# A TYPAL ANALYSIS OF OKLAHOMA BROADCAST ENGINEERING PERSONNEL USING EDUCATIONALLY RELATED ITEMS

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# PREFACE

The broadcast industry is going through major changes which will have a lasting effect on the world we live in. Changes such as government regulation (or deregulation as the case may be), competition, and rapidly advancing technology, are all interrelated. The future direction of broadcasting will be determined, to a large extent, by the way in which the broadcast industry utilizes the new technologies. Whether broadcast engineering and management decide to compete, and lead the charge for change, or be trampled under foot, will depend on the quality of training of broadcast engineering and their relationship with those who make the decisions in the industry. I would like to express my thanks to those who took time out of their day to return the surveys that made this possible. A special thanks goes to those of my committee, Dr. William Rugg, Dr. Philip Paulin, and Dr. Charles Fleming, who gave so generously of their time.

I dedicate this thesis to my wife Frances, who not only put up with me, but stood by me, providing encouragement in the darkest of times.

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# CHAPTER I

# THE RESEARCH PROBLEM

## Introduction

The idea for this research originated at the 1986 Conference of the Society of Broadcast Engineers in St. Louis, Missouri, at a late afternoon meeting which the author attended along with broadcast engineers and technicians from all over the United States. Though it started off orderly, the meeting turned sour and even became somewhat chaotic, reflecting the frustrations born out of the many changes in broadcasting.

The Federal Communications Commission, under deregulation, had previously discontinued issuing the First Class Radio Telephone License and many of those in attendance felt cheated at the loss of the First Class license, which was being replaced by a "General Radio Telephone License" that some noted was not even printed on fine paper stock as the First Class License had been. Now, the owners of broadcast stations are released from the requirement to hire an "FCC licensed" engineer. Since deregulation, the burden of ensuring technical quality has been placed entirely on management (News, 1981).

In light of this loss of responsibility and downgrading of their licenses, the engineers felt threatened and concerned that the "marketplace" had not then, nor ever would be, sufficient to insure a high quality standard of technical performance which is necessary to prevent chaos in the airwaves. There were horror stories of unsupervised and illegal operations which would surely only get worse in the future.

Amid the negative voices there were feelings that these FCC changes were in reality no more than union busting tactics, that any intelligent young person (especially with digital electronics skills) would choose to work in some other industry at much better pay, and thus the quality of the broadcast engineer/technician would drop even more. On the positive side there were those who pointed out that times are changing, that the modern broadcast industry needs engineers who can help management chart a course into the future. According to their argument, based on the proliferation of low cost, highly specialized equipment, much of a station's repair work could now be more efficiently and economically performed by specialists. They felt instead that broadcasters needed technically qualified leaders to help set the agenda for the media, rather than fall victim to competition.

These two groups also held widely divergent views on the issues of whether or not they were a profession or trade, and the resulting questions of appropriate certification and education for the tradesman or professional. The issues of what initial education and continuing education (technical or non-technical) are needed, in conjunction with the existing certification program by the Society of Broadcast engineers brought further problems to the floor. The sentiment then was along these lines: why should engineers have to retrain and take more theoretical tests which would still not have a practical component to them? Who would pay for these tests, write and administer them? What about financial compensation or reimbursement for continuing education, and relief time from already busy schedules?

It soon became apparent that there were at least two significant groups at the meeting with almost diametrically opposed viewpoints. One group, more outgoing and ambitious in many aspects, was willing to learn new interpersonal, social and communication skills without the fear of losing ground in technical skills, if advances in technology were to pass them up. The other major group appeared to be more insecure and held firmly onto its technical skills for security purposes. Each had different ideas about the best course of action for the SBE (Griffin, 1988).

## Problem

It became quite obvious that the SBE could not solve its problems with membership, certification and educational expectations without a more "objective" understanding of broadcast engineers and technicians. Such an understanding is fundamental to the success of any proposed public relations and educational planning for the future. Those who need training are for the most part unidentified except in an "intuitive" sense. No available information objectively focuses on the different types of persons in broadcast engineering, or how they feel about education, training, and related attitudes. The purpose of this research is to identify and describe those types of persons employed as broadcast engineers and technicians in Oklahoma.

## Purpose

This research is designed to provide some of the preliminary information that is necessary for the planning and implementation of a training program designed to meet the diverse needs of broadcast maintenance personnel. The particular method used in this research is "cluster analysis," chosen not just to identify the broadcast engineer or technician, but to identify and describe him. For purposes of this research, the engineer is viewed as the audience, or client, for an education or training program. Before setting educational goals it is important to first have at least a rudimentary knowledge of the individual's educational needs, desires, and perceived barriers to further education (Cross, 1986). Aside from occupational differences in individuals, there are, according to Cross (1968) in Adults as Learners, different types of people as well as different "life stages" to consider.

The Society of Broadcast Engineers is seen as the single most likely user of this information because it is the primary organizing and driving force capable of providing and implementing a coherent training program, possibly in conjunction with its already existing certification program.

Others may want to use this research when designing commercial trade-school (proprietary school), correspondence, vocational-technical or similar programs. Since the use of McQuitty's Elementary Linkage Analysis (1957), a cluster analytic method, looks at patterns of responses rather than specific responses, the research could possibly be used in the counseling and advisement of prospective students. The cluster analysis used in this research also provides a method for the objective analysis of currently employed broadcast technicians or engineers, useful in both career and educational decision making.

Scope

This project will include broadcast engineers and technicians, but since the broadcast industry does not make fine distinctions between "engineers" and "technicians" that same convention will be continued here. To make such distinctions here would be arbitrary and difficult to define; instead cluster analysis will be used to display and define the persons who do the work regardless of their present titles. Perhaps this research will provide the necessary information to enable employers to make better use of those labels in the future.

The distinction between engineering operators and engineering maintenance is also difficult to define. Some stations can afford to hire specialists who only repair video recorders, or audio equipment, or microwave remote equipment. One look at the want ads in broadcast engineering trade journals will provide some idea of how specialized these jobs can be. Some smaller non-union stations (especially radio), outside the major cities, hire "combo" people who oversee and maintain the equipment while their primary job may be in sales, or to do an air shift. Before deregulation it may have been possible to use the FCC license as a qualifier, or differentiator, to separate the types of persons based at least to some degree on knowledge and possibly interest. This is no longer as true as it once was.

For purposes of this research, the best job related qualifiers will of necessity be the responses a person gives to a) the question of percentage of work time spent in maintenance, operations, and other; and b) the question of supervisory or non-supervisory work performed. The self-disclosure type of responses are obviously not foolproof, but provide a wider base of information than do job-titles alone.

The above items to be responded to, along with the responses to be used in cluster analysis, will ultimately define and describe the persons in engineering regardless of their titles. And last, the survey will be limited to the Oklahoma engineering population from 1) AM and FM radio, 2) UHF and VHF television, and 3) Low power television stations.

## Limitations of the Study

The primary assumption being made at this time is that the "part-time engineering" respondent who may be primarily a disk-jockey or, local stereo repairman, from the smaller stations will not add significant error to the data obtained. There is simply no feasible method to measure or detect levels of involvement, and the "part-time/full-time" option is the best alternative.

## REFERENCES


Cross, K. P. (1986). Adults as learners. San Francisco: Jossey-Bass Publishers.

Griffin, J. H. (1988). SBE conference report: 1986. Unpublished manuscript.

McQuitty, L. (1959). Elementary linkage and factor analysis for isolating orthogonal and oblique types and typal relevancies. Educational and Psychological Measurement, 17, 207-229.

News feature: Abolishment of first phone license could hurt small market radio. (1981, October). Broadcast Management/Engineering, 119-120.

## CHAPTER II

## REVIEW OF THE LITERATURE

### Introduction

Very little effort has been put into researching the types of people in broadcast engineering, or the technical and non-technical training they receive, or how their training affects the competitiveness and operation of broadcast stations. It would appear that because the non-engineering-related academic community fails to fully understand the intricacies of electronics, it also fails to appreciate the nature of the efforts and struggles that go on behind the broadcast scenes. The value of education and the effect that attitudes of engineers or technicians have on society's consumption of media does not appear to be a research topic of significance.

The obvious assumption appears to be that the people who design, create and operate broadcast equipment are not the artistic or business leaders who make decisions which affect the media, and ultimately society. Since engineers and technicians work in the technical world, the roles they play in the problematic nuances of national (Rudman, 1984; Rudman, 1985) and even international radio frequency spectrum use and standardization ("Time," 1982) for example, are neither understood nor documented.

The role of the engineer or technician in the broadcast industry itself is quite possibly underestimated due to the lack of both technical understanding and research which describes who the engineer or technician is; what his interests are, both on and off the job; and what his initial education is. Nor is there adequate information about how the engineer is trained in job-specific functions, and whether the managers of industry make adequate use of his ability to scan the horizon for significant technical changes that could possibly make or break the company.

One often hears about studies of economic threats to our national economy from abroad, primarily from the Japanese, or loss of media markets when broadcasters are threatened by cable, satellite, video games, etc. But we seldom hear about studies on the effects of economic and social problems due to a) lack of appropriate education, b) failure in communications, c) human relations skills, or similar problems, in reference to broadcast engineers and how these issues relate to either the station or industry.

In a report for UNESCO, Ovesen (1980) pointed out that, at that time, 90 to 95 per-cent of the practicing engineers in the world were educated when the cost of energy was not relevant, and these same engineers continued to design buildings as if energy were not a significant financial factor. This example serves to illustrate that skills and attitudes can become outdated, and that continual, lifelong education is a necessity in an increasingly more complex world. Ovesen also made the point that the investment in an industrial machine for upkeep and maintenance far exceeds the investment that industry makes in its employees. It can be seen from this that an investment in employee education and communication is an investment in loss prevention.

While broadcasters may not be immediately threatened by the Japanese in terms of loss of rating shares, there are other very real threats from cable, video cassette recorders, computers, satellite delivery, and a host of new media options (Whitaker, 1987a). The extent to which the broadcast industry will thrive in this era of stiff competition depends on many factors, some of which are not under the broadcaster's control, while others are. Jerry Whitaker (1987b), in an editorial on the broadcast industry's lack of direction and leadership in accepting and using high definition television, pointed out that technology is like a freight train, and broadcasters must hop on board or get out of the way. The analogy holds true for those in broadcast engineering also. The human element, is a valuable resource, which can either be refined and used to its fullest potential, or squandered (Gruszka, 1987).

Akio Morita, chairman and chief executive officer of the Sony Corporation, noted the value of people in a speech at the United Engineering Building in New York, as part of the Japan Society's lecture series. His comments, as reported in the July 1987 issue of TV Technology (Gruszka), indicate a strong concern for the need of a healthy working relationship between employees and industry. Morita pointed out that the

> . . . best talent and the most energy are being drawn into a kind of money game, in which the buying and selling of companies has become more important than the buying of materials and the making of saleable products . . . For me, the wealth of a company is its employees, and the unity which exists among them. Without these, the company cannot produce quality products. (p. 5)

Morita went on to discuss the value of employee attitudes and allegiance which he said cannot be bought, noting the wasteful nature of money games, in which there is short term speculation in purchasing businesses, without investing in people or facilities. Such behavior, he said, saps the strength of industry. He went on to recommend taking a long term look at where we want to go:

> We must invest our resources and energy in research on new technology and in new facilities. We must invest in our engineers and scientists and create an atmosphere in which they can work with enthusiasm and a sense of real commitment. (p. 8)

Failure

After spending 30 years with RCA, Andrew Hilliard, wrote "RCA Revisited" (Hilliard, 1986), in which he drew parallels between the sinking of the Titanic and the financial failure of the RCA broadcast division. Hilliard points out that for many years RCA was made up of employees and executives who had worked their way up from the ranks of broadcasting, and primarily because of their experience and contacts they were able to provide invaluable feedback from broadcasters to the broadcast division.

From its beginning, RCA was a leader in broadcasting, starting with Sarnoff and then the National Broadcasting Corporation network, created by RCA. The people at RCA were on a first name basis with almost every broadcast station manager in the United States. In many cases sales representatives were themselves broadcast engineers or technicians. Because of these knowledgeable employees, RCA was not simply a manufacturer of broadcast equipment. That valuable relationship changed when the defense and communications branches were merged and many of the broadcast leaders and engineers were replaced with defense personnel. With each subsequent failure in design and marketing, more of the personnel experienced in broadcasting were replaced with managers and engineers from the defense branch who could not make a rapid transition from the less competitive (cost-plus) military system of purchasing to the highly competitive broadcast market.

High quality projects (the CCD camera), with profit making potential, were mishandled and later implementation of unacceptable cost cutting measures only made matters worse. Sales offices were closed or reduced in staff, reducing communications to a minimum, and many of the sales staff operated from their homes. There was no organized marketing plan, and finally advertising ceased.

