DOCUMENT RESUME

ED 380 081 IR 017 002

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TITLE Needs Assessment--A Savvy Way To Secure ITV Use.
PUB DATE [95]
NOTE 17p.; In: Imagery and Visual Literacy: Selected Readings from the Annual Conference of the International Visual Literacy Association (26th, Tempe, Arizona, October 12-16, 1994); see IR 016 977.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Audiovisual Instruction; *Educational Television; Elementary Secondary Education; *Needs Assessment; Resource Allocation; *Science Teachers; Surveys; *Teaching Methods; *Visual Learning; Visual Literacy

ABSTRACT

A needs assessment survey of science teachers in 5th through 12th grades was conducted to answer the following research questions: (1) What factors influence science teachers positively or negatively toward using instructional television (ITV)? and (2) What are the significant needs felt by science teachers in the actual classroom regarding ITV use? Results of needs assessment found eight factors and three stand-alone items that influenced the teachers' beliefs about ITV use: relevant and accurate; entertaining; instructional support; teacher involvement; accessibility; focus; availability; external approval; the program uses background music; the program is narrated by woman; and smaller class size for effective use. With respect to the significant needs felt by teachers, a discrepancy was found between ideal and actual situations across all eleven variables, indicating serious gaps in technological innovations in ITV use. Three tables and one figure illustrate the data analysis. (Contains 59 references.) (MAS)

Needs Assessment - A Savvy Way to Secure ITV Use

Indrani Ganguly

Since I come from India which is the world's largest documentary and film maker, I have an instinctive attraction to visuals. This has led me to examine more closely the concept of visual learning. It did not take me long to discover that although most Americans show a high level of immersion in television, the same medium failed to enthuse classroom teachers to any noticeable degree. Teachers were so desperate for students to acquire computer literacy through languaging, graphics, simulations, and computer based instructions, that instructional television (ITV) only got a brief passing nod. Educators were often heard favoring a non-linear electronic program (such as the Hypercard) over a linear one, as if one was inferior to the other, thereby justifying their stand on constructivism and other jargons. Thirty years earlier, similarly, educators had made boisterous promises with equal ardor on television's potential to create wonders in the school curriculum. The trend of this situation reminded me of George Leonard's thoughts that, ".....we must see technology as an ally, a force that can as easily enhance as diminish the human spirit" (Gilliom & Zimmer, 1972, p.6).

The two major national surveys on the use and utilization of ITV, one completed in 1977 and the other in 1983, indicated a 33% and 29% usage rate respectively (Riccobono, 1985). Today, ITV use remains rare; only 37.9% of the nation's teachers perceive media materials as adequate supports to instructional objectives (The National Center for Educational Statistics, 1993). This despite the Carnegie Foundation's Agenda for the Nation:

"If America hopes to achieve its first educational goal, television must become part of the solution, not the problem. Inaction can no longer be tolerated....."(*A Mandate for the Nation*, 1990).

Several valid reasons have prevented ITV from gaining a foothold in classroom teachers' instructional repertoire. The most prominent among these have been: 1) the myth of television's image as a medium for passive viewing; 2) the overemphasis on computers (in the parlance of educational technology); 3) the puerile research attempts on television's effectiveness over traditional teaching methods; and 4) non-compliance with the participatory design principle in developing broadcast materials. Additionally, over the last forty years of its existence, ITV has assumed differing images in order to respond to the exigencies of American

education (Cambre, 1987). The "master teacher" image of instructional television of the late 1950's, followed by the "you are there" image of the late 1960's, the "entertaining but softly instructional" image of the seventies, and finally the "dramatized and fast paced" image of the 1980's, all touted ITV's ability to create wonders in the school curriculum.

Unfortunately, the planning and purpose of ITV use was driven all along by a clientele outside the classroom, largely unseen by the teacher. The inside change agents of this innovation, namely teachers, had little knowledge of what they would have to deal with and how they would make room for the TV-teacher in their lesson plans. To fulfill ITV's goal of purposeful instruction, this spot innovation should be removed to better integrate television into the total instructional system.

In many industrialized countries, as in the United States (U.S.), the aspirations of the educational institutions have been molded by the needs of business and industry. The pressing belief that if schools did not take into consideration students' future workplaces, pupils would be educationally handicapped, has prompted educators to quickly revamp school curriculum to enable students to have better life chances. As a result about 350,000 microcomputers that gratified students and teachers alike with their non-realistic images of line drawings, schematics, and graphics through CAI, CBI, and simulations, were introduced into American public schools over a short four years (Campbell, 1984). Everything would have been fine except that the adequate training of teachers lagged behind the trend.

