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**An investigation of the distinguishing characteristics of exemplary trainers
in business and industry in Zimbabwe**

by

Onward Samuel Mandebvu

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

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Major: Industrial Education and Technology

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Iowa State University

Ames, Iowa

1998

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DEDICATION

This
dissertation
is dedicated
to Tracy
and the children:
This is as much for me
as it is for you.
Your love and support
were invaluable.

To Mum and Dad:
Your belief in my capabilities
is the foundation of my achievements.

To my extended family:
You are the team
that made it all
possible.

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ABSTRACT

This study investigated the demographic, psychological, interpersonal, and attitude and belief characteristics that distinguished exemplary business and industrial trainers ($N = 18$) and other trainers ($N = 70$) in Zimbabwe. Additionally, the study investigated whether work experience, academic ability, creativity, trainee-content orientation, and self-perception between the trainers grouped as business, technical, and management trainers significantly differentiated between the groups of trainers. Usable data collected from 88 business and industrial trainers through the Adult Personality Inventory (API), the Attitude and Belief Inventory (ABI), the Trainee-Content Training inventory (T-CT), and the Training Job Competence (TJC) rating scale were analyzed through discriminant analysis and hierarchical linear models. The findings were:

1. Work experience, a demographic variable, was the single largest factor that distinguished exemplary trainers from the rest of the trainers. Exemplary trainers had mean work experience of 16.72 years while the rest of the trainers had a mean of 12.3 years.
2. Creativity was the second best distinguishing factor, and the only psychological factor that significantly differentiated between the two groups of trainers.
3. Trainee-content orientation and attitude towards self were the third and fourth highest distinguishing factors differentiating exemplary trainers from the rest.
4. Academic ability was the fifth best predictor of job performance among the trainers.

5. A trainer's caring and assertiveness characteristics did not significantly differentiate exemplary trainers from the rest of the trainers.
6. There were significant differences between the trainers in terms of their trainee-content orientation and academic ability (with correlations of $r = .81$ and $r = .43$, respectively, with the discriminant function) when the trainers were grouped into business, technical and management trainer categories. Technical trainers showed the highest academic ability and lowest trainee-content orientation.

The implications of the results are discussed within the context of human resources development and organizational performance improvement.

CHAPTER 1: INTRODUCTION

Background

Business and industrial corporations spend a great deal of money, time and energy on training and development of human resources. In the USA, industrial corporations spend over \$45 billion per year on the development of human resources (American Society for Training and Development, 1996; Goldstein, 1993; U.S. Dept. of Labor, 1992). The rapid technological changes of the 1990s and the new management theories of organizational re-engineering (Covey, 1992; Lawler III, 1992; Peters & Waterman, Jr., 1982), learning organizations (Marquardt, 1996; Senge, 1990), total quality management (Goetsch & Davis, 1997; Goldratt, 1992) and high involvement organizations (Lawler III, 1992) have added to the increasing importance of human resources development worldwide.

In today's organizational world, where return on investment is a major concern of management, research on training and development has assumed increased importance. There is more likely a greater concern now about training effectiveness than there has ever been in the past. Studies have been done on training and training effectiveness but they have tended to focus mainly on the pre-training and post-training trainee and organizational factors that impact training effectiveness (Boscalijon, 1995; Legvold, 1990). Other researchers (Goldstein, 1993; McLagan, 1983) have identified factors that are likely to impact training effectiveness in the future, such as changes in demographics of entry-level persons in the workplace, technology changes, shifts from manufacturing to service jobs and the globalization of economies. One foundational element to training effectiveness that is yet to

achieve relative prominence in research on training is the trainer. Given the relative dearth of published research on the role of the trainer in training effectiveness, it would appear as though the question of the quality of the trainer is inconsequential to training effectiveness. This can hardly be the case. There is a need to take a macro and holistic perspective to training effectiveness in which the role of the trainer and the requisite attributes of a competent trainer are viewed as equally important as trainee and organizational factors.

Although some attention has been drawn to the question of qualities of a trainer (McGehee & Thayer, 1961), the attention has not been sustained over time. Nearly 40 years ago McGehee and Thayer commented; "If training is to be effective, considerable attention and careful decision-making must be devoted to the problem of who is to train" (p. 227). McGehee and Thayer concluded that little was known about what it takes to be an effective trainer. Other authors (Fleishman & Mumford, 1989; Ford, 1997; Kozlowski & Salas, 1997; Tannenbaum & Yukl, 1992) have, without naming trainers specifically, called for more studies in, and a wider perspective of, determinants of training effectiveness. Even much less research on the topic appears to have been done in developing countries such as Zimbabwe.

Although no figures are available on human resources development expenditure in Zimbabwe, the assumption may be made that the expenditure on training is rising, given the change in economic climate brought about by the introduction of new economic policies at the beginning of the 1990s. Through these new policies, the economy has been transformed to make it more responsive to market forces and promote higher levels of growth (Zimbabwe Government, 1996). One of the strategies adopted to bring about improved economic growth has been the development of export-oriented industries to produce goods and services that are

competitive on the global market. To facilitate this, the government put in place policies to promote rapid technological transformation of production processes, liberalized exchange control regulations and opened the economy to external competition (Zimbabwe Government, 1996). These economic measures appear to be yielding positive results. The United Nations (1995) reported that by 1993 there was significant growth in the Zimbabwean economy over the 1980 figures (the year of independence) in almost all sectors. The largest gains were registered in finance, insurance, real estate and business services (527.2%), construction (214.9%), the hospitality industry (159.9%) and in manufacturing (116.3%). Such rapid growth and technological change must have had an immense impact on human resource development practices in the country.

It is recognized in other parts of the world such as Germany, Japan and the USA (Goetsch & Davies, 1997), that the key to global market competitiveness for an organization is the development of its human resources. The trainer is one of the critical players in the development of human resources.