Hilliard compared the deteriorating situation at RCA to the sinking of the Titanic, which was supposedly unsinkable. People at both RCA and on board the Titanic made too many assumptions about their respective vulnerability. Perhaps the watch on board the Titanic believed the company's sales literature about being "unsinkable" and felt it was safe enough to sleep on duty. We could go so far as to say that the Titanic possibly sank because people placed too much faith in their hardware and were asleep at the wheel, either figuratively or literally. Likewise, did the leaders at RCA also think that they were invincible, without the need of good quality, well-trained employees to keep watch on the horizon for changes in technology, and to chart a profitable course?

The lesson to be learned from Morita and Hilliard is that having adequate hardware alone is not sufficient to keep a technical business afloat. Most will agree on the importance of "people skills" when they think of sales, management, and on-air talent, but fail to realize the value of human relations training, experimentation, and communication skills (written, oral, and interpersonal) that are needed to allow the people with the technical vision and perspective to be as helpful as possible. In fact, most of the editorials in Broadcast Engineering which point out needed skills, call for more skills in the human relations, managerial, and communications areas rather than mention technical skill needs.

## Research

Scholarly studies contain very little, good solid information about the human element side of broadcasting, and even less information about broadcast technical personnel. Most dissertations and theses that deal in any way at all with electronic or electrical engineers are concerned only with those who have at least a four-year degree (Sedge, 1984; Saale, 1985). Those that deal with the problems of continuing professional education specialize in post-graduate engineering education (Sedge 1984; Morris, 1985; Saale, 1985) or the transfer of technical information in industrial settings located in the Northeastern United States, and specifically eliminate survey responses from persons who do not have degrees (National Research Council, 1985; Sedge, 1984; Saale, 1985; Morris, 1985). This careful elimination may be due to the difficulty in dealing with personnel who cannot be easily identified (in this case by a degree) and counted for statistical purposes.

Although these sources provide bits and pieces of information, the results of their findings cannot be generalized to other populations of technical personnel in broadcasting, or to those in other parts of the country (Wright, 1969). The technology used by the broadcast industry is obviously different from that of industry as a whole. For example, there are fewer technical personnel in broadcasting and their units (size of "typical" local radio or television station as compared to the size of large manufacturing operations) are also smaller in size, which makes the technical training of employees more of a burden on each unit (Montgomery, 1986).

## Database Searches

Database searches and printed references turned up primarily the same types of materials. Technical resources like Electronic and Electrical Engineering Abstracts (INSPEC) are centered around the pure science and technology, while the content of ERIC (Educational Resources Information Center) is centered around educational resources primarily for the non-scientific community it does include references to technological training. Again, there are many references to non-technical broadcast training and some to engineering and technology, but almost no references to terms such as "broadcast engineers, engineering, technicians, technology", or any closely related field. The same was also true for Masters Abstracts International (MAI) and Dissertation Abstracts International (DAI).

## Dissertation Abstracts ONDISC

A manual search through Master's Abstracts International (MAI) (1968-1988) turned up no research directed specifically at broadcast technical personnel. MAI provided titles and abstracts that were from subjects peripherally related to broadcast technical operations (primarily electronics education and engineering technical education studies), but did not turn up a single, specifically relevant source of information. In fact, the only directly related thesis, Technical Deregulation: How Radio Engineers have Been Affected by Garofalo (1984), was not listed in MAI but was found as a written report (by the same title) in the June 1984 issue of Broadcast Engineering. A computer search of Dissertation Abstracts ONDISC (Dissertation Abstracts International using a computer and laser disc storage, referred to here as DAI) provided a wealth of information about peripherally related research. DAI on Laser disc allowed a word by word, 100% search of all titles and the associated abstracts, using boolean logic. The results of the computer search using DAI Ondisc also emphasized the scarcity of research relating directly to broadcast technical personnel.

DAI was searched in its entirety, word by word, from 1861 through 1987, with the computer finding many combinations of general engineering related dissertations limited to the initial bachelor's level of engineering education, post graduate education, or continuing education of graduate engineers. Again, there were no "hits," or combinations that included the search terms "broadcast, radio, television, audio, or video and electronics technician, electronics engineer, technician, engineer, or technical personnel." Almost all of the education or managerial studies were related to, and limited to, engineering or engineers in general (of any specialization) with at least a four year baccalaureate degree who worked in easily surveyed factories.

ERIC Search

An ERIC search was conducted using specified descriptors which were similar to those used in the search of DAI. ERIC cited articles which dealt with strategies and the need for change in technical education (Faddis et al., 1982), technical education programs in the state of Texas (Wright, 1969), radio and television engineering bibliography (Losee, 1975), and textbook requirements for technical education (Cheshier, 1974), a report on a specific training program for communications electronics technicians (Beyers, 1975), and articles on training programs for broadcast electronics technicians/engineers (Caduff, 1970; Jordan, 1971).

ERIC also turned up articles from Great Britain which were interesting but only marginally useful, especially since the British broadcast environment (i.e., government control and subsidized broadcasting, etc.) is quite different from our own, any data could not be trusted to be relevant to broadcast technical personnel and their training in the United States.

Training Needs

The studies which were most relevant to the topic of broadcast engineers are concerned with gaining more information from the educational viewpoint, about training and education for electronic technicians in general or electronic communications technicians specifically. Some of these materials are based on statistical surveys, while others are of an observational nature. The first group of materials are reports and theses dealing with educational needs, most of which relate to technicians, and somewhat less to engineers. The next group consists of the consumer oriented engineering management books which are mostly written as "how to" managerial books, from an observational and experiential level, where little is mentioned about training needs. In the category of trade journals are more materials written from the observational level in addition to salary surveys which contain some demographic information which describes the broadcast engineers' level of education.

Educational Literature

William S. Beyers (1975), of Valencia Community College in Orlando, Florida, reported the changes that were brought about in the electronics technology curriculum while striving to create a specialized communications electronics program. The college struggled with the problem of squeezing in two additional semesters of electronics courses dedicated to the communications area only. In this report Beyers outlined his proposal and method for creating an industry recognized curricula which would avoid the typical, one semester, "cram course" in electronic communication.

The International Telecommunications Union (ITU) started off its publication, The ITU and Vocational Training (1978), with the note that their developmental model for vocational training in telecommunications was designed, at least in part, to overcome problems due to lack of coordination between training institutions and their members' operational services. In other words, the established formal educational/training programs were not meeting the needs of those in ITU who operated and repaired the hardware.

Stephen R. Cheshier (1974), an assistant professor in electrical technology, conducted a survey of electronic communication textbook users in order to design a more useful and appropriate text for teaching purposes. Cheshier felt that communication electronics was both the most difficult, and one of the most expensive, of electronics courses to teach simply because of the very broad range of technical topics which may legitimately be placed under this title. Not often recognized, however, is the need to provide access to the communication equipment discussed in the courses.

Cheshier also described the pressure in most two-year and four-year degree programs to teach the communications electronics course in one semester, typically, and in at least one specific case in three semesters. He also notes that while many four-year programs may have more than one semester dedicated to the communications area, all too often, the students drop out after the second year of the program to go to work in industry.

In a study designed to provide information for the Texas Education Agency, Jerauld B. Wright (1969) surveyed instructors in the post-secondary electronic technology programs of Texas and the technical managers of industry (which included broadcast stations that employed 150 engineers or technicians) for their relative (1) emphasis in instructional units, (2) differences or agreement regarding teaching emphasis, (3) differences regarding future importance of each unit, (4) adequacy of physical facilities, (5) inventories of equipment and tools, and (6) recently completed or pending course changes.

Wright surveyed representatives from manufacturing, broadcasting, and telephone companies in Texas. He found that while 40% of the broadcasting industry's technical employees were trained in private technical schools (sometimes called proprietary schools), only 7% of those in research, 14% in manufacturing, and 7% of the telephone employees were trained in such schools.

Broadcasters in the same study also indicated that their technical employees had comparable amounts of other formal college and correspondence education. The conclusion could be drawn from this data that the broadcast industry in Texas, and possibly elsewhere, makes much more supplemental use of the specialized proprietary broadcast training schools.

Also in Wright's study, under "specialized needs," the broadcasters itemized more needs (than any of the other industries) for specialized training in transmitters, distortion analyzers, video equipment, and audio amplifiers. Since the broadcast industry employs many fewer technicians compared to industry overall, technical training for broadcast personnel is not as economical from the viewpoint of the educational institution. All of this specialized training requires additional time, as well as expense, for equipment which is not normally available to the educational institution. Ed Montgomery (1986), in TV Technology, documents just such a case, in which Northern Virginia Community College decided to abandon its specialized Broadcast Engineering Technology degree program.

Another section of Wright's questionnaire dealt with "important items for a technician to be able to operate" (p. 194). In this section both broadcast and research industries expressed a greater desire for technicians to be able to operate more of the most sophisticated electronics test equipment. This data indicates the wide scope of training and education needed to function in the maintenance side of the broadcast industry as well as the high expectations placed on engineers.

A dissertation written by Linda J. Morris (1985), although not dealing with the broadcast industry directly, discussed the problems of meeting the continuing educational and training needs of the working engineer with a degree. She examines the reasons why the four groups--business professionals, engineering professionals, education professionals, and quasi-professionals--pursue further education after entering the work force. Although her study is limited to those with a four year degree and to the employees of two major manufacturing firms in the northeastern United States, it does shed some light on the problems of getting quality information about the continuing professional educational needs and motivations of homogeneous subgroups (engineers with degrees) rather than the population of employees at large (technicians, and engineers in industry at large, both with and without formal technical education).

Morris pointed out that the professional may have both personal <u>and</u> professionally mandated reasons to pursue training beyond or in addition to the bachelor's degree. The professional may seek continuing education for a number of reasons including satisfying the requirements for membership in a professional society, needs of clients, and employer needs, as well as for personal satisfaction. In her study she found that the professional's motivation in pursuing additional education may be tempered by time limits, travel time, inconvenient timing, costs involved, and relevance of the curriculum. Morris also noted that there are differences across age and status when deciding to take an educational program for credit or non-credit.

Engineering Management Books

Many broadcasting books either deal exclusively with the hardware side of broadcast facilities and equipment, or stay away from it all together. For example, in A Selective Bibliography of Commercial Radio and Television Engineering, Robert Losee (1975) lists 379 titles; yet only one deals with anything related to the human relations aspects of broadcast engineering (management). Of 360 books listed in the NAB Broadcasting Bibliography, only one, Handbook for Radio Engineering Managers, by Ross (1980), deals primarily with the relationship between the technical personnel and other departments. Some of the general broadcasting books may mention engineering in passing; however Broadcast Management, by Quaal and Martin (1975), devotes an entire chapter to the place and function of the engineering department.

Trade journals

Trade journals are a source of valuable information based primarily on personal observations and experience. Broadcast Engineering, Broadcast Management/Engineering, TV Technology, Radio World, Video Systems, Recording Engineer/Producer, and The Royal Television Society Journal, to name just a few, all provide intuitive insights in the form of "letters to the editor" editorials, guest writers, and reports of conference or convention speakers, in addition to the normal fare of hard news and "how-to articles."

In the January 1986 issue of Broadcast Engineering, a series of articles entitled "Management for Engineers" was introduced to broaden the perspective of broadcast technical personnel. The writers, for the most part, bring in information from the broadcast and non-broadcast management literature, then focus on the problems and challenges of engineers in the broadcast environment.

Another source of information is the annual salary survey conducted by Broadcast Engineering and Video Systems, both are published each October by the Intertec Publishing Corporation. Although not without possible errors (high school education levels from 1984-1986 appear to change too drastically), it does provide some clues about the age of engineers, education levels, sources of and training, as well as incentives that are provided.

Engineer Types

According to Ward Quaal and Leo Martin (Broadcast Management, 1964), in the infancy of radio there was a time when management and engineering were more integrated, and spoke a common language. Those who once operated, managed, and maintained their own radio stations have been replaced by sophisticated specialists who speak different languages and live in their own worlds.

William Ellis, in "Hands-on C.E. Job Demanding," (1964) relates the struggle that went on within the engineering ranks before television came along. According to Ellis there were those who preferred not to move up to the chief engineer's position and chose instead to stay away from those positions that took them into management and away from the technical world.

These same people would accept responsibility but were not eager to move over into management at the cost of giving up their "hands-on" work. In contrast to this type, there were, and still are according to some, those who fit the category of "managing" engineers. These are the type who prefer to work "through" a good crew and are more willing to turn over tasks and responsibility for their proper completion to others who are capable.

Aside from the "hands-on C.E." and the "engineering" manager, Ellis also describes another type engineer he refers to as the "technician," who is perfectly happy in the shop and has no desire to ever leave the technical world. Here, he is at home and comfortable. This does not mean he is any less valuable to the station. In fact, each type can be very valuable to the well being of the broadcast station. When care is taken to use them properly and with training appropriate to each type, each in his own way can contribute to a winning team.

Coddington (1969) and Badawy (1981) both note that broadcast engineers tend to be object-oriented introverts. Badawy even goes on to note that the engineer's greatest assets, his skills and scientific philosophy, can gain him promotions but can also be his downfall when he must shift his thinking style and relate to people.

Another issue that separates broadcast technical personnel is communications, both inter-departmental, and intra-departmental. Too often, the engineer who spends his time relating to things and ideas, will have problems with communicating in general, and communicating technical ideas in particular.