A survey conducted by the American Association of Colleges for Teacher Education (1987) indicated that only 20% of teachers entering the profession perceived themselves to be prepared to teach with computers (Hasselbring, 1991). Further, the software that typically dominated the classrooms, such as drill and practice, tutorial, and simulations and programming approaches were too deterministic and biased against experiential learning (Streibel, 1986; Shane, 1987; McClintock, 1986; & Budin, et al., 1987).

Thus, before computers could qualify as an effective instructional tool, they were hurled into the educational arena to create a symphony with the so-called computer culture of the work life. As Apple said, "There is a partly hidden but exceptionally close linkage between computers in schools and the needs of management for automated industries, electronic offices, and "skilled" personnel." (1988)

On the other hand television's inclusion in school curriculum has faltered because of its 'couch potato' image in viewers' minds. Television's excessive alliance with the American people's domestic lives has diminished its potential as a vibrant educational aid. However, according to educational psychologists, the more senses that are engaged in the learning process, the better will be the information processing and retention.

Television's capacity to simultaneously transmit three general coded types of information - digital, iconic, and analogue - offers the maximum scaffolding to sensory experiences so vital to meaningful learning. Visual learning is the first step to conceptual learning - the same

pathway a child follows to extort meaning from the real world, iconic, then digital.

At this point, we must not combine the iconic (visual) and digital (language and thinking) stimulii, so as to note their distinct features. Streibel (1985) said, "Visual images are implicative and incapable of propositional form. Such images are therefore unable to serve as digital atoms of conventional language."
Eisner (1993) goes one step further in distinguishing visual from digital learning by suggesting that visual images send out messages instantaneously, and function as synchronic media. On the other hand, language as a medium carries a message over time. Viewers construe their own meanings in the light of their cognitive styles through a process of selection from the displayed visuals. The stream of visuals offered by television contains symbolic features that engage learners in assimilating reality into their own schema. Piaget (1971) explained this mental process in children as an active, internalized, schematizing process. Salomon's (1979) ideas on visual supplantation parallel Piaget's in framing visual thinking as an internalized schematizing process. The verbal information that accompanies the visual elements in a TV genre serves to link concepts and labels together. Television has the capacity to provide a spatially continuous set of experiences that is richer than unsystematic exposure to stimuli in everyday life. So the myth that television is a passive process is incorrect because active covert manipulations can be triggered in learners from viewing television.

The third factor that has hobbled ITV's progress since the initial flurry of excitement in the seventies was the premature application of summative research models that overlooked the natural range of variables so integral to this non-coercive and impressionistic visual medium. The overemphasis on scientific validation of results in an empirical set-up limited the scope of theoretical progress, as related to television and learning. (Summative research presupposes a hypothesis, that connotes that results are limited to either acceptance or rejection of the hypothesis). For about two decades (1950-1970), research on comparative effectiveness formed the bulk of the summative research. Most studies found "no significant differences." Only a handful of basic research was concerned with the effects of production variables and learning. In his doctoral dissertation Stickell (1971) reviewed 250 studies on comparative effectiveness and found that 217 of them had committed methodological sins, and only 10 could be interpreted. (Here the reader should note that research methodology is the theory and the interpretive framework that guides a particular research project; method refers to the technique for gathering empirical evidence (Harding, 1987).) Many writers doubted the results of comparative effectiveness studies further by expressing disbelief about the method, stating that there were too many uncontrolled variables to make the studies truly empirical.

The final fault with ITV has been the exclusion of teachers in product design (Schramm, 1977). Utilization of instructional television is a complex process which starts with funding agencies - typically government sponsors, since instructional television markets have generally been unattractive to investors in the private sector. Professionals at various levels then become involved, with teachers brought in last. In order for ITV to be used

effectively in classrooms, it must be pedagogically dependable, convenient, and effective - teachers need to be able to control when and how the instructional media will be used; thus their input is necessary. A team effort by principals, superintendents, media specialists, curriculum experts, and teachers is critical for proper implementation of ITV. Vernon Bronson, one of the early theorists of educational technology, advocates the employment of participatory design which brings together technological designers, content specialists, classroom teachers, and others into the development of programs. The idea is to combine the specialties of experts into a coordinated instructional whole (Hall, 1978).