Although a great deal of personnel research has been done (Schmidt, Ones, & Hunter, 1992), relatively little research appears to have been done on understanding the factors related to competent job performance as a business or industrial trainer. Personnel research focusing on selection and job performance has concentrated on the military (Campbell, 1990; Hoiberg & Pugh, 1978), the police (Ash, Slora, & Britton, 1990; Cortina, Doherty, Schmidt, Kaufman, & Smith, 1992; Ronan, Talbert, & Mullet, 1977), management and other categories of workers (Furnham & Stringfield, 1994; Gellatly, Paunonen, Meyer, Jackson et al., 1991; Neuman & Nomoto, 1990; Rosse, Miller, & Barnes, 1991; Verbeke, 1994).

The category of human resources that is responsible for the development of human capital in organizations has not yet attracted much research attention. The few research studies done in the area of a trainer's job competence have been in highly industrialized countries (Leach, 1992, 1996; Verbeke, 1994). There is a need to understand the factors that predict job excellence among business and industrial trainers as well as the role of the trainer in training effectiveness in developing countries also. Earlier studies on predictors of job performance (reviewed in the next chapter) provided the variables investigated in the present study.

Statement of the Problem

The problem of the current study was to determine the extent to which selected demographic (level of education, academic ability, work experience and training experience), psychological (extroversion, creativity and enterprise), interpersonal (caring and assertiveness), and belief and attitude (about self, other people, trainees and training content) attributes of business and industry trainers in Zimbabwe predicted trainers' job competence.

Purpose of the Study

The purpose of this study was threefold:

1. Develop a body of knowledge that can be used in the design of reliable instruments for the hiring of business and industry trainers in Zimbabwe. If this study establishes a relationship between the named variables and job competence, then recruitment and selection professionals in Zimbabwe would have a validated body of knowledge that they can use to develop reliable and valid selection instruments.

2. Contribute to the growth of knowledge about training effectiveness in the field of human resources development (HRD). The trainer is an integral and critical player in determining the success of job training. Therefore, establishing the demographic, psychological, interpersonal, and belief and attitude variables that predict job success among trainers would be a significant contribution to the growing body of knowledge on factors affecting training effectiveness and transfer of training.
3. The significant results in this study would also contribute practically to the design of better training programs for trainers. This would be done by identifying key psychological, interpersonal and belief and attitudinal attributes which, when developed in trainers, would improve the probability of excellence in training.

Research Objectives

The objectives for the study were to:

1. Determine the extent to which selected demographic variables (work experience, training experience, academic ability and level of education) predict job competence among industrial and business trainers in Zimbabwe;
2. Determine the extent to which selected psychological variables (extroversion, creativity and enterprise) predict job competence among industrial and business trainers in Zimbabwe;
3. Determine the extent to which selected interpersonal variables (caring and assertiveness) predict job competence among industrial and business trainers in Zimbabwe;

4. Determine the extent to which selected belief and attitude variables (self perception, attitude towards students and trainee-content orientation) predict job competence among industrial and business trainers in Zimbabwe;
5. Determine the extent to which selected research variables differentially predict a trainer's job competence by field of training in Zimbabwe; and
6. Contribute to the development of a profile of the psychological and interpersonal attributes of an exemplary industrial and business trainer for use in selection and training of trainers.

Significance of the Study

It is important that research identifies the attributes associated with job competence in private sector training. As Leach (1996) noted:

Identifying distinguishing characteristics of exemplary instructors will provide a better understanding of their overall character, can provide a potential role model for those interested in careers in private sector training, and may prove useful in the selection of training and development positions. (p. 8)

Additionally, knowledge of the distinguishing characteristics can serve as a guide in the design and redesign of training curricula in institutions that prepare people for positions in training and development. Furthermore, and more importantly, determining reliable predictors of job performance as a trainer, if the results are implemented, will lead to more effective training and better transfer of training. Better transfer of training would contribute to higher job productivity among workers and a better return on investment for business and industry.

Assumptions

The following assumptions were made in pursuit of this study:

1. The research participants provided accurate information.
2. The instruments used had adequate reliability and validity.
3. The sample was representative of the population of trainers in business and industry in Zimbabwe.
4. The uncontrolled variables were uniformly distributed over the sample.

Limitations of the Study

The study was conducted in view of the following limitations:

1. Only trainers from Harare were included.
 2. Only trainers who volunteered were included in the sample.
 3. The demographic characteristics were limited to the four variables including: level of education, academic ability, work experience and training experience.
 4. The psychological characteristics were limited to the three variables including: extroversion, creativity and enterprise.
 5. The interpersonal characteristics were limited to the two variables including caring and assertiveness.
 6. The job competence of the trainers was limited by the interpretation of job competence by their supervisors.
-

Procedures of the Study

The study was conducted based on the following procedures:

1. A research proposal was presented to and approved by the Program of Study committee.
2. Permission to use human subjects in research was obtained from the Human Subjects committee at Iowa State University (ISU).
3. The instruments were tested for reliability and validity in the USA and in Zimbabwe.
4. A purposive sample of companies having training departments in Harare was drawn, from which volunteers were asked to participate in the study.
5. The training managers in the participating companies were requested to rate the job performance of the trainers in their companies.
6. The trainers were asked to provide information on their psychological and interpersonal characteristics by answering the Adult Personality Inventory.
7. The trainers were also requested to provide biographical data and measures of personal beliefs and attitudes on the selected training-related variables.
8. The data from the three sources were analyzed during Spring 1998 at MetriTech, Inc., USA (for the API) and ISU (for the other instruments). The Statistical Package for the Social Sciences (SPSS) computer software (SPSS ver. 6.1 and SPSS standard ver.) and the Hierarchical Linear Model (HLM) 4.01 produced by Scientific Software International were used to analyze the data at ISU.

