools. The Technological Innovations in Educational Research (TIER) laboratory at Illinois State University provided a research team to conduct the evaluation of this program. Their methods included administering periodic written surveys to all of the participants. Prior research on survey techniques is clear on the pitfalls to be avoided in such efforts while suggesting ways to enhance both response rates and validity. Two years of effort on this project have produced additional insights into the process of surveying high school students and their parents.

Issues in Surveying High School Students and their Parents

In the Fall of 1991 a team of researchers from the Technological Innovations in Educational Research (TIER) laboratory at Illinois State University began an evaluation of Project Homeroom in three north suburban Chicago Illinois high schools. Project Homeroom is a collaborative attempt by the schools, IBM, and Ameritech (the parent company of Illinois Bell) to integrate state of the art telecommunications, computer technologies and software into a restructured high school experience. This project was different from other technology innovations in two key ways. First, each school dedicated a core team of teachers and students to design and implement a unique interdisciplinary approach incorporating the utilization of this technology across the subject areas. Second, and as important, the computer technology was distributed to teacher and student homes in addition to being available in the school, allowing both teachers and students the opportunity to do computer based work and telecommunicate outside of regular school hours and facilities.

The charge of the TIER lab team was to evaluate the impact of participation in Project Homeroom on student learning, attitudes toward learning, and attitudes and use of computer and telecommunications technology. The team was also interested in the changes that took place in the high school curriculum, teacher use of time and technology, and parental involvement in their child's education. The research team designed a multimodal data collection strategy spanning the two years of the pilot Project Homeroom effort. Techniques included: direct classroom observations, individual and group interviews with all participants, visits to participating homes for observation and interviews, analysis of student progress reports and other academic indicators, and exemplars of technology use and program impact. The research team initiated quarterly written surveys of all project participants designed at recording baseline demographic information, changing uses (including self ratings of level of comfort) with the technology, and changing attitudes towards the project itself.

Any process of written surveying can encounter difficulties. To avoid problems a literature review was conducted that identified potential difficulties connected with periodic written survey administrations. Since these were to be surveys of high school students and their parents special attention was paid to prior work done in this environment. This work led to the development of the initial survey instrument and methods of administration although. As we will report later in the paper, that instrument and administration technique had to be revised in light of new items learned from the process of research.

Potential Problems in Written Survey Research

The results of survey research are sometimes viewed with skepticism due to the possibility of a myriad of potential sources of error. The color of the paper the instrument is printed on, its typeface, wording of questions, response options, and even question content, are all potential reasons for respondents not to complete surveys. Other sources of error include the particular procedure utilized to distribute and collect questionnaires as well as individual differences in respondent personalities and attitudes. In order to attain the highest possible return rates with the most valid responses, researchers must be aware of the potential problems, consider their potential impact on the study, and take precautions to guard against them.

Sample size

The bane of any survey researcher is foremost the lack of valid respondents to their survey instrument. Non-response presents the threat that the data collected will not adequately represent the surveyed population. Worse still that data could represent a small but virulent subgroup of opinions distinctly different from those in the population. Many authors, such as Aiken (1988), postulate effective a priori formulae to compute adequate sample sizes in order to offset the effects of non-respondents. Regardless of the number of respondents polled, however there is still a need to guarantee a sufficient distribution of sampling so as to adequately represent the variability of responses present in the population.

Topic saliency

Possible reasons for low response rates to written surveys have been postulated by a number of authors. Low salience of the survey topic to the respondent is most often cited (Green, 1991; Senf, 1987). When the respondent group feels that the survey does not pertain to them or that it is not important enough to consider, they often discard the instrument all together. In the face of low salience the researcher must consider the validity of the responses that are received. The representativeness of the sample to the population as a whole is suspect as is the quality of those responses. Researchers have begun to eliminate low salience through pilot surveys and follow-up focus group interviews. This process is aimed at identifying the most salient topics and wordings for questions to be included in surveys.