Research studies on ITV over the last forty years have examined the theoretical aspects of television as a medium for instruction, and how the major chunk of the research is focused on media comparisons and their competing advantages. Media comparison studies, regardless of the media employed, tended to result in "no significant difference" conclusions (Mielke, 1968). Most current summaries of media comparison studies clearly suggest that media alone cannot influence learning under any conditions. Even though dramatic changes in achievement were seen in schools in El Salvador (Schramm, 1977) after the introduction of ITV, it was not the medium itself that caused the changes, but the accompaniment of curricular reform. True acceptance of ITV within classrooms requires television to be taken out of its normally isolated role and adapted into schools' instructional systems. This necessitates the investigation of several problems, such as: 1) Is the in-school use of ITV punishing to the user? 2) Are there adequate support personnel to help teachers use ITV, and to know about the program sources? 3) Do teachers have access to video equipment? and 4) Does a teacher care if ITV is used? Since evaluative research is the key to future decision making, this study purports to probe the beliefs and expectations of teachers for ITV use in science teaching in a systematic way.

ITV - The State of the Art

According to Toffler (1980), technological innovation requires the support and concern of the human clientele who use it. The inclusion of the values of all educational partners (learners, teachers, parents, and community) is essential in the planning process to avoid intuitive and spot-innovations. A major component of socially directed innovation policy is the participation by community groups (operating from the public sector) in the product design and development process (Mole & Elliot, 1987). The entry of television into the educational arena was need-driven at the very outset, - as such, it was a socially directed innovation. The needs were twofold: to cope with the teacher shortage in the post-World War II era and to double the effectiveness of "master teachers" in serving as examples to ordinary teachers who needed to improve their own performances. The functional purpose of ITV was tied to solving the short-range problem of teacher shortages, which not only has disappeared, but has also reverted to a teacher surplus. Further, the implied message that television teachers would do a better job than classroom teachers has left a permanent scar in the minds of teachers, thereby alienating them from the spirit of the innovation (Friedlander, 1975).

Proponents of ITV would be more

successful if they used the intervention model, described by Mole & Elliott (1987). This model prioritizes the needs of the human clientele it serves. In order to serve the goals of education--the largest industry in the United States--all people involved must make concerted efforts to solve potential problems. For instance, there is the need to decide whether to go with the economy and quality of centralized broadcasting over a large area, or the educational and psychological advantages of local control of instruction in the classroom (Schramm, 1977). If the experiences offered by high quality, nationally funded programs pose problems for the teacher, or the level of treatment exceeds the mental age of the intended audience in a classroom, then much of the quality is wasted. Hence, one solution lies in avoiding the naive ways of launching an innovation that hinder its growth and acceptance. This may be done by taking into account the needs of the teachers who are responsible for implementing ITV in the classroom (Gray, 1976; Smith, 1978; Schramm, 1977; Gayeski, 1989; Warran, 1991).

Needs Analysis in Technological Innovation

In Webster's dictionary, need is defined as the physiological or psychological requirements for the well-being of an organism; a condition requiring supply or relief. It is also generally understood to indicate a state or condition, as in Maslow's (1954) hierarchy of needs from the physical (the lowest level of survival) to self-actualization (the highest level). There are two common uses of the word, "need" (Witkin, 1984). In one, need is used as a verb, as in "We need oxygen." In the other, need is used as a noun, "Jim has a need for improving his reading performance". When need is used as a verb, the remedial solution is already suggested to the need. When used as a noun, need can be operationally described as a discrepancy in a problem. Kaufman (1988), Heath (1985), and Beatty (1976) have utilized the discrepancy definition of need - a gap between current and desired conditions.