9. The variables distinguishing exemplary trainers from other trainers and those distinguishing between trainers grouped by the field in which they offered training were evaluated using discriminant function analysis.
10. A profile of the personal and interpersonal attributes of an exemplary business and industrial trainer was developed from the results of the study.

Definition of Terms

In order to create a common understanding of the study, major terms used in the study are defined as follows:

Assertiveness: The extent to which a person is inclined to take charge. People who describe themselves as assertive make active attempts to control situations and usually lead others tactfully and with the approval of the group (Krug, 1996).

Characteristics: Behavioral or physical attributes one possesses that are judged to be important in order to successfully carry out a particular job (Powers, 1992, p. 13).

Caring characteristics: The characteristics of a trainer such as readiness to assist trainees, being warm, trusting, calm and not easily disturbed or upset by what other people do. The trainers seem satisfied with their own lives, and this satisfaction carries over positively into their relationships with others (Krug, 1996).

Creativity: People high on creativity describe themselves as imaginative, sensitive, liberal, and they like to explore new ideas and imaginative ways of doing things (Krug, 1996).

Enterprise: People high on enterprise describe themselves as adventurous, dominant risk-takers who are strongly motivated to succeed in whatever they do. They like jobs that offer challenge and responsibility (Krug, 1996).

Exemplary trainer: A trainer whose job performance consistently meets and exceeds expectations, making her/him a model for others in her/his field. This was measured through six of the nine ASTD's core trainer's competencies (McLagan, 1983) of:

- Delivery of instruction
- Facilitation of learning
- Appropriate use of training media (e.g., chalkboard, flip chart, video, audio, and/or multimedia)
- Relationship building/interpersonal skills
- Feedback skills
- Use of appropriate training techniques (e.g., lectures, role play, outdoor activities, and/or discussion groups)

Three of the ASTD trainer's core competencies—"intellectual versatility," "understanding of adult learning principles," and "use of questioning" were excluded from the measure of training job competence. Intellectual versatility and understanding of adult learning principles were adjudged to be too difficult to operationalize into observable behavior. Use of questioning was excluded from the scale because it was considered amenable to assessment through classroom observation only, and would, therefore, have been difficult for managers to evaluate because of the need to rely on secondary sources of information.

Extroversion: People high in extroversion describe themselves as outgoing and sociable. They prefer the outside world of people and events to the inner world of thoughts and feelings (Krug, 1996). This construct was expanded to include what Krug (1996) called sociability because, based on Krug's definitions of the two constructs, the two terms

appeared to be tapping into the same construct. Krug (1996) noted people who describe themselves as sociable think of themselves as cheerful, enjoy social activities, and being around other people.

Trainer: A person in an organization, at least a third of whose job time is spent in organized efforts directed at improving human performance largely through training interventions. A trainer organizes activities and delivers instruction through which trainees develop in one or more of the following areas: knowledge, skills and attitudes that enhance their performance in a present or future job (Researcher's definition).

CHAPTER 2: REVIEW OF RELATED LITERATURE

Introduction

Training has been an important human activity since the advent of recorded history (Miller, 1987). The social and economic development of the human race has been possible because human beings have the capacity to learn and to apply that knowledge in new situations. Not all learning though is training (Mayo & DuBois, 1987). In the context of industrial organizations, training is "...the formal procedures which a company uses to facilitate employees' learning so that their resultant behavior contributes to the attainment of the company's goals and objectives" (McGehee & Thayer, 1961, p. 3).

Research in the field of training has largely been fueled by the desire to improve training's contribution to the accomplishment of organizational goals. The areas of focus in training research have varied with time. An area within the broad field of training effectiveness that appears to be the focus of much current research attention is the transfer of training (e.g., Ford, 1997). It can be argued that one important component of training effectiveness is the extent that those responsible for the design, delivery, or facilitation of learning in training situations are themselves effective in their work. It is in this light that research on issues related to trainer effectiveness should be viewed. As a foundation to a review of literature in this field, a brief history of the development of business and industrial training is appropriate.

History of Training and Training Research

History's value lies in showing us where we have been, how and why we got there, and in suggesting where we are going. For this reason, it is appropriate that one should take a brief look at the history of industrial and business training, and training research before reviewing literature on the specific focus of this study.

Formal training in industry began during the Industrial Revolution, which itself began in England around 1710, and then spread out to Europe, America and the rest of the world (Bennett, 1926; Miller, 1987). The invention of machines and the establishment of the factory system of production gave rise to the need for large numbers of workers to operate the machines. The old method of skills' training, or apprenticeship, could no longer meet the need for skilled workers. According to Bennet (1926), since the advent of the industrial revolution, people have been looking for alternatives to the old-time apprenticeship form of skills training, in particular in the areas of trade skills training, teaching of trade-related technical knowledge and in the general schooling and moral value training that went with the old-time apprenticeship. Solutions have been sought in schools of all kinds—Sunday schools, part-time schools, factory schools and continuation schools for factory workers.

Further development of technology brought about more changes in the job skills that were needed. The development of assembly line production systems and management philosophies such as Taylor's scientific management theory, created the need for highly defined skills within a narrow range of job performance (Miller, 1987). Other changes significantly impacting training were the World Wars, invention of instructional technology, and developments in training-related disciplines such as instructional psychology, cognitive

psychology and artificial intelligence (Miller, 1987; Pace, Smith & Mills, 1991). These changes have brought about new ways of designing training programs and identifying training needs, new instructional methods and better ways of measuring the effectiveness of training. This has largely come about through research.