In "Improve Communication Skills," William Ellis (1987), the director of engineering for radio station KOZK in Springfield, MO, described the measures taken by his station to facilitate the communication of ideas. He noted that the typical chief engineer, who in his opinion is usually an introvert anyway, is looking ahead to the next one to five years while the other department heads are submerged in today and tomorrow. He described measures taken at his station to increase both horizontal and vertical communications in order to reduce tension levels from mis-communications.

A number of articles have dealt with the problems of change and communication. In 1968 Quaal and Martin mentioned that the engineer has not been inclined toward the business viewpoint, but the chief engineer is often expected to become part of the management team. Garofalo (1984a) noted that increased equipment reliability and improvments in automated test equipment save time and give the station a better profit margin. He recommends that forward-looking engineers and station managers take advantage of these new opportunities to contribute more to the overall operation. An editorial in The Royal Television Society Journal (1973) echoed these sentiments, saying that the modern engineer can put more emphasis on system design, development, and management; he can help non-technical employees plan a more competitive style of operation for the station.

Dennis Ciapura (1981) said almost the same thing, that the general manager is usually a non-technical person and if the engineer is willing and capable, and if he considers the station as a business, he can take the initiative to help lead and promote the station by educating and assisting the general manager in making better executive-level decisions. These authors make essentially the same point that broadcasting is being forced to change, that the better engineering department is not an after-thought fix-it shop, but a progressive department that advances ideas.

## Change

According to many who write for the media's trade journals, the technical director of a broadcast facility cannot be content with being only a technically oriented repair person. Technology itself is changing faster than ever before and that change helps to make increasingly newer products and systems "outdated" in a shorter period of time. Brad Dick (1987), in the "Management for Engineers" series for Broadcast Engineering, made the point that even though management may hold the ultimate authority, change must be carried out by the workers.

Some changes are forced on broadcasters because new services are being added daily, creating a certain amount of obsolescence. Radio AM stereo, sub-carrier services, multi-channel television sound, and high definition television are just some examples of new services that are being hampered due to limitations in present, but not necessarily old, equipment. Adding stereo to conventional AM radio necessitated changes, sometimes drastic, in AM transmitter and antennae facilities.

These changes are all in addition to the loss of market share brought on by competition from within the broadcast industry. There are also more new ways for the consumer to spend his time. Computers and computer bulletin boards, home VCRs, home satellite receivers, and CD audio are all competing for the consumer's time and subsequently his dollar (Broadcast Engineering, 1984).

Summary

The results from Garofalo's (1984) study of radio engineers show that nationwide 27% of radio stations have made use of either in-house or out-of-house education. Garofalo's report included 80 pages of comments to the effect that engineers are being squeezed by too much change, too little pay, and too little time to keep up.

Bill Rhodes and Carl Bentz, in "State of the Industry" (1983) in reference to the annual Broadcast Engineering survey noted that less than half of the stations had budgeted any money for training seminars or programs, and similarly, less than half had allocated money for annual conventions in the coming year. They noted, however, that 69% of television stations budget for conventions.

The annual Broadcast Engineering salary survey, which is published yearly in the October issue, breaks its market data into three categories, i.e. market sizes of the top 50 stations, the top 100 stations, and those stations that are below the top 100 (labeled herein as 50, 100, and <100). Their figures (in 1986) indicate that tuition reimbursement, at 60%, is highest for the top 50 market television stations; of the top 100 and below top 100 television stations, only 25% and 27% respectively, provided reimbursement.

Mean figures were used for the years of 1983-1986 in order to compensate for possible errors in data collection or survey instrument design. These figures show that radio stations in any given market have fewer reimbursement plans than do television stations. Using total market figures (i.e., disregarding market ranking) for the same three-year period showed that twice as many television stations had reimbursement plans than did radio stations. The picture looks bleak however for the top 100 radio engineers where only 8% of those stations provided reimbursement plans.

According to Garofalo (1984b) 17.7% of radio stations offer partial reimbursement and another 15% pay the total tuition for courses taken to improve job related skills. 12.8% of the respondents answered in the affirmative to the question "Sends engineers to technical school on company time," (p. 57) and another 13.7% answered that their stations provided technical training, but only on their own time. No tuition provisions, in any form, were provided for 67% of the respondents and no educational provisions were provided for 73% of those respondents.

According to the National Research Council (1985), there are tremendous differences in the percent of participation of engineers, support provided for educational programs based on such factors as size of facility, numbers of engineering employees, and location (urban/non-urban). Garofalo did not study these and similar factors, but glaring differences in access to, and amounts of, education quite possibly exist in the broadcast industry.

The vast majority of research work excludes the broadcast industry and technical people by being limited to those with four-year engineering degrees and concentrating on a diverse population, but some of the more practical, vocationally related academic oriented literature does discuss broadcast electronic technicians, their education, and work. However the non-research oriented literature, either books or trade journals provide more intuitive or observational information relevant to the broadcast engineering environment but little data which can be generalized to the broadcast engineer.

## References


Badawy, M. (1981, April 9). The causes and prevention of failure. _Machine Design_, _53_(8), 217-221.

Beyers, W. S. (1975). _Development and integration of a course in electronic communications for a new engineering technology program at Valencia College_. Orlando, Fla.: Valencia College. (ERIC Document Reproduction Service No. ED 175 654)

Caduff, G. F. (1970, October). Broadcast engineering: The horn of plenty. _Educational Television_, 22-24.

Cheshier, S. R. (1974). _Analysis of textbook requirements for an associate degree level electronic communications course as reported by technology teachers in the field_. West Lafayette, Indiana: Purdue University. (ERIC Document Reproduction Service No. ED 098 392)

Ciapura, D. (1981, October). The changing face of engineering management in the '80's. _Broadcast Engineering_, 23-38.

Coddington, R. H. (1969). _Modern radio broadcasting_. Blue Ridge Summit, Pa.: Tab Books.

Dick, B. (1984, October). Salary survey. _Broadcast Engineering_, 36-50.

Dick, B. (1985, October). 1985 salary survey. Broadcast Engineering, 20-36.

Dick, B. (1986, October). 1986 salary survey. Broadcast Engineering, 22-38.

Dick, B. (1987, June). Management for engineers: Workers are ultimate enforcers of change. Broadcast Engineering, 20.

Dick, B. (1987, October). 1987 salary survey. Broadcast Engineering, 22-45.

Ellis, W (1987, July). Hands-on c. e. job demanding. TV Technology, 14-15.

Faddis, C., Ashley, W. L., Abram, R.E. (1982). Preparing for high technology: Strategies for change. Columbus, Ohio: National Center for Research in Vocational Education. (ERIC Document Reproduction Service No. 216 168)

Garofalo, R. (1984a, June). Technical deregulation: How radio engineers have been affected. Broadcast Engineering, 104-108.

Garofalo, R. (1984b). Technical deregulation: How radio engineers have been affected. Unpublished master's thesis, School of Arts and Sciences, National College of Education, Evanston, Illinois.

Gruszka, M. (1987, July). Sony chief discusses U.S. trade. TV Technology, 5.

Hawker, p. (1973, January/February). A change in lifestyles for engineers. The Royal Television Society Journal. 14(7), 153.

Hilliard, A. M. (1986, October). RCA revisited. Broadcast Management/Engineering. 121-127.

International Telecommunications Union. (1978). The ITU and vocational training. Geneva, Switzerland: ITU. (ERIC Document Reproduction Service No. 211 667)

Jordan, J. T., Jr. (1971, April). To train television engineers. Educational and Industrial Television, 21-29.

Kearsley, G. (1984). Training and technology. Reading, Ma.: Addison-Wesley Publishing Co.

Losee R. (1975). A selective bibliography of commercial radio and engineering. Shorewood, Wis.: EBR Press. (ERIC Document Reproduction Service No. 107 263)

Montgomery, E. (1986, July). Broadcast education is critical. TV Technology, 5.

Morris, L. J. (1985). Reasons for participation in continuing professional education: A multivariate analysis of group differences. (Doctoral Dissertation, University of Idaho, 1985). Dissertation Abstracts International, 46, 1809A.

National Research Council. (1985). Engineering education and practice in the United States: Continuing education of engineers. Washington, DC: Author.

National Research Council, (1985). Engineering education and practice in the United States: Engineering graduate education and research. Washington, DC: Author.

National Research Council. (1985). Engineering education and practice in the United States: Foundations of our techno-economic future. Washington, DC: Author.

Ovesen, N. K. (1980). Advances in the continuing education of engineers. Paris, France: UNESCO.

Quaal, W. L. & Martin L. A. (1968). Broadcast management. New York: Hastings House Publishers.

Reinsch, L. J. & Ellis, E. I. (1960). Radio station management. New York: Harper and Brothers.

Rhodes, B. and Bentz C. (1983, October). Broadcasters' salaries: A national survey. Broadcast Engineering, 22-32.

Rhodes, B. and Whitaker, J. (1983, December). Research report: State of the industry. Broadcast Engineering, 96-106.

Ross, J. F. (1980). Handbook for radio engineering managers. London: Butterworth Group.

Rudman, R. A. (1984, January). RENG: Catching up with TV. Broadcast Engineering, 44-51.

Rudman, R. A. (1985, July). When too much is not enough. Broadcast Engineering, 6.

Saale, N. B. (1985). The participation of Nigerian licensed engineers in professional development activities related to management. Dissertation Abstracts International, 47, 0055A.

Sedge, S. K. (1984). A comparison of engineers pursuing alternate career paths (Doctoral dissertation, University of Maryland, 1984. Dissertation Abstracts International, 46, 0690B.

Stashun, L. (1983, December). Fundamental and Product Training for Film and Television Engineers. British Kinematograph, Sound and Television Society Journal, 65(12), 684-687.

Toffler, A. (1971). Future shock (8th. ed.). New York: Bantam Books.

Time to bury the digital hatchet. (1982, February). Broadcast Management/Engineering, 10.

Whitaker, J. (1987a). Editorial: HDTV at the crossroads. Broadcast Engineering, 6.

Whitaker, J. (1987b). Editorial: People make it work. Broadcast Engineering, 6.

Wright, J. B. (1969). An investigation into public post-secondary electronic technology programs in Texas with implications into planning. College Station, Texas: Texas A & M University. (ERIC Document Reproduction Service No. 034 028).

# CHAPTER III

# METHODOLOGY

There is no definitive research which gives a profile of the broadcast engineer/technician. The goal of this research is to provide such necessary information which will help create a picture of the broadcast engineering population of Oklahoma, by describing the types of persons involved with broadcast engineering, focusing on specific information about their education and related attitudes.

A number of researchers have dealt with the problem of identifying and describing personality types in terms of patterns of behavior by using cluster analysis. In Taxonomy and Behavioral Science, Mezzich and Solomon (1980, p.19) point out that cluster analysis should "tell us what is going on" when people or things cluster together. McQuitty (1957) in discussing "Elementary Linkage Analysis," describes a form of cluster analysis which is useful in separating a heterogenous population into clusters of like-minded individuals based on their characteristic behavior patterns.

Accordingly, like-minded engineering "types" with similar patterns of thinking should give similar patterns of responses to a survey instrument, and therefore have a high correlation ratio between their responses. The "typal representative" is defined as the one person in each cluster of like-minded persons who most typifies that cluster (McQuitty, 1957). A review of the literature showed that there could well be two or more broadcast engineering types.

Of the methods available McQuitty's Elementary Linkage and Factor analysis, used with statements to be evaluated on the five-point Likert scale was chosen because it of its ease in mailing, thereby eliminating the need for personal travel and interview time which would be needed if the Q-methodology were used (Miller, 1977). Another advantage is the ability to reach a much higher percentage of the target population. This type of analysis will provide typal descriptions of broadcast engineers and technicians. Kerlinger (1973) made the point that factor analysis is especially appropriate for preliminary exploration of variables where little is known. In a similar vein, Agresti and Agresti (1979, p. 504) also noted that factor analysis is useful for:

a) Revealing patterns of interrelationships among variables.

b) Detecting clusters of variables, each of which contains variables that are strongly intercorrelated and hence somewhat redundant.

c) Reducing a large number of variables to a smaller number of statistically independent variables (called factors) that are each linearly related to the original variables.

These uncovered "types," given names that epitomize the essence of the factors (Kerlinger, 1973), then become new independent variables, which can later be analyzed against demographic data.

According to Bartz (1976), the Pearson r correlation, which is the backbone of this research, must be obtained using scales that are interval or ratio in nature. All the statements as well as the questions relating to educational and training reimbursement were designed to be ratiometric.

Survey Instrument

The instrument chosen for this research was the five-point Likert scale, on which respondents were instructed to register their response to each statement by circling the appropriate abbreviation which best indicated their agreement (or disagreement) for that particular item, as shown below.

SA = Strongly Agree
A = Agree
NO = No Opinion
DA = Disagree
SD = Disagree

I am a great parent. SA (A) NO DA SD

The scales were coded from 1 through 5, with SA (strongly agree) equal to 1, and SD (strongly disagree) being equal to 5.

According to McQuitty (1957), items should be selected which yield differential patterns, that is, items should be written or chosen such that persons of different mind sets will respond to the same item differently.