Method of distribution

Researchers have also found that the distribution, collection, and overall response rates can be influenced by conscientiously trying to make the respondent

feel special. Sending questionnaires by Express Mail (Anderson, 1987) or other special delivery method (Galpin, 1987) has been shown to improve response rates as well as reduce the amount of time between sending the survey out and its return to the researcher. Galpin (1987) has shown that improving the respondent-researcher relationship also improves response rates. Personalized correspondence and pre-contact letters seem to improve topic saliency for respondents and thus increase response rates. Taylor (1987) reiterates the importance of respondent familiarity with the sender as being a key component to achieving higher response rates.

Instrument length

Another potential barrier to high response rates is questionnaire length. Specifically, respondents seem to engage in a cost-benefits analysis concerning the survey length. Too short of a survey may send the message that it is really not important. Too long of a survey may intimidate the respondent into non-response. In either case, an optimum survey length is needed to adequately engage the respondents. Adams and Gale (1982) examined the differences in response rates utilizing a sample size of 1,650 respondents controlling for instructions, follow-up, questionnaire type, incentives, and length (1, 3, and 5 pages). They found differences in response rates among the different lengths of questionnaire. The three page questionnaire was deemed the most appropriate for the conditions when no follow-up and no incentives were planned. Though Adams and Gale found a statistically significant difference in the response rates of the one and three page surveys, both had much higher response rates than did the five page questionnaire.

Coercion

Any method of standardizing instrument distribution, administration, and collection procedures should be examined for its potential effect on coercing individuals to respond. Coercion can create potential errors in terms of what Tennant, Badley, and Sullivan (1990) call a "proxy effect." The proxy effect happens when space is given on one survey instrument for two individuals to respond. One respondent can become the spokesman, answering the items for both. Tennant, Badley, and Sullivan report that the "proxy" respondent often over- or underestimates the attitudes of the person they are responding for. To correct for this type of "proxy effect" two surveys could be sent, one for each respondent. This solution, though, flies in the face of the research on questionnaire length. Completing two questionnaires is twice the work and increases the probability that both questionnaires necessary for the set might not be returned.

Response bias

Response biases inherent in the individual respondent can be found as response peaks (Hultsman, Hultsman, & Black, 1989), other spurious responses (Goldsmith, 1988), and other forms of distortion such as sabotage, lack of knowledge, or unconscious motivational distortions (Castelli-Sawicki, Wallbrown, & Blixt, 1983). For example, Hultsman et al report respondents disproportionately using numbers ending in zero or five to estimate number of days spent hunting and number of years a hunter. All of these distortions and biases must be controlled for by the experimenter as effectively as possible. Once the instrument is designed there is little the researcher can do to ward off spurious responders, responders with low knowledge of the topic trying to "fake it", or subjects who respond in a biased fashion due to underlying personality variables. The most that can be done is to design well worded, specific items and perhaps include "traps" to alert the researcher to biased responding. For example, a market researcher might add non-existent brand names to a list of names containing the product of interest to check on respondent awareness of that product (Goldsmith, 1988). Respondents who identify the bogus brand names are most likely not truly aware of the market.

Socially desirable responding

A certain level of socially desirable responding can be expected when questioning about most every topic. Furnham (1986) indicates that social desirability may not be a response set, but rather a personality trait. That is, instead of being rather "spurious" and unpredictable, Furnham maintains the socially desirable responding is really a fairly stable multi-dimensional personality variable. Hong and Chiu (1991) suggest eliminating socially desirable responding through the "enlightenment effect." Accordingly, respondents are told of the existence of social responding, then asked to complete questionnaires in a deliberately socially acceptable way. Respondents are then asked to complete the survey truthfully as themselves. This would seem to have an inoculating effect on respondents and might work well for initial surveys as part of the "entering the field" stage of formative research. Gordon (1987) suggests emphasizing "...the importance of the information being provided by the subjects, the importance of honest and accurate self-reports, and the anonymity of the subjects' responses" (p. 40). By emphasizing the importance of the survey instrument in terms of benefits to the respondent, most of the possible threats to validity due to social responding can be controlled.