Ford (1997) provided a cogent synopsis of the history of research in training. He noted that formal literature on applied psychology and workplace training extends back to the turn of the century, with early studies tying training to management theory development such as Frederick Taylor's theory of scientific management. Comprehensive reviews of training research literature conducted by McGehee (cited in Ford, 1997), Campbell (cited in Ford, 1997) and Tannenbaum and Yukl (1992) have shown that the volume of research on training is increasing. The reviews have also shown that most training in the first half of the century was conducted by foremen and experienced workers, and that areas of research interest have largely been content selection methods, training methods, evaluation of training and application of learning theories to training. In ending their review, Tannenbaum and Yukl (1992) identified areas in training where more research needs to be done. They:

1. called for more incorporation of cognitive science into training;
 2. saw a need for researchers and practitioners to see training within the larger context of organizational change and effectiveness (i.e., they suggested the need to examine pre-training and post-training organizational factors that affect training effectiveness); and
 3. called for more research on how different features of high technology methods can facilitate learning and retention.
-

In addition, a team of training experts that met at Michigan recently called for more research attention to the same areas above, as well as to the need to apply more psychology to training research and practice (Ford, 1997).

It is noteworthy that the issue of who conducts training does not appear to have been investigated in any significant manner in the past. It was neither mentioned in the three major reviews referred to previously nor was it raised by the reviewers as needing research attention. This, however, should not be taken to mean that the question of who conducts training is inconsequential to training effectiveness. McGehee and Thayer (1961) contended that, if training is to be effective, considerable attention and careful decision making must be devoted to the problem of who is to train. They argued further that, although some studies had been done, especially in the military, the outcomes suggested that the quality of instructor made a significant difference to training effectiveness; however, there simply was not enough research evidence to make that conclusion. They concluded: "...we obviously have little reliable data to present on the characteristics of the good instructor in industry. This is a necessary area of research if industrial training is to make a significant contribution to the attainment of organizational goals" (p. 243).

Little appears to have changed since then in terms of research-based knowledge on who is an effective trainer in business and industry. At this point it is appropriate for the present research to examine literature on prediction of job performance that has emanated from business, industrial and educational studies.

Individual Differences and Job Performance

The belief that human beings are differentially endowed with potential and abilities has existed since the early days of humankind. In ancient Greece, Plato set forth a program of managerial selection that categorized people into “guardians,” “auxiliaries” and “workers,” and also proposed methods for the selection and training of members for each category (Katzell & Austin, 1992). The ancient Chinese and the French are also known to have used some form of pre-training selection (DuBios, 1965; Hull, 1928, both cited in Katzell & Austin, 1992). Personnel psychology, in particular, and the discipline of Industrial and Organizational (I/O) psychology, in general, are predicated on the existence of individual differences among people (Aamodt, 1996).

Cognitive ability and job performance

Hundreds, maybe thousands, of research studies have been conducted on personnel selection (Monahan & Muchinsky, 1983). Although many predictor variables, such as intelligence, vocational aptitude, vocational interest and personality have been used, only intelligence (measured as cognitive ability) has demonstrated consistently high predictive validity as a predictor of job performance (Hoiberg & Pugh, 1978; Hunter & Hunter, 1984; Monahan & Muchinsky, 1983). Studies of cognitive ability as a predictor of job performance have suggested that verbal and mathematical ability are the best predictive elements of cognitive ability (Austin & Hanisch, 1990).

Biodata and job performance

It is generally accepted that past behaviors are reliable predictors of future behavior (Schmidt, Ones, & Hunter, 1992). Studies with the police (Ronan, Talbert, & Mullet, 1977), the army (Hoiberg & Pugh, 1978) and industrial and business workers (Ghiselli, 1966) have all shown that biodata are significant predictors of job performance. In their meta-analysis, Hunter and Hunter (1984) observed that biodata has a validity high enough to compare with that of ability. It is, therefore, regrettable as Schmidt et al. (1992) observed, that this method of predicting job performance is under-used.

Personality and job performance

While it makes a great deal of intuitive sense to assume that personality is a major predictor of job performance, the research findings have been inconsistent. Early studies (e.g., Guion & Gottier, 1965; Hedlund, 1965; Locke & Hulin, 1962) concluded that there was little basis for using personality as a predictor of job performance. However, in a watershed meta-analysis in which methodological weaknesses and measurement errors were controlled, Tett, Jackson and Rothstein (1991) showed that there is a consistent but small correlation between personality and job performance ($r = 0.24$). Other studies (e.g., Ones, Mount, Barrick, & Hunter, 1994; Barrick & Mount, 1991; Day & Silverman, 1989; Hoiberg & Pugh, 1978) have come to similar conclusions.

Some researchers have argued that the persistent small correlation between personality and measures of job success can be improved by examining the relationship through individual dimensions of personality, and by basing trait measures on job analysis

information (Day & Silverman, 1989; Barrick & Mount, 1991; Tett et al., 1991; Verbeke, 1994). This line of research has yielded some significant results. However, when looked at together with cognitive ability, personality has not added much incremental validity to the prediction of job success. In a study of the Minnesota Multiphasic Personality Inventory (MMPI) and the Inwald Personality Inventory (IPI) personality scales, Cortina et al. (1992) concluded that, although some dimensions of personality were significantly related to job performance among police officers, personality did not add much above cognitive ability to the prediction of job performance.

Personnel research has been carried out with many job categories. In a review of 394 personnel research studies done over the 29 year period from 1950 to 1979, Monahan & Muchinsky (1983) identified that these studies had been done with semi-skilled , industrial, trades and crafts, service, sales, professional and management personnel. Although many jobs are mentioned by name in these early studies, there is no reference to studies involving industrial and business trainers. The closest category to trainers on which a large body of research literature exists is teachers (e.g., Dunkin, 1987; Kegel-Flom, 1983).