Items for this project were written or selected based upon readings from a) the social and psychological areas, b) the broadcast related literature, and c) from personal experience in the field. Keeping the introversion-extroversion scale in mind, some items were written, for example, to differentiate between those persons who prefer to work as hands-on technicians all day without interruptions, and those who prefer to (and are able to) work with people, "selling" ideas about new uses for equipment.

Target Population

There is no adequate quantitative information available which described broadcast engineers in Oklahoma. Therefore it was necessary to rely on four sources of information to gain an approximation of the broadcast engineering population for the state, and to create a mailing list. Compounding the problem of identifying the target population is the practice of the smaller stations, mostly rural stations, which will often list a person as chief engineer for clerical reasons even though he, or she, may have little or no technical expertise.

The Broadcasting/Cablecasting Yearbook 1987 was used as the primary source of information for names, call signs amd numbers of stations. But it was also the least accurate in that it contained the most outdated listing of names for chief engineers due to the lag time between the gathering of information and its ultimate printing. The directory of the Oklahoma Association of Broadcasters appears to be more up to date on personnel listings, but it only includes those stations in its organization.

Both directories failed a) to provide adequate information for those stations where the technical work is performed by anyone other than a full-time broadcast engineer, and b) they fail to distinguish between the working chief engineer and the chief engineer in name only. Since the deregulation of broadcast stations in 1981, station managers are free to hire anyone for their engineering, and there are no longer any minimum qualifications (News, 1981). As in the past the "combo person," that is, a sales person, manager, or disc-jockey who may or may not have any electronics education may be responsible for making repairs, "trading out" equipment, or sending off defective equipment to a repair shop.

Today, however, this person is no longer required to be licensed and may make no pretensions of being even a part time engineer. A few telephone calls to small radio stations close to, but outside the Stillwater area, verified this practice. According to the persons reached, one full-time engineer had left the state, another had "moved across town," and one disc-jock said that he didn't know if his station had an engineer (which shows a probable absence of any significant upkeep). Another station disc-jockey said that he did most of what he could do in his spare time, but that someone from the Corp of Engineers drove in from Tulsa, once or twice a year, to work on the station when it broke down. The same picture was described by broadcast engineer, Dennis Orcutt, (telephone conversations, July 1988) who had 20 years of radio experience in Oklahoma in addition to having been involved as a leader in the SBE.

The two Oklahoma chapters of the Society of Broadcast Engineers allowed the survey, a letter of introduction, and a stamped, self-addressed, return envelope to be placed into their envelope along with the newsletter. However they were reluctant to provide an adequate mailing list ahead of the mailing day.

The Oklahoma City chapter sent a mailing list and then made a new one on the mailing day (June 20, 1988). The Tulsa chapter mailing list was not available until the night of the mailing (June 23, 1988). Three SBE members and the researcher prepared the newsletters for mailing and also inserted a survey, along with a stamped, self addressed return envelope, with those newsletters mailed to Oklahoma zip codes. An abbreviated list was provided each night, by each chapter, that included minimal information. Very little complete information was included. The Oklahoma City list included names and addresses but no mention of station employment. The Tulsa list included names, zip codes (only), and in some cases the station call signs (without a city). Those names and station call signs that were included in the SBE mailings were added to the newly created master "station" list based on the Broadcasting/Cablecasting Yearbook 1987 and the directory from the OAB. Where there were multiple names for Chief Engineers the correct name was verified where possible, by those persons who helped with the mailings, by mail contacts, or in some cases by telephone. Where there was a high degree of uncertainty, letters were addressed to "Engineer" (only).

Many of the persons who were listed as both engineer and owner, or president, or general manager were quick to point out that they did not do any maintenance themselves, but simply hired a contract service. Returns were few from those listed in this manner since the top of the survey specified those who worked half-time or more in engineering, eliminating many who were engineers in name only.

In some cases the same person, working for a network or as a private contractor, was listed as Chief Engineer for as many as ten stations. In one such example, a note said, a company engineer from Wichita, Kansas, maintained about eight stations, at least one of which was in (Enid) Oklahoma.

In many of the rural and small stations the "combo-person" probably does the simple maintenance and ships off the portable equipment to specialty shops. It should also be noted that in many cases the equipment is simply used until it ceases to function, at which time it is thrown away, sold as-is, or donated.

Using this as a starting point, the next step was to use the master station list to enter the names of chief engineers, which provided some idea of numbers of engineers outside the Tulsa and Oklahoma City areas. This list was also used to tally the stations which listed the same engineer for more than one station. Sometimes a person is listed as chief engineer because he signed the annual proof of performance records kept to document the stations technical performance. In other cases a station manager, for example, with no technical skills may have had himself listed as the chief engineer simply for record keeping purposes.

Dennis Orcutt (1988) pointed out that currently more stations are using part-time people, using contractors, or simply do without engineering services. For an estimate of total number of chief engineers in the rural areas, the movement of chief engineers from station to station can probably be thought of as reasonably constant, and the total numbers are either constant or decreasing. There is certainly no evidence to indicate that their numbers are increasing.

Total numbers of engineering employees were derived after soliciting information from stations and employees, first by gathering figures over the phone from chief engineers, managers and contract engineers. Then postcards were sent to non-responding engineers, and finally postcards were sent to general managers of stations where engineers were listed but did not respond. The final postcard asked for specific information about whether the station used a contract service, etc. and requested his name.

The total number of engineers found in Tulsa and Oklahoma City, and reasonable estimates for rural television stations (3-4 engineers per network affiliate stations as recommended by Dennis Orcutt) were added to the number of engineers on the master listing of stations. This provided a more accurate total figure of no more than 120 for the total population of this study.

Telephone calls and visits to encourage engineers to return questionnaires also provided an opportunity to verify or revise earlier estimates. Using verified figures, some estimates, and giving the benefit of the doubt to some rural stations yielded a population of 110 total for broadcast engineers. Of these there were 93 usable returns. This represents a return rate of at least 77 percent based on the worst case population figure of 120 broadcast engineering personnel for the state of Oklahoma.

<u>Item selection</u>

Based on the trade journals, it was expected that broadcast engineering personnel would break down into two or perhaps three well defined clusters such as the hands-on technician and the climber. According to these readings, the hands-on technician would place less value on any education without immediate payoff, for example, any education that deals primarily with theory and ignores manual skills such as soldering. The hands-on technician would also favor learning high-tech skills at the exclusion of human relations skills, and at the same time he would also be more likely to feel that a technician of any value could "pick-up" the needed skills on the job, through sales literature, technical manuals and experimentation. This type of person was also expected to be more likely to say his work is "more like a hobby", whereas the alternative group(s) would disagree.

The other group expected to show up as a different cluster is the "climber," who at least in theory is probably younger, better educated, and more willing to leave the "union" mentality behind in favor of making his way to the top. He is more likely to be in favor of learning human relations, management, and financial skills in addition to electronics skills. The climber is also more willing to take chances and try his hand at the "combo-job," such as engineer/disc jockey or engineer/news person, in order to gain more experience and options. His prime allegiance may not be in the direction of electronics at all, but may prefer and enjoy performance-related work.

Studies in other fields of professional engineers have also shown that older professional engineers do take some advantage of continuing educational opportunities, but are somewhat reluctant to do so for credit. Some speculation has it that the pay-off is less for the older professional who may be quite busy and who expects to retire in the not-too-distant future. The "climber" may also feel that college credit or credentials are more important than would the person who is less secure in his basic education, and therefore may be more afraid and feel negative about college classes that he may not be able to pass easily. Some lesser educated, not as well prepared broadcast technicians and older chief engineers (who entered broadcasting in its infancy) may fit this category.

Regardless of education and confidence, the respondents were expected to separate or disagree on the perceived need for specific technical training that they need because of their different career stages (different values). The respondents also were expected to differ in their perception of their own need for some of the basic and advanced electronics classes.

Some of the items for non-technical communication needs also were expected to be viewed differently at different stages in the persons career because of changes in maturity. These same items may also differentiate the hands-on technician from the climber who is willing to try to change the organization as well as work with equipment (people-thing orientation). The climber will be more likely to appreciate a challenge and enjoy change whereas others may feel threatened.

Job satisfaction is another distinguishing factor among employees. Items 17 and 20 may be answered matter of factly, but also may indicate the "union" mentality, that is a refusal to use non-work hours, or unpaid time, to study for what is considered the company's benefit. This could be called the "company doesn't care, why should I waste my time?" attitude. It was also thought that lack of communication skills and of involvement could also play an important role in whether the individual feels that he is contributing to his own welfare through the advancement of his station.

## Cluster Analysis

An item discrimination procedure was used to eliminate 7 "weak" statements from analysis because they failed to serve their purpose. Rather than discriminate between types of respondents, the deleted items were responded to in haphazardly rather than systematically.

Pearson product-moment correlation coefficients were computed for all possible pairs of individuals using the remaining 23 statements. McQuitty's Elementary Linkage and Factor Analysis was then used in conjunction with the (93 by 93) correlation matrix to extract 20 types or clusters from the 93 broadcast engineering persons. These clusters varied in size from 2 to 12 individuals. The 3 clusters made up of 2 individuals each were dropped from consideration immediately, their small size making them suspect and interpretation impossible. Later, the decision was made to omit the smaller clusters from discussion, and interpretation will be further limited, to the 7 largest clusters (of 5 or more individuals), which are Types 1, 2, 4, 5, 9, 12, and 14.

## REFERENCES

Agresti, A., & Agresti, B. F., (1979). Statistical methods for the social sciences. San Francisco: Dellen Publishing Company.

Bartz, A. E., (1976). Basic statistical concepts in education and the behavioral sciences. Minneapolis: Burgess Publishing Company.

Kerlinger, F., (1973). Foundations of behavioral research. New York: Holt, Rinehart and Winston, Inc.

McQuitty, L. (1957). Elementary linkage analysis for isolating orthogonal and oblique type and typal relevancies. Educational and psychological Measurement. 17, 207-229.

Mezzich, J. E. & Solomon, H. (1980). Taxonomy and behavioral science. London: Academic Press Inc.

Miller, D. C. (1977). Handbook of research design and social measurement. New York: David McKay Co., Inc.

News Feature: Abolishment of first phone license could hurt small market radio. (1981, October). Broadcast management/engineering, pp. 119-120.

# CHAPTER IV

## FINDINGS

McQuitty's Factor and linkage analysis enabled the researcher to place the engineers and technicians into "types" or groups of like-minded individuals. Each type of engineer was then treated as if that type were one individual. From that point on, the researcher worked with the numbers for each composite type in order to put flesh on the skeleton as it were. These "types" are approximations of individuals involved in Oklahoma's broadcast industry.

Twenty types were originally extracted from 93 engineers and technicians, making it virtually impossible to adequately describe and name them all, much less make a clear report of each. Based on the results of this research, the broadcast engineering population was found to be quite diverse in educational needs and attitudes. This shouldn't be at all surprising considering the wide variations of age; education (both quantity and type); type, size, and location of facilities/operations; years of service; and roles of the person in the organization, all in addition to individual differences.

Clusters made up of only two individuals were dropped not only to reduce the number of types involved but also to reduce the risk of reporting types which were quite possibly unreliable. Three clusters which consisted of two persons each were immediately dropped, leaving 17 types (listed here as T1-T17) made up of 87 individuals. The 17 remaining types were documented, but only the 7 largest types (5 to 12 members) will be reported and discussed here.

Overall Findings

After dropping 3 types, only 87 engineers were left in the study. Before discussing the responses of each type, each item and its overall (ignoring types) mean responses, or average, rating will be discussed. The resultant mean rating will be given and an interpretation in which the number is translated into something meaningful. The means will no longer be whole numbers as were originally marked on the survey, verbal evaluations in most cases will be verbal approximations of the original scales and responses on those scales. Any mean between 1 and less than 3 indicates at least some agreement with the statement, although the degree in verbal form will not always be noted. Likewise any mean greater than 3 and up to 5 will denote at least some disagreement with the statement, even though the verbal equivalent may not be noted.

Items

Item 1, "A college degree in electronics is very important in broadcast engineering," received an overall mean score of 2.782, indicating a slight, but not strong, agreement. The standard deviation (abbreviated here as SD) for all the items (ignoring the Types for this discussion only) ranged from a low of 0.831 to a high of 1.161. The standard deviation for Item 1 was 1.050 which indicates a rather large amount of dissent on this issue. Looking at the 17 typal responses, 9 were in agreement, 4 were "no opinion", and 5 were in disagreement. Of interest here is the fact that not a single person (or type) responded with "strongly disagree" on this item.

Item 2, "In broadcasting, practical electronics experience is more important than college training in electronics," showed more consensus. The overall mean of 2.310 (and a standard deviation of 0.968) indicates a general agreement. Of the resultant types, 13 were in agreement, with 2 "no opinions", and only one type disagreed (mean of 3.833). This indicates the general feeling that a college degree in electronics is "ok" but practical experience is more important.