Leniency bias

Bias is also seen in the forms of leniency bias as a function of self esteem, wherein respondents tend to rate themselves more leniently on performance scales if they have high self esteem (Farh & Dobbins, 1989). This is especially evident in the situation where respondents are asked to rate themselves on ambiguous performance scales, or ones that the respondent is relatively certain that the researcher cannot check. A leniency bias could lead to a ceiling effect, wherein respondents consistently rate themselves at the top of the scale. This results in the measure of interest having little to no variability. While these scores could be adjusted mathematically, it is probably best on self-report items to make the item as unambiguous as possible.

Mathematical Accommodations

The issue of what to do about non-response, either for entire instruments or on single items, is only considered after all efforts have been taken for insuring the best possible response rate. Once the data is collected, the problems of sample size and representativeness still remain for individual items on the survey.

Four mechanical means of dealing with incomplete data have been examined by Raymond and Roberts (1987) and by Ward and Clark (1991). These techniques compared non-replacement of missing data to three forms of data replacement: (1) variable mean substitution; (2) simple regression; and (3) iterative regression. Both sets of researchers agree that the regression replacement techniques are superior to mean substitution and non-replacement. Unfortunately, Ward and Clark warn of the prohibitive costs in computer time with the iterative process while Raymond and Roberts contend that the gains attained through substitution are minimal at best.

It should be noted that any method of substitution for missing data will have an effect on the item variabilities. Special care must always be taken not to create a non-representative picture through the use of substitution. Two examples of non-representative pictures would be: (1) the case where there exist curvilinear relationships among the items, and (2) the case where the responses tend toward the extreme ends of your scale with a high number of missing cases. In the first instance, substitution using regression coefficients would not accurately represent the data since regression is a linear model. In the second instance, replacing the missing cases with the variable means will tend to cancel out any observable effects.

The Project Homeroom Surveys

Project Homeroom's major thrust was the introduction of technology into the homes of students and teachers as well as into the classroom. The resultant changes in attitudes concerning technology among students and parents were of primary importance to the evaluation of the project. Information such as the general demographics of the participants, previous experience with computers, and current usage and comfort was collected.

Project Homeroom has two years as its initial pilot lifetime. During these last two years, surveys have been administered quarterly. As of this writing, three surveys have been administered and collected from the respondent groups. All of the three high schools studied by the Illinois State evaluation team are located in affluent to upper middle income suburbs of Chicago. School B is located to the north, School A to the north-west, and School C to the south-west of Chicago. Each school enjoys an exemplary record for achievement in education, and each has been recognized nationally for excellence.

The surveys were initially sent to everyone concerned with Project Homeroom at each of the three high schools studied. The first survey was sent to the administrators, teachers, students and parents of students involved in Project Homeroom. This survey asked the respondent tc provided general demographics such as gender, age, highest educations level, current occupation, years in that occupation, number of children, etc.. Students were asked to supply demographic information regarding their gender, whether they had a part-time job, favorite subjects in school, least favorite subjects, mode of transport to school, etc. Since the other major component of Project Homeroom was its integrated curriculum, it was of interest to the evaluators whether success in the project could be linked to a liking or disliking of specific subjects.

The major components of all of the surveys administered were the comfort and use scales, the self-reported hours per week engaged in specific computer related and non-computer related activities section, and the open-ended questions. This latter section was added in an attempt to tap information not reflected in the closed ended sections and to guide further "in person" inquiries such as home visits and group interviews.

The comfort and use items were on a Semantic Differential scale ranging from 1 to 5. Fifteen computer applications were listed in the middle of the page with the "Use" scale to the left and the "Comfort" scale along the right. The "Use" scale was headed by the question, "How much do you use?" with 1 to 5 scales beneath corresponding to each of the fifteen applications. A value of 1 was equated with using the particular application "Rarely." Similarly, a value of 5 was

equated with using the application "Often." The "Comfort" scale was constructed like the "Use" scale, differing only in that the heading read, "How comfortable are you using?" and 1 corresponded to "Hardly" comfortable using and 5 indicated the respondent was "Very" comfortable using the application. The values 2 through 4 were not given any affective label, the intent being that each scale approximate interval level data.