Studies on Effective Teachers

Teaching and training can be argued to be essentially the same thing, the main difference being the immediacy of use of the knowledge and skills gained. While in education the knowledge the learners gain tends to be broad and of long term need, training is the development of knowledge and skills for immediate use that are required to perform an identified task or job. It has been argued that teaching is a generic term for a family of

activities that includes instructing (Smith, 1987). Miller (1995) more specifically stated that, "...the conductor of the learning experience is usually called a trainer, an instructor or a teacher" (p. 55). It, therefore, appears logical to look at literature on teaching as one tries to understand the factors related to success as a trainer.

The teaching profession is one profession where interest in factors determining job success has been long and sustained although the results of the studies have largely been unsuccessful (Gage, 1972; Lacroix, 1987). Alessi (1982) extensively reviewed literature on teaching that shows interest in studies of teaching effectiveness dating back into the 1920s. A persistent interest throughout the studies is a search for the relationship between a teacher's personality and effective teaching. Similar to other fields, the relationship between personality and job performance has not been a clear one. While some researchers (e.g., Levis, 1987) concluded that the studies have been unproductive, others (e.g., Kegel-Flom, 1983) concluded that teacher personality is a major contributor to job success.

In a study of personal and professional traits that influence hiring of beginning teachers, Smith (1995) found that school administrators rated personality factors as very important in their hiring decisions. This suggests school administrators' underlying belief that the teacher's personality is a significant contributor to teaching success. Such personality attributes as enthusiasm, empathy, warmth, flexibility, sense of humor and confidence have been rated as important attributes of teachers (Smith, 1995). Other studies have come to the same conclusion on these attributes of effective teacher.

In a review of 21 studies on qualities of good teaching, Wotruba and Wright (1975) identified that the nine most frequently named effective teacher characteristics were

communication skills, positive attitude, knowledge, organizing ability, enthusiasm, fairness, flexibility, encouraging behavior and good speaking skills. Lowman (1996) identified words most commonly used by college professors and students to describe their memories of their exemplary college professors. He found that the descriptions fell into the categories of intellectual versatility, interpersonal skills, affective disposition and general positive attitude towards life.

A number of methods have been used to identify the characteristics of exemplary teachers. Regarding the reliability of methods used to collect data on exemplary teachers, Centra (1996) found that evaluations by colleagues, chairs, students and deans all had a role to play in identifying the characteristics of exemplary teachers, and that students' and deans' ratings of teachers correlated better than colleague and deans ratings of the same teachers. It thus appears that where one is interested in multiple sources of job performance ratings, combined deans' and students' (supervisors and subordinates, in the case of non-educational settings) ratings can be used to provide reliable measures of job performance.

Feldman (1996) discounted misconceptions regarding the reliability and validity of students' rating of teachers. Richlin and Manning (1996) described the use of teaching portfolios in judging job performance of teachers. The general agreement in the field is that multiple sources of information about the job performance of teachers provide more reliable and valid information than using single sources. Notwithstanding, the research effort so far expended, the relationship between personality and teacher effectiveness, even towards the end of the twentieth century, remains inconclusive.

The Training Trinity: The Human Elements of Training Effectiveness

There is widespread agreement that training effectiveness is a product of a number of factors, chief among them being the characteristics of the trainee, characteristics of the organization as reflected through management and co-workers, and characteristics of the trainer (e.g., Kozlowski & Salas, 1997; Mathieu & Martineau, 1997; McGehee & Thayer, 1961; Rae, 1993; Salas, Cannon-Bowers, & Kozlowski, 1997). While research evidence remains inconclusive on the nature of the relationship between demographic variables and training outcomes (Mathieu & Martineau, 1997), some studies have shown that the training experience, education and motivation levels of trainees are significantly related to training success (Ghiselli, 1966). Organizational characteristics such as manager's support for training, co-worker support and organizational reward systems have also been shown to be related to training effectiveness (Mathieu & Martineau, 1997).. Indeed, there is greater realization now than ever before that, for maximum training benefit, training has to be seen within the broad context of organizational systems theory, where it is as much a part of the organizational strategy as finance, operations and marketing (Kozlowski & Salas, 1997).

The success of training programs in organizations depends on a number of factors. Rae (1993) saw training success as dependent on what he called "the training quintet" (p. 9), of line management, the trainee, the trainer, the training manager and the organization. Legvold (1990), in a study of the effect of post-training strategies on positive transfer of training involving 93 county directors in Iowa, and using pre-training and post-training measures of work performance, found that involving the trainees, trainers and the management brought about better training transfer. In the Legvold study, the trainers were

involved at all levels, including the pre-training, during training and the post-training back-at-work levels.

Philosophical Models of Training Roles

It is an accepted philosophical position in psychology that a person's beliefs about an object, issue or people affect that person's behavior towards the thing or person (Rae, 1993). Trainers, like everybody else, hold beliefs about themselves, other people, organizations and about training-related issues such as the trainer-trainee relationship. Understanding trainers' attitudes towards these, therefore, may help others to understand their behavior, and to identify the behavioral factors that distinguish exemplary trainers from other trainers. There are several philosophical models related to trainer behavior. Two of them are discussed below.

Neuro-Linguistic Programming (NLP)

Developed by a linguist, John Grinder, and a mathematician and student of psychology, Richard Bandler, NLP espouses a person's innate capability of excellence in any field that he or she chooses. It is argued that one's excellence in any field is a product of learned behavior patterns, and that everyone can learn the same patterns if he or she is motivated enough and the relevant information presented in a way which suits the learner (Kamp, 1996). According to NLP, everyone can become excellent in their reactions and responses in any field they choose. Thus, learning new behavior is always possible. The theory is about how to uncover one's own unique way of being excellent.

The operating principles of NLP are a set of beliefs (Kamp, 1996). Among these beliefs are:

1. Everybody has what they need to be wise and excellent.
2. The meaning of one's communication is the response one gets.
3. Unless one knows what one wants, one will not be able to know if one has it.
4. We create our own life stories.
5. To be our most effective, we need to use all of us.
6. The world is a place of abundance.
7. When we are attuned to ourselves and the world around us, magic happens.