Item 3, "I am underpaid for the work I do," was rated about the same as the previous item with a overall mean of 2.391 (SD = 1.049). Likewise most of the types (13 of 17) were in agreement, with 2 "no opinions" and only 2 disagreements. Not one respondent marked "strongly disagree" on this item.

Item 4, "Technical people are not usually called on for advice until it is too late," had an overall mean of 2.575 with a SD of 1.041. By type, 10 types were in agreement, 2 had "no opinion", and 5 disagreed. This indicates that there is substantial agreement to the old complaint among engineers that they are not (for whatever reason) involved in the planning stages at their facility. Whether the problem lies in managerial stereotypes or engineering's inability to become involved at the management level is another question.

Item 5, "I prefer to take electronics classes for credit rather than non-credit," was also rated with slight agreement (an overall mean of 2.471). But the lower standard deviation (0.860) indicates a greater degree of uniformity of opinion as well as agreement. Overall the respondents felt that they wanted to receive credit for their educational achievement. This may therefore be an important factor to consider in an educational program since the Federal Communication Commission downgraded the First Class Radio Telephone License. Credit, degrees, etc. may now be more important than ever, as evidence of special qualification.

The overall mean for Item 6, "I need more basic electronics education," was 2.782 (slight agreement), but the SD of 1.125 (one of the highest) shows that there was a considerable amount of variance between individuals on this subject. There were 11 types who were in agreement, 1 "no opinion," and 5 who disagreed. Intuitively this would be expected since a wide range of persons work in broadcast engineering (compared with factory, or research settings as mentioned in chapter 1), some of whom have only some electronics background and others have years of experience and possibly degrees in electronics, or even music.

Item 7, " I need more advanced electronic theory," drew the single most agreement with a mean of 2.149 (almost "strongly agree") and almost the lowest SD of all the items (0.856). On this item there was only one type (T17, with a mean of 3.333) that disagreed with this statement. Most of the types were in (approximately) strong agreement. The conclusion can be drawn that most broadcast engineering staff felt ill at ease in this area.

Item 8, "I need more practical experience on specialized equipment (VCR's, etc.)," was rated (mean of 2.241 and SD of 0.927) similar to Item 7 above, and the same implications can be drawn from both items at the overall level only. At this level they appear similar, but the means, by types, show considerable changes in the priority given to these items. Not a single respondent marked "strongly disagree" on this item.

The mean of Item 9, "The people I work for encourage me to advance myself whenever possible," was 2.517 (SD = 0.987), midway between "no opinion" and "agree." Overall, the respondents felt encouraged. Eleven of the types agreed, with 2 "no opinion" responses and only 2 who disagreed.

Item 10, "I could advance in broadcast engineering if I had more math skills," with a mean of 3.276 and a low standard deviation of 0.872, indicates an overall, rather consistent, disagreement with this statement. In fact 14 of the 17 types would appear to be saying that math skills are not a problem for them at all.

Item 11, "Lack of time at home prevents me from taking more technical training classes," had a mean of 2.793 and a SD of 1.091, indicating that, overall, the respondents registered a slight agreement but there was a greater amount of variance among respondents on this item.

The mean of Item 12, "Electronics is changing too rapidly for the average person to keep up," which was 2.678 with a SD of 1.105, indicates a slight agreement overall but also a higher degree of variance among the respondents on this item.

Item 13, "I could get ahead in this business if I had more of the basic skills," was rated at 3.126 (SD=0.950), which is a very slight disagreement. This is a more general item, which indicates that the respondents, overall, feel ambivalent about whether any lack of basic skills is hindering their careers.

Item 14, "I don't have enough time for technical training after work," with a mean of 2.862 (SD = 1.080), showed a slight agreement and not a small amount of variance among the respondents.

Item 15, "My job is like a hobby to me," with a mean of 2.759 and the highest standard deviation (1.161), shows a slight agreement but a large amount of variance among the respondents. This item indicates a large difference of opinion among respondents; some view their work as a hobby (possibly amateur radio operators) and others view it as more of a profession and perhaps require more financial incentive for motivation.

Item 16, "Supervisory skills are best learned on-the-job," with a mean of 2.943 (SD of 1.114), indicate some ambivalence on the topic of whether it is better to learn supervisory skills on the job or from the theoretical standpoint as in the classroom. The types were almost evenly split on this item.

Item 17, "The future of broadcast engineering looks bleak," with a mean of 3.287 and the second highest standard deviation (1.156), indicates some disagreement overall and a large variation of individual responses.

Item 18, "I prefer not to have very much change at work," with the highest mean of 3.770 and also the lowest standard deviation at 0.831, gives a clear indication that broadcast engineering personnel have a strong (and almost unanimous) dislike for routine. This in conjunction with the finding that most of the respondents feel underpaid, gives credence to the idea that broadcast engineers prefer the fast paced life of broadcasting even if they must work for lower income. It may also indicate that they prefer the action in broadcasting rather than pursue the theoretical skills necessary to move into a more confining "research" position in a factory for example.

Item 19, "Engineering people need more training in personal communication skills," with a mean of 2.322 and a somewhat low standard deviation of 0.946, indicates that overall the respondents felt a definite need for interpersonal communication skills.

Item 20, "Engineering people need more training in written communication skills," with a mean of 2.425 and a SD of 0.984, indicates that respondents consider written communication skills important, but slightly less so.

Item 21, "Engineers and technicians fail to learn the skills needed to get along well with others," with a mean rating of 3.287 (SD=0.987), which indicates a slight but not a strong disagreement with the statement. There is a slight rejection of the idea that engineers and technicians fail to learn the inter-relational skills necessary for coping with others.

Item 22, "A two-year program of Vo-tech electronics training is more useful than a college degree in electronics," came in with a mean of 3.034, or "no opinion", and a standard deviation of 1.028. Overall the mean was "no opinion" but the standard deviation of 1.028 shows that there was a wide difference of opinion on this item.

Item 23, "A college degree of any kind is needed to get ahead in broadcast engineering," with a mean of 3.161 and a standard deviation of 1.119, also indicates such a very slight disagreement that it could be classified as "no opinion." However the large SD also indicates a large amount of disagreement on this statement.

## Item Correlations

Looking at a correlation matrix of the items revealed many of the patterns in responses that later showed up in the way different "types" responded to the items. The item correlation matrix revealed that those who feel personal communication skills and written communication skills are important are also more likely to think that engineers fail to learn the skills needed to get along well with others (correlation of Item 19 to 21 = +.546 and +.593 for Item 20 to 21).

The correlation of -.303 between Items 1 and 4 showed that often there is an inverse relationship between the way an engineer would respond to these two statements. Those who believe a college degree in electronics is important (Item 1) were more likely to disagree with the statement that they are not called on for advice (Item 4). Some of those who were positive toward a college degree in electronics were also less than enthusiastic about a two-year vocational technical degree as indicated by the negative correlation between these two items (-.266).

The same respondents who agreed with Item 1 were somewhat more likely to agree (r = 0.416) that Item 23 "a degree of any kind is needed to get ahead in broadcasting." The conclusion can be possibly drawn that those who value the college degree in electronics (and possibly have a degree?) also have a greater respect for an advanced education which is not severely limited in its scope. It also seems valid to suggest that those with a wider perspective may also feel (and perhaps are) more involved in planning where they work.

## Consistent Agreements

The clutter of numbers was greatly reduced by using the tables shown below, the first (Table I) being a list of types-by-items and the second (Table II) being the same except it is sorted by unanimous agreement at the top to better illustrate, at a glance, where some consistent opinions exist. The seven largest types are listed with their responses in symbolic form. The plus symbol (+) denotes agreement but not magnitude, the negative symbol (-) denotes disagreement but not magnitude. "N" denotes a neutral position as in "no opinion", and where the mean is close to 3.0 (2.9 to 3.1) and may add information about a marginal response, the polarity is listed along with the "N." Throughout this report

TABLE 1

ITEM POLARITIES - NUMERICAL ORDER

| ITEMS | T1 | T2 | T4 | T5 | T9 | T12 | T14 |
|---|---|---|---|---|---|---|---|
| 1 | - | - | + | - | - | + | - |
| 2 | + | + | + | + | + | - | N |
| 3 | + | + | + | + | + | + | + |
| 4 | + | + | + | N | + | + | + |
| 5 | + | + | + | + | + | + | - |
| 6 | + | - | + | - | + | + | + |
| 7 | + | + | + | + | + | + | + |
| 8 | + | + | + | + | + | + | + |
| 9 | + | + | + | + | + | + | - |
| 10 | - | - | - | - | + | - | - |
| 11 | + | - | + | - | + | + | N |
| 12 | + | + | + | + | + | + | + |
| 13 | - | - | + | - | + | + | - |
| 14 | + | - | N | - | + | + | - |
| 15 | + | + | + | - | N | + | - |
| 16 | + | - | + | - | - | - | N |
| 17 | - | - | + | - | + | - | - |
| 18 | - | - | - | - | - | - | - |
| 19 | + | + | + | + | + | + | - |
| 20 | N | + | + | + | + | + | - |
| 21 | - | N | -N | - | + | - | - |
| 22 | + | + | + | + | + | - | + |
| 23 | - | - | - | - | + | + | - |

TABLE II

ITEM POLARITIES - SORTED

| ITEMS | T1 | T2 | T4 | T5 | T9 | T12 | T14 |
|---|---|---|---|---|---|---|---|
| 18 | - | - | - | - | - | - | - |
| 3 | + | + | + | + | + | + | + |
| 7 | + | + | + | + | + | + | + |
| 8 | + | + | + | + | + | + | + |
| 12 | + | + | + | + | + | + | + |
| 5 | + | + | + | + | + | + | - |
| 9 | + | + | + | + | + | + | - |
| 19 | + | + | + | + | + | + | - |
| 20 | N | + | + | + | + | + | - |
| 2 | + | + | + | + | + | - | N |
| 22 | + | + | + | + | + | - | + |
| 4 | + | + | + | N | + | - | + |
| 10 | - | - | - | - | + | - | - |
| 6 | + | - | + | - | + | + | + |
| 1 | - | - | + | - | - | + | + |
| 23 | - | - | - | - | + | + | - |
| 11 | + | - | + | - | + | + | N |
| 13 | - | - | + | - | + | + | - |
| 14 | + | - | N | - | + | + | - |
| 15 | + | + | + | - | N | + | - |
| 16 | + | - | + | - | - | - | N |
| 17 | - | - | + | - | + | - | - |
| 21 | - | N | -N | - | + | - | - |

"verbal approximations" are made where appropriate. For example a mean of 2.230 may be described as an (almost) agreement.

## The Types

T1--Action Oriented. The three most agreed-upon items for Type 1 (see Table III) are, in order, 3,4, and 6. Type 1 feels underpaid (Item 3), not involved in planning (Item 4), very weak in basic electronic skills (Item 6), and almost as weak in advanced electronics skills (Item 7). According to Items 6, 7, and 8, he needs more basic, advanced and specialized electronics training.

Based on the mean of 4.250 for Item 18, Type 1 also has the greatest distaste for boredom on the job. Those in this group placed the most value on practical experience, basic work related skills and the least on communication skills (Items 19,20) and feel that technical people get along with others well enough (Item 21).

"A college degree in electronics..." (Item 1), with a mean of 3.083 ("No Opinion") and "A college degree of any kind... (Item 23) with a mean of 3.750 both indicate that this group feels little value in advanced education, whether technical or non-technical. Vocational programs (Item 22) with a mean of 2.900 (essentially "no opinion") also rated poorly with this "practical" type of person. Item 14, "I don't have enough time for technical training after work",

TABLE III

ITEM MEANS FOR TYPE 1

| Item | Mean |
|---|---|
| 3 | 1.500 |
| 4 | 1.750 |
| 6 | 1.917 |
| 14 | 2.000 |
| 16 | 2.083 |
| 8 | 2.083 |
| 2 | 2.167 |
| 7 | 2.250 |
| 9 | 2.417 |
| 12 | 2.500 |
| 5 | 2.583 |
| 15 | 2.750 |
| 19 | 2.833 |
| 11 | 2.833 |
| 22 | 2.917 |
| 20 | 3.000 |
| 1 | 3.083 |
| 13 | 3.250 |
| 10 | 3.500 |
| 21 | 3.667 |
| 17 | 3.667 |
| 23 | 3.750 |
| 18 | 4.250 |

with a mean of 2.000 (agrees) indicates that this person is either short on time for technical training or gives it a low priority.

Judging from the overall responses for Type 1, this type of person is very active, possibly needs physical activity, and spurns any instruction time he considers to be a distraction from his job. He may also be the type of person who thinks of paperwork as an unnecessary distraction that keeps him away from what he considers his real "job." Considering Item 4 again, "not called on for advice," there is also reason to believe that this person does not, or cannot, step into the fore-front of planning, but rather waits until problems occur before getting involved. It is possible that this person is action (performance) oriented. For this type, 7 of 12 respondents marked in the demographics section that they are in maintenance and operations, which is a higher ratio of operations-related positions than in the other types. This type of person is the antithesis of the proverbial bench-technician, and may well be in an entry level position for the less qualified (non-bench) technician.