Located beneath the "Comfort" and "Use" scales was the question, "During a recent typical week, how many hours do you spend on the following activities?" Below this question were two columns of activities and spaces (lines) for the respondent to estimate their engagement in either computer related or non-computer related activities. Of the 24 total activities listed, interesting relationships were observed between the "Comfort" and "Use" scales and the activities that could be termed either "Structured" or "Unstructured." For a complete discussion of these relationships see Hecht & Dwyer (in Press).

Since much additional information was asked in the first survey it was considerably longer than the remaining surveys. The first survey was four pages single-sided, while the remaining surveys were a single page but printed double-sided. All surveys were color coded by respondent category, though these colors were rotated among respondent groups across administrations. Furthermore, after the first survey, Administrator and teacher responses seemed to closely parallel the information these groups gave in personal interviews. Since these two groups were the easiest to access, surveying them repeatedly seemed redundant and they were no longer asked to complete surveys. Instead, the evaluation team surveying efforts were concentrated on parents and students and they became the subjects of later survey administrations.

Results

Project Homeroom, as of this writing, is one and one-half years into its two year lifespan. The results of the program from its first year have been compiled and analyzed in massive detail in Hecht, Dwyer, Wills, Kelly, Parsons, Nietzke & Virlee (1992) Project Homeroom: First year experiences. Hecht and Dwyer (1993) found support to assert that learning to use a microcomputer can be seen as learning to engage in structured behaviors. We found that students in Project Homeroom tended to increase their reported time spent engaged in structured activities outside of school. Finally, Dwyer and Hecht (1992) postulated a taxonomy of barriers to parent involvement in the education of their high school aged children based on the Project Homeroom data.

The purpose of the current paper is not to report on these and other findings of Project Homeroom, but rather to explore the processes used in collecting the Homeroom data. Of specific interest are the evolving methods utilized in surveying both parents and students. It is our intent to shed light on the issues inherent in surveying high school aged students and their parents.

Sample size

Our first concern as survey researchers was to insure that our sample was representative of the population at large. A benefit of Project Homeroom was having the entire study population at our disposal, a population that was small enough to allow for full study. While this was fortunate it meant that any benefits attributable to Project Homeroom could only be generalized to those individuals who actually participated in the project. Later studies will have to validate Project Homeroom for different samples and more widely ranging populations. This research, therefore, was not overly concerned with issues of generalizability due to the project's pilot nature. It did, however, focus on accurately capturing issues representative of the project.

Methods of distribution

Problems did arise, however, over the method of distribution of the quarterly questionnaires. In the first round of surveys each of the three high schools used a different distribution procedure. School A sent the surveys home with the students and asked students and parents to return the surveys by mail to the university in envelopes provided by the research team. School B chose to mail the surveys home to each family with the understanding that parents and students would mail their responses back to the researchers in the same manner as did School A. School C administered the student surveys in class and had students hand carry the parent surveys home for completion and hand return to the school.

The school then returned all of the surveys to the research team. Table 1 presents the rates of response from the three survey administrations to students, and Table 2 presents the rates from the administrations to their parents.

Table 1: Student response rates by school and administration

School	N	Survey 1	Survey 2	Survey 3
School A	91	73 (80.2%)	84 (92.3%)	81 (89.0%)
School B	75 53	73 (97.3%) 52 (98.1%)	65 (86.7%)	(N/A)
School C	76	76 (100%)	74 (97.4%)	74 (97.4%)
Total Responding	242 53	222 (91.7%) 52 (98.1%)	223 (92.1%)	155 (92.8%)

Table 2: Parent response rates by school and administration

School	N	Survey 1	Survey 2	Survey 3
School A	91	72 (79.1%)	47 (51.7%)	49 (53.8%)
School B	75 53	65 (86.7%) 48 (90.6%)	20 (26.7%)	(N/A)
School C	76	59 (77.6%)	55 (72.4%)	42 (55.3%)
Total Responding	242 53	196 (81.0%) 48 (90.6%)	122 (50.4%)	91 (54.4%)

Note: All schools (A, B, and C) received survey #1 at the first quarter and survey #2 at the second quarter. Due to program and participant changes schools A and C received the #3 survey instrument at the third quarter while school B received survey #1 a second time.