The operating principles of NLP have been applied to the field of training. Trainers who use NLP as their guiding philosophy become excellent in their field (Kamp, 1996; O'Connor & Seymour, 1994). Kamp (1996), in her book, *The excellent trainer: Putting NLP to work*, produced a long list of characteristics of trainers, which she grouped under the trainers' beliefs about themselves, other people, about information and about how the world works. Her argument in defining excellent trainers on the basis of their beliefs is that people's beliefs affect their behavior, and that a trainer's behavior towards his/her trainees determines his/her success in training.

The Rae model

Rae (1993) describes a philosophical orientation of trainers that has trainees and content as the two variables determining a trainer's approach to training. The two variables form positively valued axes of the interpretation grid. According to this model, trainers have

an attitudinal orientation towards their job which reflects their position on the grid. A trainer who views his/her responsibilities as the sharing of authority and decision-making with trainees behaves quite differently from one who views his/her job in the traditional educational perspective.

In the traditional educational perspective, the trainer is low on student needs sensitivity and high on task. The trainer views himself or herself as a subject matter expert whose job is the design and delivery of trainer-determined course work. According to Rae (1993), such trainers believe that trainees will learn if they are controlled and given strong direction. Such trainers see their major responsibility as making sure that material gets taught.

The other type of trainer is one who is low on task orientation and high on student needs sensibility (Rae, 1993). Such trainers tend to believe that, although trainees do not really want to learn, they will learn something if they like the trainer. They view their primary responsibility, as winning trainees over so they (the trainees) can be taught. These trainers are overly concerned with meeting the approval of trainees, even when the trainees' wants are at variance with organizational needs.

The ideal trainer is one who highly regards both concern for the trainee and for the subject matter. Such a trainer believes that trainees—like all people—learn and explore. Such a trainer sees his/her responsibilities as the integration of trainee and system needs by creating a positive learning climate and making the learning meaningful and relevant. A trainer's orientation can be established by asking the trainer to respond to a trainee-content training inventory.

Trainers/Vocational Instructors

A great deal has been written about the qualities of effective trainers. Expert opinion on the qualities or the roles and competencies of an effective trainer abounds (e.g., Birnbrauer & Tyson, 1985; DeWine, 1994; Pace et al., 1991; Powers, 1992). The qualities of an effective trainer invariably discussed are that a consummate trainer:

- has expertise and experience in the use of a wide variety of learning delivery techniques.
- is flexible and versatile and open to change.
- takes risks and can submerge ego for the good of the group and the training.
- can generate excitement in training.
- has a sense of humor.
- shows patience, understanding and care for students.
- shows a positive attitude towards life.
- does his/her homework and is a lifelong learner himself/herself.
- shows understanding of adult learning principles.
- appropriately and timely provides feedback to trainees.

Some research studies (Bennett, 1985; Evans & Associates, 1989) have confirmed these qualities of exemplary trainers.

Empirical knowledge on the roles and competencies of trainers and other HRD professionals however remains sparse. Probably the best known study in the USA on the subject is the American Society for Training and Development (ASTD)-sponsored study on the models of excellence in HRD which identified 15 roles and 31 competencies of HRD professionals (McLagan, 1983; McLagan & Bedrick, 1983). Not all trainers though view all these competencies as important. A study by Igbokwe (1989) found that trainers in Iowa considered the five most important competencies to be: (a) presentation skills; (b) understanding of adult learning theory; (c) understanding and application of a variety of training and development techniques; (d) writing skills; and (e) group facilitation skills.

Studies of characteristics of exemplary trainers have also been conducted in professional schools. In a study of clinical instructors at a university school of optometry, Kegel-Flom (1983) found that instructors rated effective by peers and students differed in psychological makeup from the rest. Effective instructors were shown to be intelligent, assertive, conscientious, self-confident, poised, self-assured, sociable, organized and possessed a strong sense of personal worth. On the other hand, a study by Bloom (1995) failed to establish any relationship between personality type and selected demographic and professional variables of college instructors who received teaching awards.

Most of the studies on characteristics of exemplary trainers available to the present researcher were done by one person. Leach, either alone or in partnership with others, has established the demographic, psychological and interpersonal attributes that appear to be associated with excellent performance as trainers. In a study of 204 trainers in Fortune 500 companies, using training managers as raters, Leach (1991a) found that trainers who had been rated excellent by their training managers, differed significantly from the general population on all psychological, interpersonal and, career and life style preferences scales, with the exception of extroversion. In that study, data were collected on a standardized Adult Personality Inventory scale (API) (Krug, 1990). Excellent trainers were found to be stable, calm and secure, sensitive people. They were also shown to be team players, organized, respectful, strongly motivated, sympathetic and pleasant people.

In another study of 250 vocational instructors aimed at identifying the psychological, interpersonal and motivational characteristics associated with excellent secondary level vocational instructors, Leach (1992) found that the vocational instructors were rated above

mean norm values on some psychological dimensions of personality. Compared to national norms, the instructors were rated higher on some personality characteristics (adjustment, enterprise), interpersonal characteristics (caring, sociability, assertiveness), career factors (practical, social, competitiveness) and motivation (accomplishment).

In an identical study, but with vocational instructors in two-year colleges as the sample, Leach (1991b) found the same results. Using the same methodology as Leach (1992), Leach, Evans and Whetstone (1992) compared the demographic, personal, interpersonal, occupational and motivational characteristics of trainers rated excellent in business and industry, two-year post-secondary school institutions and secondary institutions. The study revealed that excellent instructors differed from the general population, turning out to be more calm, intuitive, sensitive, being team players, compassionate and concerned with group standards. Although the researchers concluded that the groups of trainers (i.e., secondary vocational instructors, vocational instructors and business and industry trainers) were more similar than dissimilar, the groups tended to differ from each other, with business trainers being the most extroverted and secondary-vocational instructors being the most disciplined and adjusted.