<u>T2--Positive Supervisor</u>. In contrast, the Type 2 person appears to be more positive and confident (see Table IV). He has the highest agreement for Item 2, "practical experience" (rather than college), with a mean of 1.571 and a SD of 0.5351, highly values Vocational training (1.857), and yet also places a high value on communication skills (Items 19

TABLE IV

ITEM MEANS FOR TYPE 2

| Item | Mean |
|---|---|
| 2 | 1.571 |
| 19 | 1.857 |
| 22 | 1.857 |
| 20 | 2.000 |
| 4 | 2.000 |
| 7 | 2.000 |
| 15 | 2.143 |
| 5 | 2.143 |
| 9 | 2.286 |
| 3 | 2.857 |
| 8 | 2.857 |
| 12 | 2.857 |
| 21 | 3.000 |
| 16 | 3.143 |
| 17 | 3.429 |
| 10 | 3.429 |
| 23 | 3.429 |
| 13 | 3.429 |
| 11 | 3.571 |
| 6 | 3.714 |
| 1 | 3.714 |
| 14 | 3.857 |
| 18 | 3.857 |

and 20). He (almost) strongly disagrees (3.714) with the statement that he needs basic electronics but agrees that he needs advanced electronics (2.000).

Since there seems to be no strong expression of need or desire for practical training on specialized equipment (Item 8, mean = 2.857), the researcher can conclude that this type of person is well trained in basics, adequately trained in advanced electronics, and probably manages to keep up with new equipment as it reaches the market or picks up the necessary training, as it is needed, from available sources. It may also be that this person works in a simpler, less complicated environment (like radio as opposed to television) where the pressure is lower, or simply feels that as a supervisor he has less need for more specific training.

Another bit of evidence leading to the same conclusion is that Items 11 and 14, relating to lack of time for training and education, are both rated near "strongly disagree." This in conjunction with items 15 (hobby) and 9 (encourage me) leads the researcher to conclude that this employee has more reason to be satisfied and confident.

The single demographic figure that stands out most for this type is that 5 of the 7 respondents are involved in supervisory or management positions, 5 of the 7 are also in television, and none are from a rural area. This concentration of supervisory types could explain the ambivalence relating to practical training on specialized equipment and the seeming contradiction of placing an almost equal value on Vo-tech and technical skills and communication skills. A good manager wants highly trained personnel and has also come to realize the value of communication skills in increased productivity. It is interesting to note that 5 of these went to a conference in the preceding year, 2 of whom paid their own expenses.

T4--Rural Technician. The Type 4 person (see Table V) needs basic electronics (2.666), has a greater need for advanced electronics (2.111), and an even greater need for practical training on specialized equipment (1.889). Not just any college degree is appreciated (Item 23, mean = 3.333), while vocational training in electronics is somewhat important (2.889) and an electronics degree is a little more important yet (2.778).

While this person also insists that practical experience is preferable to college electronics, there is still a strong appreciation for communication skills (Items 19 and 20, both means = 2.222). Lack of education/training time for Type 4 is not an issue but there is more of the feeling of not being involved in planning. While both Types 1 and 2 felt that the future of broadcast engineering was not bleak, Type 4 appears to be more cynical (2.556).

A look at the demographics revealed that 7 out of this group of 9 were from areas other than Tulsa or Oklahoma City, and 5 of the 7 work in AM/FM radio stations. Only 2 persons

TABLE V

ITEM MEANS FOR TYPE 4

| Item | Mean |
|---|---|
| 8 | 1.889 |
| 2 | 2.000 |
| 7 | 2.111 |
| 3 | 2.111 |
| 19 | 2.222 |
| 20 | 2.222 |
| 15 | 2.333 |
| 16 | 2.333 |
| 9 | 2.444 |
| 5 | 2.444 |
| 17 | 2.556 |
| 6 | 2.667 |
| 4 | 2.667 |
| 1 | 2.778 |
| 12 | 2.778 |
| 13 | 2.778 |
| 22 | 2.889 |
| 11 | 2.889 |
| 14 | 3.000 |
| 21 | 3.111 |
| 3 | 3.333 |
| 0 | 3.444 |
| 8 | 3.778 |

received any education reimbursement and only one went to a conference (NAB) in the preceding year. This type is more isolated geographically, and also technologically. He is not well trained and has enough time for more training but does not have the resources. Type 4 could possibly be called the "rural bench-technician" or "rural hands-on technician."

The Type 4 is similar to the Type 1, but has better training, feels a little more consulted, and is a little more negative about the future. Otherwise many of their responses are very similar. Comparing the two groups by demographics also shows that 33% in Type 4 either have used or have access to educational and conference benefits as opposed to 66% of those in Type 1, indicating a possible reason for a lower level of optimism in Type 4.

Type 4 is also less enthusiastic about change, a possible indicator of age. It is quite possible that Type 4 are the older generation who received their hands-on training in the military. For them, the "honeymoon" period is over, and their younger counterparts (Type 1?) are being hired into the progressive "new-image" organizations.

<u>T5--Hands-on Senior Engineer</u>. The Type 5 person (see Table VI) has even less appreciation for any college education (Item 1, mean = 3.600 and Item 23, mean = 4.000) than the Type 1 person. But means of 2.000 on Item 19 and 2.200 on Item 20 indicate that unlike the Type 1, the Type 5 does see the need for communication skills.

TABLE VI

ITEM MEANS FOR TYPE 5

| Item | Mean |
|---|---|
| 5 | 1.800 |
| 19 | 2.000 |
| 8 | 2.000 |
| 2 | 2.200 |
| 7 | 2.200 |
| 20 | 2.200 |
| 3 | 2.400 |
| 12 | 2.400 |
| 9 | 2.400 |
| 22 | 2.800 |
| 4 | 3.000 |
| 10 | 3.200 |
| 13 | 3.200 |
| 6 | 3.200 |
| 11 | 3.400 |
| 17 | 3.400 |
| 18 | 3.400 |
| 21 | 3.400 |
| 1 | 3.600 |
| 14 | 3.800 |
| 15 | 4.000 |
| 23 | 4.000 |
| 16 | 4.200 |

The Type 5 does not need basic electronics as evidenced by the mean of 3.200 for Item 6. There is however a need for advanced electronics skills (2.200) and practical training on specialized equipment (2.000).

This person has less desire for change (3.400), perhaps wanting more stability than the other types and feels somewhat encouraged Item 9 (2.400). He feels strongly (4.000) that his work is not a hobby, he is underpaid (2.400), and that credit is important (1.800).

Demographics show that all five of those in this type work in television (which is more complex), 4 of the 5 are also in some level of management. Type 5 resembles Type 2, but the researcher speculates that the Type 2 is younger and perhaps sees more hope for advancement in the future, while the type 5 is older and possibly waiting for retirement. It seems quite probable that these are older individuals who received their training in the military, perhaps in the vacuum-tube era, which emphasized the hands-on approach.

T9--People Oriented. Like many of the other types, Type 9 (see Table VII) needs some basic electronics (2.714), needs advanced electronics (2.286) more, but also has an equal need for practical, specialized training (2.286). He feels that practical experience is important (2.286) but also feels the need for a wider range of education, and feels left out of the planning stage where he works (2.143).

TABLE VII

ITEM MEANS FOR TYPE 9

| Item | Mean |
|---|---|
| 19 | 1.429 |
| 20 | 1.429 |
| 11 | 1.571 |
| 5 | 1.857 |
| 4 | 2.143 |
| 7 | 2.286 |
| 8 | 2.286 |
| 2 | 2.286 |
| 23 | 2.286 |
| 12 | 2.286 |
| 10 | 2.429 |
| 21 | 2.429 |
| 14 | 2.429 |
| 3 | 2.571 |
| 17 | 2.571 |
| 13 | 2.571 |
| 9 | 2.714 |
| 6 | 2.714 |
| 22 | 2.857 |
| 15 | 3.000 |
| 1 | 3.143 |
| 16 | 3.286 |
| 18 | 3.714 |

The Type 9 rated an electronics degree with a mean of 3.143, and "any degree would help" at 2.286. Practical experience is considered important (2.286) but both Items 19 (1.429) and 20 (1.429), communication skills, are rated top priority. He also feels that engineering people fail to learn the skills they need to get along well with others (2.429), leading the researcher to believe that the Type 9 expects the engineering department to take an active role in relating to other departments, and the public in planning ahead.

The demographics show that 5 out of the 6 respondents from Type 9 work in radio, and all except one of these work in Tulsa or Oklahoma City areas. Only one in this type works in a rural area. This is also the only type to agree that engineers fail to learn the skills needed to get along well with others, and is only one of two types to agree that the future of broadcasting is bleak. He also feels that "any degree is important" but does not appreciate a degree in electronics.

The researcher concludes that this type is not under great stress in the area of maintenance but may have to work often with people rather than equipment, as in operations. Demographic information shows that 2 of the 6 in this type are in operations roles and 2 more are supervisors. These respondents may work in newer facilities, where equipment problems are few. Operations, training of operators, and human relations problems may be his number one concern. He may even spend a large portion of his time planning for and setting up and tearing down remotes.

One person noted in the "comments" section that those with only technical skills will more likely be "victims" (of lay-offs, etc.) in the future of broadcasting.

T12--Educated Engineer. Two of the most agreed upon statements for the Type 12 person (see Table VIII) are Item 1 "A college degree in electronics..." (mean of 1.500) and Item 23 "A college degree of any kind..." (mean of 1.833), and importance of vocational training (Item 22, mean of 4.000) is at the other end, the most disagreed-with item for this type.

The Type 12 person feels somewhat secure in the basics (Item 6, mean = 2.833), needs advanced electronic training (Item 7, mean = 2.167), and even more practical experience on specialized equipment (Item 8, mean = 1.667) ranked between the two items on college education.

This type of person feels somewhat included in planning stages (Item 4, mean = 3.167), feels encouragement (Item 9, mean = 2.167), and claims that his job is like a hobby (Item 15, mean = 1.833). The communication-related Items, 19 and 20 (both means = 2.167), and Item 5, prefers credit (mean of 2.000), in conjunction with the above paragraph, leads the researcher to conclude that this person has and appreciates a well rounded education and can be classified as well educated or "upwardly mobile." Half the persons in this type are at least at the supervisory level and 4 out of 6 are in radio.

TABLE VIII

ITEM MEANS FOR TYPE 12

| Item | Mean |
|---|---|
| 1 | 1.500 |
| 8 | 1.667 |
| 23 | 1.833 |
| 15 | 1.833 |
| 5 | 2.000 |
| 9 | 2.167 |
| 19 | 2.167 |
| 20 | 2.167 |
| 11 | 2.167 |
| 7 | 2.167 |
| 14 | 2.333 |
| 12 | 2.500 |
| 13 | 2.500 |
| 3 | 2.500 |
| 6 | 2.833 |
| 4 | 3.167 |
| 10 | 3.167 |
| 17 | 3.333 |
| 21 | 3.333 |
| 16 | 3.500 |
| 18 | 3.667 |
| 2 | 3.833 |
| 22 | 4.000 |

T14--Narrow Focused. The mean for Item 6 (2.800) expresses a slight need for basic electronics; a mean of 2.200 for Item 7 shows a need for advanced electronics and there is less need for specialized training (Item 8, mean = 2.600).

Type 14 (see Table IX) disagrees radically with the other types in the non-technical aspects of engineering. He disagrees that written (4.000) and personal (3.600) communication skills are needed, and that engineers fail to learn the skills necessary to get along well with others. His job is not a hobby (3.400) and he does not prefer credit for electronics classes (3.200). The Type 14 person apparently does not feel encouragement either (Item 9, mean = 3.200), but for some reason he is more optimistic about the future (Item 17, mean = 4.2) than the other types.

The Type 14 is very secure (arrogant?) and focused in on his work related skills. He may even be narrow minded in his belief that he is a professional, and communicates well with those he relates to, and may, in fact, feel so for good reason. He may well be highly educated in electronics, possibly having a degree.

TABLE IX

ITEM MEANS FOR TYPE 14

| Item | Mean |
|---|---|
| 1 | 1.800 |
| 4 | 1.800 |
| 7 | 2.200 |
| 3 | 2.200 |
| 8 | 2.600 |
| 6 | 2.800 |
| 22 | 2.800 |
| 12 | 2.800 |
| 2 | 3.000 |
| 16 | 3.000 |
| 11 | 3.000 |
| 9 | 3.200 |
| 5 | 3.200 |
| 15 | 3.400 |
| 10 | 3.400 |
| 13 | 3.400 |
| 19 | 3.600 |
| 23 | 3.800 |
| 14 | 4.000 |
| 20 | 4.000 |
| 18 | 4.200 |
| 21 | 4.200 |
| 17 | 4.200 |

CHAPTER V

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## Summary and Conclusions

The literature review shows that there are generally three stereotypical images of the those in broadcast engineering: the hands-on chief engineer, the engineering manager, and the technician. Using cluster analysis, the researcher showed that these classifications are quite simplistic. For purposes of educational and public relations planning, more accurate typal descriptions are needed.

In July of 1988, the researcher mailed surveys to Oklahoma broadcast engineering personnel, a population of approximately 120. Cooperation and publicity from the Oklahoma chapters of the Society Of Broadcast Engineers helped to boost the return rate to 70 percent; a total of 87 surveys were used.