Heath (1985) identified three types of needs assessment models that conform to the aforementioned needs. The *discrepancy model* of needs assessment focuses attention on the degree of discrepancy. In the *demand model*, potential clients are surveyed to elicit their "felt needs". Respondents are encouraged to express their needs rather than to demonstrate their deficits. Finally, the *dialogue model* has been proposed to insure a sustained interaction between investigators and clients. In this research, a combination of the discrepancy and the demand model was employed to discover teachers' perceptions of ITV implementation. If ITV is to be successful, the distinction needs to be made between a mass audience and specific target audiences, and this information must be conveyed to funding agencies, administrators and producers. According to Kozma (1986), television for education must cause learning in individual viewers. This statement should create an awareness that the attraction of a mass audience is **not** the primary goal of televised instruction. Instead, instructional television is defined as the application of television technology to purposeful instruction. Tyler (1971) concluded that expected behavioral gains on the part of the learner should testify to the attainment of program objectives. In reality, however, producers lose sight of the needs of the target audience in their concern to attract a larger audience; so they often sacrifice the instructional effectiveness of

programs.

The notion of a needs assessment for a target audience needs to be considered more seriously in view of this country's decentralized educational system. In the U.S., unlike England, Japan, France, and some other developing countries, there are no uniform curricular standards from school to school, from district to district or from state to state. This lack of uniformity makes it difficult to implement model instructional television programs across districts, and on different grade levels. The size of the decentralized systems makes "education" an abstraction (Bosner, 1976). So, one particular set of program objectives cannot be claimed as educationally appropriate. Within the environment of the classroom, program content needs to be directly related to teachers' lesson plans in order to establish a cohesive bond between teacher objectives and program content.

The ultimate success of a production depends on its psychological effects, and not on the medium itself. Studies that examined the effectiveness of different media have shown repeatedly that no learning benefits are gained from employing different media--what matters is the method, aptitude, and task variables of instruction (Clark, 1983; Salomon, 1978). Consequently, a theoretical base must exist to fulfill the above instructional criteria. As part of inservice programs on TV utilization, Maccoby and Comstock (1965, cited in Wade, 1969) designed an experiment which involved two types of preparation and follow-up to be used with television: Socratic and Teacher-Tell. The Socratic method emphasized active teacher questioning, and correction of student responses, and the Teacher-Tell method was a mere iteration of TV content for students - one a brief synopsis to prepare them for TV lessons, and the other, a summary for when the lesson was over. Wade experimented with the Maccoby-Comstock hypothesis in a two-way ANOVA design and found significant learning gains in students utilizing the Socratic method over those in the Control and Teacher-tell methods.

When so much depends on the message in the medium, and on its utilization by the classroom teacher, one clear way to decide the effectiveness of programs is to consider viewer needs. Since ITV is used in formal classroom settings, where the beneficiaries are students, the expectations and input of teachers should be incorporated into decisions on program development and utilization. Sound curricular decisions are usually dependent upon two sets of influences: 1) general and theoretical and 2) practical and pragmatic. The first set considers television in light of society, knowledge, and learning; the second one addresses the state of ITV programming, the availability of supplementary delivery systems, and the utilization strategy. The pragmatic influence requires an assessment of the needs of the teachers who will make meaningful contributions to ITV's functional aspect. The literature on the relationship between teacher needs and ITV utilization will help offer a baseline as to the nature of the connection.

For instance, the attitude of principals toward the use of ITV in schools can greatly determine the extent of utilization. Approval and recognition by principals was deemed critical to its inclusion in classrooms (Klasek, 1976; Driver & Bracey, 1980). Keller & Johnson (1982) made tentative conclusions

concerning the differing variables which influence the utilization of ITV. Using a forward-stepping multiple regression design, the researchers found that the amount of ITV use by teachers greatly depended on their past and present dispositions toward the medium and on the number of favorable conditions derived from its use. The experience of teachers correlated negatively with ITV use, with less experienced teachers as somewhat heavier users. The availability of equipment along with newer capabilities, like recorded video programs, slightly affected the usage rate of ITV. In the cross-tabulated data of the Maryland instructional television study final report (Johnson & Keller, 1981), school type was also shown to have a strong relationship to ITV use. It was found that elementary schools were heavier consumers than middle/junior high schools, and the latter in turn used more programming than high schools.

The overview of the survey research on ITV (Dirr & Pedone, 1979; Crane, 1981; Maftoon, 1980(cited in 1982); Warran, 1991; Riccobono, 1985; Mercer, 1980; Keller & Johnson, 1982; & Patterson et al., 1993) reveals that broadcast scheduling, inadequate availability and accessibility of equipment and materials, lack of administrative, parental and student support, and lack of coordination with media specialists have been major deterrents to its use. Additionally, most elementary teachers regard ITV as an isolated piece that has no connection to other activities in the classroom. Consequently, the purpose of this research was to identify factors affecting ITV's usage rate for teaching science, and to determine the "felt needs" of teachers that must be satisfied to warrant additional use.