The response rates between survey administrations in the above tables clearly show that is an effect attributable to survey administration procedures. This effect is best characterized in terms of the control each respondent had over there responses.

In the first survey administration schools A and B allowed parents to mail back their surveys directly to the researchers. The initial attempt had such poor return rates from parents (below 20% from each school) that a second administration was needed. This second administration yielded a cumulative 81% average return rate for parent respondents.

In later administrations (surveys #2 and #3) parents were asked to complete the surveys and then return them with the student to the school to be mailed back to the research team. This method produced over a 50% response rate from a single survey attempt (with the exception of a school B on survey #2). Although higher rates could have possibly been attained with additional efforts it was felt that these numbers adequately balanced the difficulty of additional administration efforts against concerns of respondent group representation. It is, however, a more coercive method that the first, and might not be appropriate in situations where highly sensitive information is to be transmitted to the research team without the potential knowledge of the student or school.

Students were uniformly given less control over their method of responding in all but the first administration. School C elected to follow a procedure of administering the survey to students during class time for all of the three survey instruments. The other two schools allowed students to take the first instrument home and return it at a later date, then switched to the method of School C for the remaining two instruments as they encountered delays and difficulties in obtaining returned surveys.

In the Project Homeroom study it was not possible, due to project versus evaluation start calendars, to familiarize the students or parents with the researchers or the requirements of the written survey effort. However, prior to the later surveys letters, parent meetings with the evaluators at the schools, and regular site visits and home visits helped to increase researcher familiarity with the respondents. This familiarity was not well established at the very beginning of the evaluation period and could very well have been a source of initial low response rate in the first survey attempt. Meetings with the respondents, familiarizing them in writing with the requirements and importance of the survey effort, and stressing the need for timely and accurate completion of the instrument seemed to reduce the issue of topic saliency.

Coercion

The response rates clearly show that exercising such a degree of control over the method of administration to both students and parents does produce somewhat higher response rates. But what about the potential of skewed responses due to a perceived feeling of coercion on the part of the respondents? Personal interviews

with students, parents, and teachers have convinced us that schools in general, and these schools in particular, regularly coerce parents and students in ways very similar to this. Students are accustomed to being tested on a variety of topics in the classroom. Parents have become aculturated to being asked their opinion on a number of school-related issues. This survey, then, appeared little different from other instruments students and parents are regularly asked to attend to as part of the normal process of American secondary education. As such it was treated as, according to one parent, "just another one of those things [I] have to do for the school".

Response bias

In the second and third Project Homeroom surveys students were told to carry a survey home to their parents, convince their parents to complete the survey then return the survey to their teacher. While coding surveys it was noted that some surveys looked as though the student had answered for the parents (childish appearing handwriting and language referring to self rather than son/daughter). Students answering for their parents could have immense ramifications for survey research involving the at-home administration of surveys of parents. In the analysis of data gathered through Project Homeroom surveys, special attention was paid during the coding and data entry phase of data analysis to catch surveys potentially completed by proxy respondents. Once a potential forgery was identified, it becomes a simple matter to delete (or otherwise identify) the particular case in the analysis. Luckily this only occurred a few times through the total survey effort so proved to be a little impact on either sample size or analysis.

Possible ways to ensure the survey is completed by the intended respondent would be to send it registered mail or to administer the survey during a personal or group meeting. Both methods could prove exceedingly expensive and the latter further suffers from the fact that respondents now have to be additional encouraged to attend the meetings. Once again, the researcher is faced with trade-offs. The only real solution is a conscientious assessment of whether this constitutes a risk, and how prevalent it might be in the actual setting.