Using a different methodology—qualitative methodology and critical incidents as the method of data collection, Leach (1996) studied the distinguishing characteristics of exemplary trainers in business and industry. Contrary to expectations, descriptions provided by the research participants revealed only small differences between exemplary trainers and other trainers. No differences were found between self-descriptions of average and exemplary trainers, nor were there large differences in instructional skills between the two groups.

Although Leach did not offer a possible explanation for the unexpected findings, methodological weakness (using *t*-tests with data derived from highly subjective descriptions of critical incidents) could have been part of the cause.

At the end of their study, Leach, Evans and Whetstone (1992) raised a number of questions for further research. They suggested that studies were necessary to: (a) establish whether exemplary trainers differed from their colleagues; (b) establish the threshold competencies reflected by both excellent and average trainers; and (c) identify the discrete competencies that distinguish exemplary trainers from other trainers. The researchers also called for the use of different methodologies, both descriptive and experimental in the study of characteristics of excellent trainers.

There appear to have been methodological weaknesses in the Leach and Leach and associates studies. A single global measure of job performance was used. In addition, the supervisors used their own interpretation of exemplary job performance. This lack of a common understanding of exemplary job performance is bound to have increased variance in job performance measures emanating simply from the lack of a common understanding of the construct. Furthermore, the use of multiple *t*-tests in each of the studies could have led to some false findings (owing to increased α). It is thus desirable to conduct similar studies where the above methodological weaknesses are eliminated.

Summary

This review of the literature has indicated that, while many studies have been done on predictors of job performance, relatively few such studies have been done with trainers in

business and industry. On the other hand, much has been studied about teachers. Teaching and training call for essentially the same personality and professional attributes. The theory of Neuro-Linguistic Programming and the philosophical position presented by Rae (1993) suggest that behavior is a reflection of one's philosophical belief and attitudinal orientation. Professional opinion and the few studies on business and industrial trainers suggest that exemplary trainers are enthusiastic, energetic, open, approachable, concerned, imaginative, humorous people (Kegel-Flom, 1983; Smith, 1995; Wotruba & Wright, 1975). The same studies have also shown exemplary trainers to be disciplined, sociable and assertive. Exemplary trainers also differ from the general population in terms of their ratings on scales for being submissive, uncaring, non-conforming and tough-minded—scoring lower than the population mean on all of these scales. Last, there is a philosophical position that the way one behaves reflects his or her psychological and philosophical makeup. For trainers, this makeup largely determines the way they view their job, and how well they excel in it.

A common practice in business and industry is to hire outstanding technical experts into training positions. A number of authorities (e.g., Chaddock, 1976; Leach, 1996; Miller, 1995) contend that it is not enough for one to be just a subject matter expert. Therefore, one needs to look beyond subject matter expertise in recruitment and hiring practices. Most of the studies reviewed used statistics such as multiple t-tests and analysis of variance to test for differences between exemplary trainers and comparison groups. While these statistical designs have their merits, they may not be the most efficient in using data to explain variances in the dependent variables. In addition, carrying out multiple t-tests with the same two populations increases the probability of type 1 error (i.e., rejecting a correct null

hypothesis). There is a need to know what distinguishes exemplary trainers from other trainers, as well as the need to use powerful statistical designs.

CHAPTER 3: METHODOLOGY

The methodology for this study was a survey, with discriminant function analysis as the statistical technique used to analyze the data. Hierarchical linear models were used to estimate the amount of variance in job performance rating that was due to differences among trainers, managers and industries. According to Borg and Gall (1983), Isaac and Michael (1995), and Fraenkel and Wallen (1996), the survey methodology is an appropriate and economical methodology for the study of relationships. This is particularly the case where, for one reason or the other, it is not possible or it is unethical to conduct an experiment to establish causal relationships.

Population and Sample

The target population for the study was all business and industrial trainers in Zimbabwe, estimated at about 600 (personal communication, Howard Dean, Institute of Personnel Management Zimbabwe, March, 1998). The study was, however, restricted to Harare because Harare is the largest city in Zimbabwe with the largest concentration of businesses and industries in the country. At the time of this research, no comprehensive record of business and industrial trainers in Zimbabwe existed—a situation which precluded the use of random sampling.

Harare companies that had training departments were identified through the Institute of Personnel Management, Zimbabwe's Harare chapter membership register for trainers, and through referrals from other trainers. Questionnaires were then distributed to 160 trainers and their managers in the companies that had agreed to take part in the study. Three companies

with a total of less than fifteen trainers chose not to participate in the study. Ninety-two trainers returned completed questionnaires, 88 of which were usable. The resultant sample was approximately 15% of the population of trainers in the country.

Variables of the Study

There were two types of variables in the study:

1. *Criterion:* The criterion variable in the study was the trainer's job competence, measured through job performance rating by the training manager. The composite score of the trainer's job performance rating in six core instructional skills' competencies of an instructor were used as the measure of the criterion variable.
2. *Independent:* The independent variables were selected trainers' demographic, psychological, interpersonal, belief and attitudinal attributes as provided through trainer self-rating.

Rationale for Rating Trainers on the Basis of Instructional Skills

Although trainers perform a wide variety of job roles and, in spite of the increasing use of long distance and computer-based training, trainer evaluation is still largely based on their classroom skills. In the USA, instructor-led classroom training is still the predominant method of instructional delivery, with the tried and tested methods of books, videos and role plays leading in usage (*Training*, October, 1996). The situation is unlikely to be different elsewhere in the world, more so in less technologically advanced countries.