Research Questions

A needs assessment survey of science teachers in fifth through twelfth grades in the state of Ohio was conducted to answer the following research questions:

1. What factors influence science teachers positively or negatively toward using instructional television?

2. What are the significant needs felt by science teachers in the actual classroom regarding ITV use?

Methodology

A target population survey on teacher needs and expectations were given to science teachers to uncover their perspectives on the most effective utilization of ITV. A survey instrument was constructed and validated to collect information. The first part of the survey consisted of items related to ITV utilization. The second part requested demographic information on teacher characteristics. The study was descriptive and included ex-post facto analysis of the effects of certain teacher characteristics on the opinions and stances toward ITV.

Sample for the Needs Assessment Survey

The sample for this survey research consisted of Ohio science teachers (5-12 grades) who were affiliated with the Science Education Council of Ohio (SECO). Surveys were mailed to 960 teachers. Incorrect addresses reduced the size of the target population from 994 to 960. Surveys were mailed with two cover letters: one from the researcher and department directly involved in the study and the other from the past president and membership chair of SECO. The survey instrument and the cover letters are available upon request.

Data Analysis

After nine weeks, two-hundred-sixty responses to the survey were received. This represented 27% of the target population. To evaluate the representativeness of the sample, a profile analysis was performed to compare the distribution of gender, age, grade levels taught, and geographical location of teachers among the respondents with those of the non-respondents. The sample consisted of 140 female, and 120 male teachers. Of these, 98 were physical science teachers, and 133 were life science teachers. There were 39 teachers in the first age group (22-35), 163 in the second (36-50), and 46 in the third (above 50) age group. The teaching experience of these teachers ranged from 1 to 50 years.

Cross-tabulated Chi-square analysis was used to test whether the sample matched the population on the above four demographic characteristics. The first step of the data analysis was a Principal Component Analysis to reduce the 31 items of the first part of the instrument to meaningful clusters. The sample size for reliable factors suggested by Stevens (1992, p. 384) requires more than 150 for any analysis. Stevens states that for social science research, at least 150 subjects for components with 10 or more low loadings will be reliable. Also, components with four or more loadings above .60 in absolute value will be reliable, regardless of sample size. The data from 260 subjects used for this analysis were believed to yield reliable results. The internal reliability of the factors obtained were estimated using Cronbach's alpha. Next, the effect of teacher characteristics (gender, age, grade levels taught, and teaching experience) on the factors extracted were examined through four separate multivariate analyses of variances. Significant multivariate F-ratios were followed by univariate tests in the case.

The second step in the data analysis used a repeated measures multivariate analysis of variance on the single group of subjects in a "One-Within" design. The within-subject factor was the social conditions of "ideal" and "actual". The set of factors yielded by the principal component analysis of part A of the instrument constituted the dependent variables. The difference variables created measured the need or discrepancy between the ideal and actual conditions using the same group of subjects for the two sets of responses. The sphericity assumption was tested by Greenhouse-Geiser and Hyunh and Feldt epsilons in order to control for bias in the univariate tests that followed the multivariate tests. The purpose of this analysis was to determine the significances of the "felt needs" of science teachers on the variables identified through the principal component analysis. Here again, the sample size of 260 was adequate for small effect sizes to have a statistical power of .80 (Stevens, 1992).

The significance of the Chi-Square statistic was greater than .05 level, across gender, subjects taught, and geographic location. Hence, the null hypothesis could not be rejected. In other words, there was no significant difference between the sample and the population on any of the above three demographics. Across school type of teachers, the Chi-Square statistic was found to be $p < (0.012)$. Since this was less than the .05 level, the null hypothesis was rejected. In other words, there was a significant difference between the sample and the population on grade levels taught alone.

Factors Influencing Teachers

The first research question addressed by this study was; "What factors would influence science teachers positively or negatively toward using ITV?" Two approaches were used to answer this question. First, a factor analysis using principal components analysis with varimax rotation was performed on the responses to the "actual" column of part A of the survey instrument. The result was used to construct eight subscales which clarified the interpretation of the responses. In addition, descriptive statistics were used to compare the factors that were ideally viewed by teachers, as opposed to those perceived actually in the ongoing classroom environment, and to come up with the discrepancy between these two conditions that led to the assessed need.