Topic saliency

The concern of topic saliency was not an issue with the Project Homeroom study. Participants consistently appeared eager about the project. This was hardly a surprise since participation in Project Homeroom insured a computer in the home for the student and low cost access to the selected data service (Prodigy). Interestingly, though, excitement about the project did not insure a high response rate or even indications of high program participation. Numbers of respondents to

the written survey, although good to excellent, were not total, and responses to the question items indicated that few of the parents understood (or were willing to relate) the full scope of the project.

Measurement accommodations

No substitutions were made to the Project Homeroom data for individually missing responses since sufficient sample sizes were available for the variables of interest. Should there have been substitutions made, they would have been made regarding the respondents' reported comfort with and use of various computer software applications as it changed between administrations of surveys. Cronbach and Furby (1970) argue convincingly against the use of "change" scores. Nonetheless in the evaluation of Project Homeroom change scores were used, though not to make inferences about the program but rather as indicators of changes in respondent attitudes about the program. These indicators were used most often to guide personal interviews and focus group discussions with survey respondents.

The use and comfort scales utilized in the Project Homeroom surveys proved to be good "traps" for spurious responses due to lack of knowledge, or inattention to the instrument. For instance, interviews and site visits would tend to support the written survey finding that few of the students (only five out of 222) reported high use and comfort with Computer Aided Drafting (CAD) or Computer Aided Machinery (CAM) software. A process of cross-validations was essential to insuring that accurate data was being collected throughout all of the survey administrations. Intentional sabotage was also not a problem, but was check for in the traditional ways (such as examining for run-coded items and multiple similar item inconsistencies).

In the case of Project Homeroom, response peaks did occur among respondent's estimations of how much time per week they spent engaged in various computer and non-computer related activities each week. Respondents generally overwhelmed the scale by reporting outrageously high amounts of time; such that the total hours reported exceeded the number of hours possible in a seven day week. Other respondents seemed to estimate their daily use and then respond in multiples of seven. To correct for these peaks, the reported times were converted into percentages of the total time reported. Thus the unit of measure was not raw score changes in time spent on individual activities, but proportional changes within subjects reported times.

Latency bias

One unintentional outcome was that students taking part in the project reported having higher self esteem because they were the "chosen few" -- even though they had volunteered for the participation in the program. The students of Project Homeroom were told outright, on numerous occasions by school administrators and teachers, that they were special. The act of participating in written surveys may have heightened this perception. We believe that this led to inflated ratings on the first survey of the importance of Project Homeroom and students' desire to be in the program. Student responders might also have inflated their responses to survey questions, especially in their self ratings of comfort and use. In later surveys, student attitudes regarding the program seemed more subdued. Repeated administrations of the survey over time helped to identify this changing elements of this effect.

Conclusions

The purpose of this research was to examine methods of survey research when applied to high school students and their parents. From the research conducted during Project Homeroom we found that non-response was the single major controllable source of error encountered. Utilizing a multiple exposure methodology aided in developing and indication of respondent consistency. This also tended to identify socially desirable responding. The survey topic was made salient to respondents through emphasizing the importance of the research, personalizing cover letters, and increasing respondent-researcher familiarity through personal interviews, phone calls, and letters.

Perhaps the most intriguing finding of this research is the apparent effect of school authoritarian coercion on student and parent responders. Most survey researchers would agree that respondent coercion is a double edged sword: it can improve response rates while destroying the validity of the very responses desired. With an abysmally low initial response rate the Project Homeroom evaluation design turned to a coercive approach in order to improve response rate. This technique improved and stabilized the rate of response but raised the issue of item validity. Cross validation techniques (in the forms of multiple similar questions, personal and group interviews, and site visits) were convincing that the data collected via written survey were both accurate and valid.

The most reasonable explanation is that systematic coercion is an accepted part of the American public school culture, accepted by both students and parents alike. While this many not be true for all topics and geographic areas it does suggest that survey researchers can take more liberties with survey design and administration knowing that the respondent group is inherently more likely to complete the instrument faithfully. Further research on the effect of respondent coercion under different settings and conditions is certainly warranted.

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