Cluster analysis, a systematic method which places like-minded individuals into typal groups, revealed seventeen types of engineering personnel. The researcher disproved the null hypothesis that there is no more than one "type" of Oklahoma broadcast engineering personnel, finding instead a diverse population of seventeen different types. Stated differently, the researcher showed that, based on educational attitudes and perceived needs, Oklahoma broadcast engineers and technicians are not nearly the homogeneous group that the literature would lead us to think.

None of the 17 groups was large in proportion to the total number of engineer/technicians surveyed, and the largest of the 17 types consisted of only 12 persons. Because of the large number of small groups, only the seven largest types, consisting of five, or more, persons per group, were described and labeled. The smallest typal groups, which were not discussed, contained only two to four members. The finding of so many small and distinctly different groups, or types, of engineers, sets to rest the idea that the population of broadcast engineering personnel can be thought of as containing one or two large groups. The population is simply too diverse to accurately set educational goals based on such a limited understanding of the engineering population.

The large number of small groups indicates the diversity of Oklahoma's broadcast engineering personnel and the wide range of attitudes and needs. It would be dangerous to make plans, for example, based on unrealistic assumptions that there are only a few types of engineers. To do so would lead to lower acceptance and usage due to inappropriate content, or training programs designed with inappropriate preparatory content for the educational level of the audience.

Likewise, failure to research the barriers to education could lead to basic, lower level lectures and lab times being scheduled only when upper level, engineering managers are free to attend. Any educational program to address the needs of engineering personnel must consider the wide range of motivations and barriers unique to those in the broadcast industry who would ultimately use the program.

By looking at how the engineering types responded, item by item, it is possible to make some generalizations about the engineering population. Looking at the overall mean ratings for each item (ignoring types) on the survey, one could get the impression that most engineers and technicians are rather non-committal on most of the item statements. Had this been a "typical" survey, and had it not uncovered information about "types" of engineers and technicians, the mean ratings would appear to indicate that there are no strong differences of opinion. However, looking beyond the overall mean ratings, we see that there are some strong differences of opinions and needs among the different types.

Overall, it was found that a few of the typal groups believe they need more advanced technical training, and they all believe that they need more advanced electronic training as well as more training on specialized equipment. Since so few of the available college or vocational training programs provide, for example, hands-on operation and repair of high power transmitting equipment, it may seem logical to cite the shortage of broadcast equipment available to the providers of initial education for some of this particular deficiency.

The great need for specialized training is quite possibly indicative of the increasing rate of change in technology and the trend toward buying new replacement equipment in preference to performing labor intensive repairs; and it is the repair process which often provides an educational by-product. In the past, highly documented and well illustrated service manuals were a primary source of explanatory information and almost served as auto-tutorial training manuals. A more rapid turnover in lower-cost equipment, and more rapid obsolescence, also cuts down on the incentive for manufacturers to provide descriptive service manuals and training seminars. Along with the problem of quality in present day technical manuals, there is simply less free time to use the "quality" manuals that do exist. And broadcasters may be less than willing to pay for the increased costs of documentation, training manuals, or seminars, when they believe that their equipment will be outdated and replaced before it needs repair. The non-technical decision maker may also fail to include training materials and documentation in the bidding or purchasing process out of simple ignorance or lack of concern for the informational needs of the engineering department.

It should also be pointed out that, with one exception, all the engineering types voiced a need for better communication skills, both written and personal. Those in the Society of Broadcast Engineers who were consulted for feedback in the early stages of this research were unanimous in approving of research of the non-technical skills relating to the success or failure of the individual in broadcasting. Their concerns were addressed in this research.

All the typal groups feel underpaid and five of the seven types believe that the future of broadcast engineering is bleak. Yet, six out of the seven described types feel that they are consulted for advice, and the same number feel encouragement from those they work for. There is also unanimous agreement among the types that change is coming too fast, but they do not want to work in an occupation without change. It can be concluded that even though they feel that they are underpaid, lack many of the skills they want, and feel though they are pushed due to lack of training time and financing in an environment of excessive change, that they enjoy the fast paced nature of their work and prefer not to work in a factory, for example, even for better benefits.

## Recommendations for Further Study

In the early stages of this research, the author visited Rogers State College in Claremore, Oklahoma. The students in the electronics technology program there can select a broadcast specialty and practice their skills by working on the campus radio or television stations. This program blends classroom theory and hands-on experience, but it does not address the needs of the engineer who works full-time, at some distance from Claremore.

It is usually understood, and expected, that during the college years the student will devote massive amounts of time, on a priority basis, to the process of learning for the future. This is not necessarily true for the adult learner who is usually employed and needs goal oriented education, aimed at accomplishing certain immediate tasks. Selling education to the adult learner requires a careful assessment of his/her abilities, needs, and attitudes.

Finding and examining the relevant variables will reduce the errors in identifying the target population and in evaluating or designing educational programs. It will also increase the chance of a program's survival by increasing its usefulness and ease of access. Researchers need to examine demographic variables as a function of willingness or ability to pursue further education and training, and to examine the effect of age or union-mentality in affecting the willingness of engineers to pursue the training necessary to maintain and enhance their employment. An additional area of research would answer questions which relate the person's positive or negative attitude and his willingness to pursue further training during personal time as opposed to during work hours. A well-designed vocational-technical college curriculum may be suited for initial education but fail to attract students from the ranks of those who work in the broadcast industry until it offers intensive short courses in the summer, when relief help for radio and television stations is available from local colleges.

Managerial support is obviously an important element in the success of those in broadcast engineering. Research is needed to study broadcast managers and the ways in which they are willing and able to provide support. Management should be studied by location, types of operation and willingness to provide financial support, or willingness to allow release time, or leaves-of-absence for short-term, intensive training on specialized equipment at educational facilities such as Rogers State College. Knowing what is realistic and acceptable to both management and engineering personnel is also important.

## Recommendations for Educators

Educators must realize that there is a vast market consisting of adult learners who have many unmet needs but who are not willing to learn for learning sake. Educational administrators and instructors, for example, need to learn from the research and classes relating to adult learners. Research which helps the educator and the institution better relate to the needs of the broadcast engineer should be encouraged.

It has been the author's experience that too often educators employ rules in the classroom for the sake of keeping order and conformity. If goals and objectives are written for the adult learner, they must be based on valid research to meet the needs of engineers rather than the institution. If learning content is more important than mandatory class attendance then educators should set their goal as that of education for the distant learner, or the employee whose future employment makes occasional erratic demands such as out of town travel. The author's experience in mixing engineering work and education, has shown that emergency, work-related travel is simply an unexcused absence, rather than something to be expected.

Before the educator targets the broadcast engineering market, there must be serious research within the institution to examine its policies and search for the existence of unnecessary barriers to education. Some changes in educational policy could reduce the broadcast engineers' dependance on commercial trade schools (see literature review) which offer open or flexible entry and exit, evening classes, and intensive courses.

Because course content may or may not fit the needs of broadcast engineering, research should be carried out to find ways to cater to the communications fields. As one example of how to help solve problems due to lack of equipment, they can at least offer short-term intensive summer classes in selected areas where a broadcaster is willing allow access to transmission equipment for lab use.

Recommendations for Industry

Considering the present economic condition of Oklahoma, it seems most unlikely that any research will be useful that does not focus on how the broadcast community can "make-do" with its present resources. Broadcasters are cutting corners rather than training for the future. The vitality of the broadcast industry demands greater communication and cooperation between engineering personnel and organizations that represent them and a) broadcast managers, b) equipment manufacturers, and c) educational institutions.

For an effective educational program to survive without sufficient funding, it may be necessary to depend in large part, on the combined efforts of broadcast engineering personnel and equipment manufacturers. The Society of Broadcast Engineers must search for ways and means to encourage management and manufacturers to provide hands-on training for specialized equipment which is not available in educational institutions. They must also educate non-technical managers, by explaining the need for entry level training positions. Funding should be provided for studies designed to identify ways in which barriers to initial education, continuing education, or specialized training can be reduced or eliminated.

Managers must work with engineering departments to consider policy changes that allow scheduled time off, or leaves-of-absence for long term training. Management will have to realize that training is not free; it takes planning and cooperation. According to the comments received on the surveys, managers want to hire qualified, well-trained employees, but too few are willing to allow the time, and provide the necessary resources to help the employee grow.

# BIBLIOGRAPHY


Agresti, A., & Agresti, B. F., (1979). Statistical methods for the social sciences. San Francisco: Dellen Publishing Company.

Badawy, M. (1981, April 9). The causes and prevention of failure. Machine Design, 53(8), 217-221.

Bartz, A. E., (1976). Basic statistical concepts in education and the behavioral sciences. Minneapolis: Burgess Publishing Company.

Beyers, W. S. (1975). Development and integration of a course in electronic communications for a new engineering technology program at Valencia College. Orlando, Fla.: Valencia College. (ERIC Document Reproduction Service No. ED 175 654).

Caduff, G. F. (1970, October). Broadcast engineering: The horn of plenty. Educational Television, 22-24.

Cheshier, S. R. (1974). Analysis of textbook requirements for an associate degree level electronic communications course as reported by technology teachers in the field. West Lafayette, Indiana: Purdue University. (ERIC Document Reproduction Service No. ED 098 392).

Ciapura, D. (1981, October). The changing face of engineering management in the '80's. Broadcast Engineering, 23-38.

Coddington, R. H. (1969). Modern radio broadcasting. Blue Ridge Summit, Pa.: Tab Books.

Cross, K. P. (1986). Adults as learners. San Francisco: Jossey-Bass Publishers.

Dick, B. (1984, October). Salary survey. Broadcast Engineering, 36-50.

Dick, B. (1985, October). 1985 salary survey. Broadcast Engineering, 20-36.

Dick, B. (1986, October). 1986 salary survey. Broadcast Engineering, 22-38.

Dick, B. (1987, June). Management for engineers: Workers are ultimate enforcers of change. Broadcast Engineering, 20.

Dick, B. (1987, October). 1987 salary survey. Broadcast Engineering, 22-45.

Ellis, W (1987, July). Hands-on C.E. job demanding. TV Technology, 14-15.

Faddis, C., Ashley, W. L., Abram, R.E. (1982). Preparing for high technology: Strategies for change. Columbus, Ohio: National Center for Research in Vocational Education. (ERIC Document Reproduction Service No. 216 168).

Garofalo, R. (1984, June,a). Technical deregulation: How radio engineers have been affected. Broadcast Engineering, 104-108.

Garofalo, R. (1984b). Technical deregulation: How radio engineers have been affected. Unpublished master's thesis, School of Arts and Sciences, National College of Education, Evanston, Illinois.

Griffin, J. H. (1988). SBE conference report: 1986. Unpublished manuscript.

Gruszka, M. (1987, July). Sony chief discusses U.S. trade. TV Technology, 5.

Hawker, p. (1973, January/February). A change in lifestyles for engineers. The Royal Television Society Journal. 14(7), 153.

Hilliard, A. M. (1986, October). RCA revisited. Broadcast Management/Engineering. 121-127.

International Telecommunications Union. (1978). The ITU and vocational training. Geneva, Switzerland: ITU. (ERIC Document Reproduction Service No. 211 667).

Jordan, J. T., Jr. (1971, April). To train television engineers. Educational and Industrial Television, 21-29.

Kearsley, G. (1984). Training and technology. Reading, Ma.: Addison-Wesley Publishing Co.

Kerlinger, F., (1973). Foundations of behavioral research. New York: Holt, Rinehart and Winston, Inc. Losee R. (1975). A selective bibliography of commercial radio and engineering. Shorewood, Wis.: EBR Press. (ERIC Document Reproduction Service No. 107 263).

McQuitty, L. (1957). Elementary linkage analysis for isolating orthogonal and oblique type and typal relevancies. Educational and Psychological Measurement. 17, 207-229.

Mezzich, J. E. & Solomon, H. (1980). Taxonomy and behavioral science. London: Academic Press Inc.

Miller, D. C. (1977). Handbook of research design and social measurement. New York: David McKay Co., Inc.

Montgomery, E. (1986, July). Broadcast education is critical. TV Technology, 5.

Morris, L. J. (1985). Reasons for participation in continuing professional education: A multivariate analysis of group differences. (Doctoral Dissertation, University of Idaho, 1985). Dissertation Abstracts International, 46, 1809A.

National Research Council. (1985). Engineering education and practice in the United States: Continuing education of engineers. Washington, DC: Author.

National Research Council, (1985). Engineering education and practice in the United States: Engineering graduate education and research. Washington, DC: Author.

National Research Council. (1985). Engineering education and practice in the United States: Foundations of our techno-economic future. Washington, DC: Author.

News Feature: Abolishment of first phone license could hurt small market radio. (1981, October). Broadcast management/engineering, pp. 119-120.

Ovesen, N. K. (1980). Advances in the continuing education of engineers. Paris, France: UNESCO.

Quaal, W. L. & Martin L. A. (1968). Broadcast management. New York: Hastings House Publishers.