A factor analysis of the 31 items describing teachers' beliefs about ITV was performed to identify the subscales embedded in the instrument. The principal components analysis (Table 1) reduced the 31 variables to 8 factors (or subscales) that would closely fit the pattern of the observed correlation matrix. The value of a good principal component analysis is that it indicates a close fit between the observed and reproduced matrices (Tabachnik and Fidell, 1983; Stevens, 1992). The purpose of varimax rotation (a form of orthogonal rotation) is to make the interpretation of factors most obvious by maximizing the variance of the loadings across variables within factors. This method was employed to the extracted factors. In orthogonal rotations the factors are uncorrelated; the solutions offer ease of description and interpretation of results. Varimax rotation was deemed appropriate in view of the low correlation found in the original factor matrix. The cut-off size of loading was set by the researcher at .45, instead of the general rule of thumb which considers loadings in excess of .30 for interpretation. The reason was to avoid non-chance loadings and to secure greater overlapping between a variable and a factor. Hence, the minimum factor loading considered for interpretation would account for at least a 20.25% overlap in variance between the variable and the factor.

Based on Kaiser's and Cattell's recommendations, the analysis yielded twelve factors with eigenvalues greater than 1, and approximately 8 factors before the break-point in the scree plot. Hence, an eight-factor solution was retained for interpretation, along with three stand-alone items from the remaining factors, because of their unique nature, and their relatively high loadings. Thus, the resulting eight factors and three unique items described the facets of teachers' beliefs about ITV use, and explained fifty-three percent of the total variance. The three stand-alone items which had high factor loadings were retained as unique dimensions accounting for beliefs of science teachers. These items were:

Item 1: The program uses background music.

Item 2: The program is narrated by a woman.

Item 3: Smaller class sizes needed for effective use.

Even though item 14, "Other science teachers in my school believe that the instructional television program is worthwhile before I would use it", did not load in factor eight, it was placed there because it logically associated with the category of "External Approval."

The second part of the survey instrument provided information on

Table 1.-- Summary of Principal Component Analysis

Factors	Items	Eigenvalue	% Var.	Loading	Cr.-Alpha
Relevant & Accurate	4	5.64	18.2	.57-.73	0.73
Entertaining	4	1.97	6.4	.46-.81	0.67
Instructional Support	3	1.81	5.8	.68-.69	0.62
Teacher Involvement	3	1.63	5.2	.61-.79	0.67
Accessibility	3	1.43	4.6	.56-.74	0.57
Focus	2	1.38	4.5	.75-.78	0.67
Availability	2	1.34	4.3	.53-.65	0.31
External Approval	3	1.26	4.1	.68-.78	0.43
Total	**24**		**53**		

Table 2.-- Multivariate Test for CONDITION main effect

Test	Value	Exact F	Hyp DF	Error DF	Sig. of F
Hotelling	5.485	118.665	11.00	238.00	.000

teachers' personal characteristics, such as gender, age, teaching experience, subjects and grade levels taught, and amount of media training. Responses to these were analyzed to discover the impact they had on the factors influencing teachers' ITV use (through four separate MANOVA's).

Significance of Teachers' Felt Needs

The second research question was; "What are the significant needs felt by science teachers in actual classrooms regarding the use of ITV?" Here, need was assessed as the discrepancy between teachers' belief of ideal and actual standpoints. A multivariate "totally within" design was used, where the same subjects responded to two distinct social conditions (ideal and actual) across eleven dependent variables. This analysis was conducted to determine if the discrepancies between "ideal" and "actual" states were significant across factors. The results of MANOVA (Table 2) on condition (ideal and actual) main effect shows significance at .05 alpha level. However, it is necessary to probe if the sphericity assumption is met to guard against any bias in the univariate tests. The average of Greenhouse-Geisser Epsilon and Hunyh-Feldt Epsilon was 0.60133, showing that sphericity was not tenable with epsilon less than .70. Since the minimum epsilon was .091, this departure from sphericity was not severe. By utilizing the Bonferroni approach that controls the overall alpha to remain .05 across variables, the needs still

Table 3.-- Univariate Tests for Within Subject Effect (N=249)