Reinsch, L. J. & Ellis, E. I. (1960). Radio station management. New York: Harper and Brothers.

Rhodes, B. and Bentz C. (1983, October). Broadcasters' salaries: A national survey. Broadcast Engineering, 22-32.

Rhodes, B. and Whitaker, J. (1983, December). Research report: State of the industry. Broadcast Engineering, 96-106.

Ross, J. F. (1980). Handbook for radio engineering managers. London: Butterworth Group.

Rudman, R. A. (1984, January). RENG: Catching up with TV. Broadcast Engineering, 44-51.

Rudman, R. A. (1985, July). When too much is not enough. Broadcast Engineering, 6.

Saale, N. B. (1985). The participation of Nigerian licensed engineers in professional development activities related to management. Dissertation Abstracts International, 47, 0055A.

Sedge, S. K. (1984). A comparison of engineers pursuing alternate career paths (Doctoral dissertation, University of Maryland, 1984. Dissertation Abstracts International, 46, 0690B.

Stashun, L. (1983, December). Fundamental and Product Training for Film and Television Engineers. British Kinematograph, Sound and Television Society Journal, 65 (12), 684-687.

Toffler, A. (1971). Future shock (8th. ed.). New York: Bantam Books.

Time to bury the digital hatchet. (1982, February). Broadcast Management/Engineering, 10.

Whitaker, J. (1987a). Editorial: HDTV at the crossroads. Broadcast Engineering, 6.

Whitaker, J. (1987b). Editorial: People make it work. Broadcast Engineering, 6.

Wright, J. B. (1969). An investigation into public post-secondary electronic technology programs in Texas with implications into planning. College Station, Texas: Texas A & M University. (ERIC Document Reproduction Service No. 034 028).

# APPENDIXES

## APPENDIX A

## SURVEY

## *Broadcast Engineering Survey*

If you work at least half-time as a broadcast technician or engineer please take the time to fill out both sides of this survey and return it to:

John Griffin
2900 E. 6th, #75
Stillwater, OK 74074

The number in the corner is there only to prevent mailing you another survey...it will be cut off when the survey comes back, and no information that you provide here will get back to your employer. However, if you are interested, the results of this survey will be written up for the local SBE newsletters.

1) My primary technical job is...___Full-time ___Part-time ___Contract

2) My job function is...
___Maintenance
___Maint. and Operations
___Maint. and Production
___Maint. and Supervision
___Management mostly
___Other (please specify) ______________________

3) I work mostly in the...
___OKC area
___Tulsa area
___Other areas

4) Please check one that best describes where you work...

___FM Radio (1)
___AM Radio (2)
___VHF Tv (3)
___UHF Tv (4)
___LPTV (5)
___CCTV/CATV (6)
___Production facility (7)

*OR* a combination of______________

and ______________________

*OR* other (please specify)__________

______________________

### *EDUCATIONAL TRAINING AND REIMBURSEMENT*

5) Does you employer have a tuition reimbursement policy? __yes __no

6) How much tuition reimbursement do you receive for taking <u>technical</u> classes.
______percent _____none

7) How much tuition reimbursement do you receive for taking <u>non-technical</u> classes.
______percent _____none

Please indicate if you attended any of the following in the last 12 months and the % of costs that <u>your employer</u> paid...

If you went to any of the following conferences please check "yes" and mark the percentage of the expenses that your employer paid by drawing a line across the percentage line.

* if, for example, your employer paid for three-quarters of your expenses *
* then draw a line between 70 and 80% on the %line. *
* NAB 0%..10%..20%..30%..40%..50%..60%..70%/.80%..90%..100% *
* ✔yes *

8) NAB
___yes 0%..10%..20%..30%..40%..50%..60%..70%..80%..90%..100%

9) SBE CONFERENCE
___yes 0%..10%..20%..30%..40%..50%..60%..70%..80%..90%..100%

10) ITVA
___yes 0%..10%..20%..30%..40%..50%..60%..70%..80%..90%..100%

11) SMPTE
___yes 0%..10%..20%..30%..40%..50%..60%..70%..80%..90%..100%

12) JOHN BATTISON'S RADIO SEMINAR
___yes 0%..10%..20%..30%..40%..50%..60%..70%..80%..90%..100%

13) other...
___yes 0%..10%..20%..30%..40%..50%..60%..70%..80%..90%..100%
please specify____________________

14) I did not attend any conferences in the last 12 mos. ____

Please read each statement below and circle the response that best indicates what you believe about that statement, for example...

SA = Strongly Agree  A = Agree  NO = No Opinion  DA = Disagree  SD = Strongly Disagree

I am a great parent. . . SA (A) NO DA SD

21) People with amateur radio experience make better technicians than those who are trained only in the classroom. SA A NO DA SD

22) A college degree in electronics is very important in broadcast engineering. SA A NO DA SD

23) In broadcasting, practical electronics experience is more important than college training in electronics. SA A NO DA SD

24) College electronics classes are not very helpful to me. SA A NO DA SD

25) I have no problem communicating with those above me in the chain of command. SA A NO DA SD

26) I am underpaid for the work I do. SA A NO DA SD

27) Technical people are not usually called on for advice until it is too late. SA A NO DA SD

28) I prefer to take electronics classes for credit rather than non-credit. SA A NO DA SD

29) I need more basic electronics education. SA A NO DA SD

30) I feel like management listens to what I have to say. SA A NO DA SD

31) I need more advanced electronic theory. SA A NO DA SD

32) I need more practical experience on specialized equipment (vcrs, etc.). SA A NO DA SD

33) The people I work for encourage me to advance myself whenever possible. SA A NO DA SD

34) I could advance in broadcast engineering if I had more math skills. SA A NO DA SD

35) Lack of time at home prevents me from taking more technical training classes. SA A NO DA SD

37) I could get ahead in this business if I had more of the basic skills. SA A NO DA SD

38) Cost is a more important factor than time when I decide to take a technical class. SA A NO DA SD

39) I don't have enough time for technical training after work. SA A NO DA SD

40) My job is like a hobby to me. SA A NO DA SD

41) Supervisory skills are best learned on-the-job. SA A NO DA SD

42) The future of broadcast engineering looks bleak. SA A NO DA SD

43) In broadcasting, on-the-job training is the best way to learn technical skills. SA A NO DA SD

44) Learning new technical skills would not be appreciated where I work. SA A NO DA SD

45) I prefer not to have very much change at work. SA A NO DA SD

46) Engineering people need more training in personal communication skills. SA A NO DA SD

47) Engineering people need more training in written communication skills. SA A NO DA SD

48) Engineers and technicians fail to learn the skills needed to get along well with others. SA A NO DA SD

49) A two-year program of Vo-Tech electronics training is more useful than a college degree in electronics. SA A NO DA SD

50) A college degree of any kind is needed to get ahead in broadcast engineering. SA A NO DA SD

COMMENTS PLEASE . . . about education, training needs, incentive, and what keeps you from being more/better prepared for the work you do.

APPENDIX B

COVER LETTER

Hello broadcast engineers and technicians!

I'm a graduate student at Oklahoma State University, who, as a broadcast technician, sat in on one of the SBE meetings at the National SBE Conference in St. Louis in 1986. The meeting was chaotic, due to many differences among the members. I realized then that planning for educational and training needs could not proceed until more solid information based on the wants, needs and even attitudes of the members became available. The number of "unknowns" had to be reduced in order to make coherent plans.

So now, as a graduate student I am working with the local SBE chapters on this research to reduce the speculation about who the broadcast engineer or technician is, and what he (or she) wants and needs in education and training. This type of study has never been done before, so please give me your valuable input!

This survey was designed to take the least amount of your time, so please fill it out front and back, and return it in the stamped envelope provided, by June 30. If you have comments or explanations please return them with the survey--I want to hear from you.

If you work with another engineer or technician please photocopy this survey and ask them to fill it out. In today's world it takes documentation of needs to get programs promoted, and now is your time to be counted.

Every effort has be made to ensure your anonymity, and nothing you say will be identified with you. So please feel free to be honest, and thank you for taking the time to fill this out.

Sincerely,

John Griffin
2900 E. 6th.#75
Stillwater, OK 74074

## APPENDIX C

## POSTCARD REMINDER

Dear Chief Engineers:

Many of you have already received the Broadcast Engineering Survey in the latest mailing of the SBE newsletter. I would greatly appreciate it if you would ask the engineering staff who did not receive this survey in the SBE newsletter to fill them out and return them, if at all possible (I realize some may be on vacation), by July 5-8. Thank you for very much for your time.

John Griffin, OSU

## APPENDIX D

## POSTCARD TO GENERAL MANAGERS

Dear Sirs:

I am doing a study of broadcast engineers in the state of Oklahoma, your station is included but I haven't gotten a survey back from your engineer. I would appreciate some feedback from you so I can finish this project and also stop wasting postage on possibly non-existent engineers. I need to know whether you currently have an engineer and his correct name.

A) use a contract service____
B) part-time eng.___
C) full-time eng.___
D) his name is:

Thank You

## APPENDIX E

## LIST OF ITEMS WITH OVERALL MEAN RESPONSES AND STANDARD DEVIATIONS

## LIST OF ITEMS WITH OVERALL MEAN RESPONSES AND STANDARD DEVIATIONS

| | | |
|---|---|---|
| 1) | A college degree in electronics is very important in broadcast engineering. | Mean = 2.782<br>SD = 1.050 |
| 2) | In broadcasting, practical electronics experience is more important than college training in electronics. | Mean = 2.310<br>SD = 0.968 |
| 3) | I am underpaid for the work I do. | Mean = 2.391<br>SD = 1.049 |
| 4) | Technical people are not usually called on for advice until it is too late. | Mean = 2.575<br>SD = 1.041 |
| 5) | I prefer to take electronics classes for credit rather than non-credit. | Mean = 2.471<br>SD = 0.860 |
| 6) | I need more basic electronics education. | Mean = 2.782<br>SD = 1.125 |
| 7) | I need more advanced electronic theory. | Mean = 2.149<br>SD = 0.856 |
| 8) | I need more practical experience on specialized equipment (vcrs, etc.). | Mean = 2.241<br>SD = 0.927 |
| 9) | The people I work for encourage me to advance myself whenever possible. | Mean = 2.517<br>SD = 0.987 |
| 10) | I could advance in broadcast engineering if I had more math skills. | Mean = 3.276<br>SD = 0.872 |
| 11) | Lack of time at home prevents me from taking more technical training classes. | Mean = 2.793<br>SD = 1.091 |
| 12) | Electronics is changing too rapidly for the average person to keep up. | Mean = 2.678<br>SD = 1.105 |
| 13) | I could get ahead in this business if I had more of the basic skills. | Mean = 3.126<br>SD = 0.950 |
| 14) | I don't have enough time for technical training after work. | Mean = 2.862<br>SD = 1.080 |
| 15) | My job is like a hobby to me. | Mean = 2.759<br>SD = 1.161 |
| 16) | Supervisory skills are best learned on-the-job. | Mean = 2.943<br>SD = 1.114 |
| 17) | The future of broadcast engineering looks bleak. | Mean = 3.218<br>SD = 1.156 |
| 18) | I prefer not to have very much change at work. | Mean = 3.770<br>SD = 0.851 |
| 19) | Engineering people need more training in personal communication skills. | Mean = 2.322<br>SD = 0.946 |
| 20) | Engineering people need more training in written communication skills. | Mean = 2.425<br>SD = 0.984 |
| 21) | Engineers and technicians fail to learn the skills needed to get along well with others. | Mean = 3.287<br>SD = 0.987 |
| 22) | A two-year program of Vo-tech electronics training is more useful than a college degree in electronics. | Mean = 3.034<br>SD = 1.028 |
| 23) | A college degree of any kind is needed to get ahead in broadcast engineering. | Mean = 3.161<br>SD = 1.119 |

VITA

John Henry Griffin

Candidate for the Degree of

Master of Science

Thesis: A TYPAL ANALYSIS OF OKLAHOMA BROADCAST ENGINEERING PERSONNEL USING EDUCATIONALLY RELATED ITEMS.

Major Field: Mass Communications

Biographical:

Personal Data: Born in Dallas, Texas, July 18, 1947, the son of Billie R. and Gladys S. Griffin. Married to Frances Elaine Kaufman on August 23, 1970.

Education: Graduated from Richland Hills High School, Fort Worth, Texas, in May 1966; received Bachelor of Arts Degree in Radio-Television-Film from University of Houston in December 1973; Completed the requirements for Master of Science Degree at Oklahoma State University in December, 1988.

Professional Experience: Antisubmarine Warfare Technician 2nd. Class, USNR-TAR, New Orleans, Louisiana, 1967 to 1969. Physics Department, North Texas State University, Denton, Texas. KAKE-TV, Wichita, Kansas, 1977-1978. University of Kansas School of Medicine, Instructional Media Department, 1978-1981. Muskingum College, Chief Engineer for WMCO and CATV-8, Muskingum, Ohio, 1982-1984. Oklahoma State University, Television Lab (Graduate Assistant), Audio-Visual Sound Studio, and repair and sales of electronic test and broadcast equipment, 1985-1988.