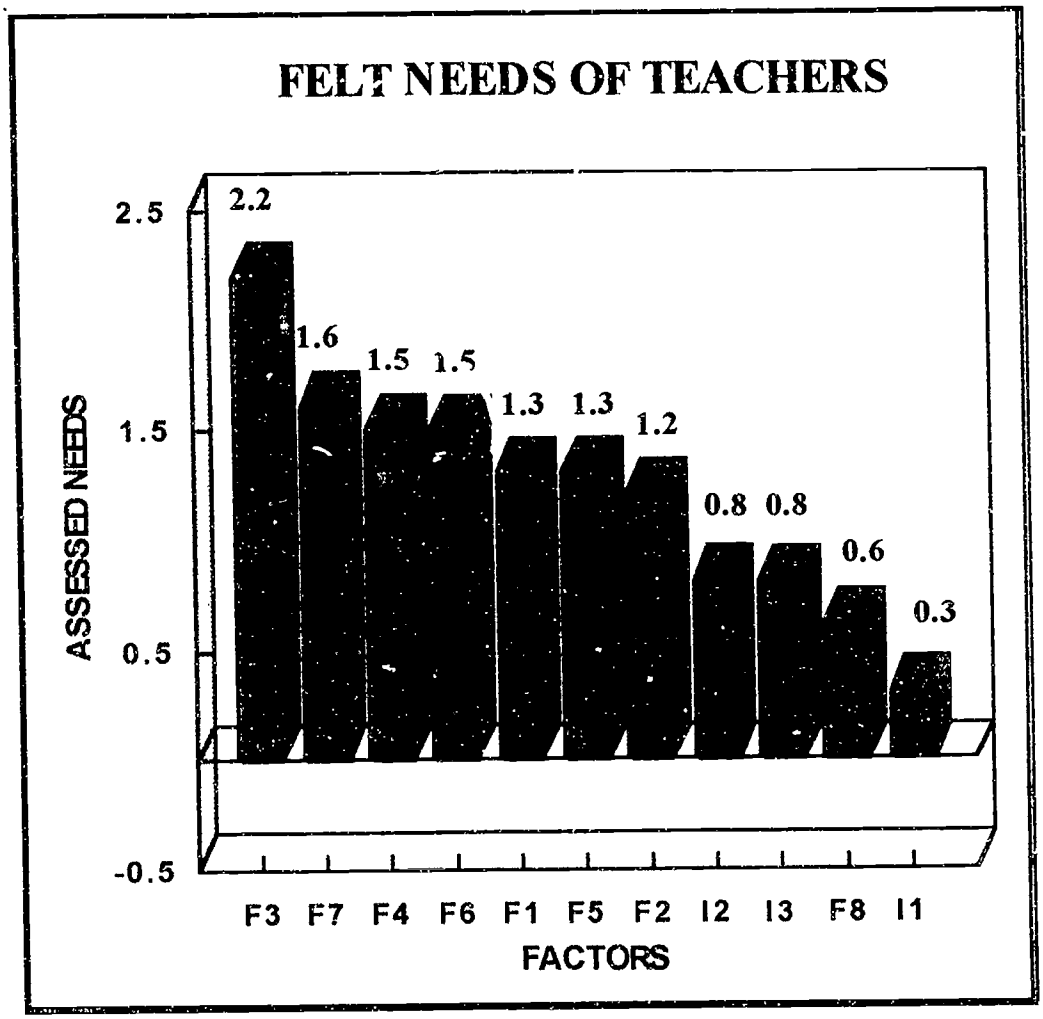
Need(Ideal,Actual)	HypSS	ErrorSS	HypMS	ErrorMS	F	Sig
Fac1 (4.5, 3.3)	204.50	76.04	204.50	.307	667.1	.000
Fac2 (4.2, 3.0)	176.10	77.66	176.10	.313	562.4	.000
Fac3 (4.2, 2.1)	579.70	168.60	579.80	.680	852.7	.000
Fac4 (4.3, 2.8)	283.10	178.30	283.10	.719	393.7	.000
Fac5 (4.7, 3.5)	183.30	132.80	183.30	.536	342.4	.000
Fac6 (4.2, 2.7)	265.30	129.80	265.30	.523	506.9	.000
Fac7 (4.1, 2.5)	322.80	168.80	322.90	.681	474.2	.000
Fac8 (3.3, 2.7)	38.61	84.11	38.61	.340	113.8	.000
Item1 (4.0, 3.7)	12.53	92.97	12.53	.375	33.43	.000
Item2 (3.4, 2.6)	69.47	188.50	69.47	.760	91.38	.000
Item3 (3.3, 2.5)	81.13	254.40	81.13	1.03	79.1	.000

continue to be significant as indicated by the significance of .000 in Table 3 (Stevens, 1992, p. 454). The above information led this researcher to conclude that the assessed need as a discrepancy between the ideal and actual social conditions was significant on each of the eleven factors at .05 alpha level. A bar graph has been provided on science teachers' "felt needs" along the eleven subscales or variable (Fig. 1).

Discussions and Recommendations for Future Research

The sample profile was consistent with the population in gender, teaching experience, and age. This consistency permits generalization of results to a similar population. The sample profile showed a discrepancy only with the population on school type (middle or high school) and revealed a greater number of responses from high school teachers than from middle school ones.

Relevance to specific content area was the first strong criteria for teachers' use; this result mirrored earlier studies (Warran, 1991; Broussard, 1976; Cambre, 1987 & Mercer, 1980). Close behind was the notion of "entertaining." Mielke and Chen (1983) claimed that science content need not be minimized for the presentation to be entertaining. In fact, the formative research on the series 3-2-1 Contact noted that due to educational and entertainment value, it was given sustained use by teachers. The third factor, "instructional support", continued to stress media resources (video-by-learning objective database) and inservice training for teachers.



F1-Relevant & Accurate F2-Entertaining F3-Instructional Support
F4-Teacher Involvements F5-Accessibility F6-Focus
F7-Availability F8-External Approval
I1-The program uses background music I2-The program is narrated by a woman
I3-Smaller class size for effective ITV use

Figure 1. Felt Needs of Teachers

Since 52% of teachers in this study reported receiving some undergraduate media training, the situation qualified as improved, relative to national survey findings of only 33.3% receiving such training (Riccobono, 1985). The next factor, "teacher involvement" (with a mean score of 2.8) showed a marked impression by teachers that their views were not incorporated into the production of programs. As proper use of television demands an active teaching style, this factor was perceived an important one. Previewing of programs was deemed essential for appropriate lesson planning, and teachers' ITV use could be negatively affected if

support staff or equipment were not in place (Willis, 1978; Schneller, 1977; Harbison, 1989; & Forsslund, 1991).

Teachers rated "accessibility" and "availability", the next two factors of the same ilk, just as important as in earlier studies (Broussard, 1976; Jones, 1986; Mercer, 1980; & Maftoon, 1982). The factor mean score of 2.7 (actual) on the next factor "pedagogical focus", showed that teachers did not believe that programs had a clear objective and gave didactic cues for viewer responses. Teachers believed that programs could be more interactive by offering proper cues to viewers rather than in just presenting a magazine format. Finally, the mean score of 2.7 (actual) on the last factor, "external approval," showed such approval was not present in real life, nor was it necessary as science teachers regarded it of little importance. This factor contributed to only 4.1% of the total variance, suggesting that science teachers may be autonomous and isolated in their decision making about using ITV.

The influence of teacher demographics, as tested by MANOVA, yielded a significant difference only for school type on the set of eleven factors influencing teachers. However, this effect size was very small (of the order of .1 with power .88), so its practical significance was negligible.

It is clear from the results of this study that what schools set out to do, and what actually takes place do not converge. The significance of needs along each of the eleven variables of ITV use document serious gaps in technological innovations. Due to the loose logistics of the utilization process, educators easily give up the technological reform, showing little allegiance to the whole effort. Cuban has described this attitude of policymakers as a cycle of enthusiastic response, subsequent disappointment, and ultimate non-use of the media (1986). Since efforts to improve education in America come from four political fronts (the Establishment, the Standards Movement, the Technological Movement, and the Choice Movement) (Carlisle, 1993), there needs to be a balance so as to fulfill desired standards with minimum conflict.

Recommendations

1. Future research can use more of the variables that underlie each of the factors enumerated in this study.
2. Teachers' preferences about program time lengths, number of topics in a program, and the nature of the pedagogical approach, such as demonstration type, enrichment learning, or cross-curricular applications of science, need to be determined in future research.
3. Since visual messages have implications for procedural requirements in a learning system, future research needs to assess teachers' awareness in this area.
4. Studies should determine whether producers of ITV solicit teacher input in program production and planning in keeping with the participatory design principle.

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