Instruments

Data were collected through a set of three instruments—two for the trainers and one for the managers. The instruments for the trainers were: i) the Adult Personality Inventory (API)—a standardized psychological instrument, and ii) the Attitude and Belief Inventory (ABI) (See Appendix A). The ABI is a composite scale developed by this researcher to measure attitudinal orientation towards oneself and towards other people, and a trainer's orientation on the trainee-content sensitivity continuum. The scale was made up of 24 attitude and belief items (15 on attitude about self and 9 on attitude about other people) and the 40-item Trainee-Content Training Inventory (T-CT) taken from Rae (1993) with permission from McGraw-Hill Companies. Another instrument developed by this researcher—the Training Job Competence scale (TJC), (See Appendix A) was used by training managers to rate the trainers' job competence. The instrument (with six items) was based on The American Society for Training and Development's core competencies of an instructor. A more detailed description of the instruments is provided below.

Adult Personality Inventory (API)

The trainers' psychological and interpersonal attributes were assessed through the short form version of the Adult Personality Inventory—a normal personality instrument developed and distributed by MetriTech, Inc., in the USA.

The full length API is a 324-item, 21 scale paper and pencil inventory that is used to assess normal range personality characteristics in adults. It has a shortened form that has 189

counseling, personal development and recruitment and selection of personnel (Krug, 1991). The API has been described as an improvement of the well-known 16PF scale developed by Raymond Cattell, with improvements in internal consistency of items in the scales and the grouping together of general ability items which in the 16PF are mixed with non-ability items (Krug, 1991).

The 21 scales in the inventory are divided into three sets: (a) personal characteristics scales (Extroverted, Adjusted, Tough-minded, Independent, Disciplined, Creative, Enterprising); (b) interpersonal characteristics scales (Caring, Adapting, Withdrawn, Submissive, Uncaring, Non-conforming, Sociable, Assertive); and (c) career/lifestyle factors scales (Practical, Scientific, Aesthetic, Social, Competitive, Structured). Additionally, there are four validity scales. Factor analytic studies have shown that the API accurately measures Cattell's normal personality sphere (Bolton, 1985). Some reviewers have called the inventory a modern version of the 16PF scale (Bolton, 1985).

The API can be completed by most adults (Bolton, 1985), having been designed for a fourth grade reading level. It was normed on over 1,000 adults in the USA and has median internal consistency and test-retest reliability of over .80. The average correlation between the long and short form is .88, with individual scale values ranging between .75 and .91 for five of the scales. For an average reader, responding to the short form requires approximately 45 minutes (Krug, 1996). Scoring of the inventory is only by computer.

Attitude-Belief Inventory (ABI)

The self-rating scale for the trainers comprised the first 24 items of the ABI. The instrument was developed by this researcher and was adapted from a detailed description of the attitude and beliefs of an excellent trainer towards oneself and towards learners given by Kamp (1996). All items in the scale are positively stated. According to Borg and Gall (1983), negative scale items should be avoided since there is a tendency for research participants to misread them, resulting in the respondents giving answers or opinions opposite to their real ones.

Trainee-Content Training inventory (T-CT)

This 40-item scale is a forced choice response scale that makes up the second part of the ABI. It requires the respondents to choose between paired statements, in each case with one statement that reflects sensitivity to trainee needs and the other, orientation towards training subject matter. Many of the statements are repeated in the instrument, but each time paired with a different statement. According to Rae (1993), the instrument was first published in 1974 as the Student-Content Teaching Inventory. The third part of the ABI consists of questions requesting demographic data. Included, among others, are: gender, age, level of education, sum of the trainer's high school grades in Mathematics, Science and English, years of working experience and years of training experience.

Training Job Competence scale (TJC)

The TJC is a paper and pencil numerical rating scale used by training managers to rate the trainers' job competence (see Appendix A). The scale is based on six of the nine ASTD core competencies of an instructor (McLagan, 1983). The trainer's core competencies of "intellectual versatility" and "understanding of adult learning principles" were judged to be too difficult to operationalize into observable behavior and were thus excluded from the scale. The competence, "use of questioning," was excluded from the scale because it was considered amenable to assessment through classroom observation only, and would therefore have been difficult for managers to evaluate because of the need to rely on secondary sources of information.

An examination of the ASTD's trainer core competencies shows that the competencies are neither discrete nor mutually exclusive, neither are they all of equal weighting. The three ASTD variables excluded from the TJC do not appear to be the major trainer's competencies. Their exclusion from the rating scale was therefore likely to have only a negligible effect on the validity of the results.

Instrument Development

The ABI and TJC scales were written using an iterative process. The scales were examined for construct and content validity, first by the researcher's team of advisers, and then by a team of experts—American and Zimbabwean—in academia and in business. The external consultants were each sent a cover letter explaining the objectives of the study, the kind of help that was requested of them, and copies of the ABI and the TJC. The researcher-

developed instruments were then modified based on the feedback from each evaluator. Appendix B presents a list of these experts outside the Program of Study committee, as well as the fields of their expertise. The derivation of the ABI and the TJC scales from literature relevant to this study, and the adoption of pre-existing scales also helped to increase the content validity of the instruments.

The instruments were then pre-tested using four groups of people: trainers in business and industry in Ames, Iowa (N = 6); graduate students in the English department at Iowa State University, USA (N = 17); and students and faculty in the Department of Technical Education, University of Zimbabwe (N = 97) (see Table 1). All groups of respondents were requested to respond to the research instruments as well as take the liberty to comment on the clarity of any questions/items in the instruments. Trainers in business and industry in Ames, Iowa, and the faculty in the department of Technical Education, University of Zimbabwe were chosen because their jobs were the same as those of the study population.

Graduate students in English at Iowa State University were selected in order for the pilot testing to benefit from the students' expert knowledge in written communication in English. The TJC was pilot-tested only once because of the difficulty of finding a large enough group of people to evaluate one or more trainers. Bachelor of Education (B.Ed.) students at the University of Zimbabwe were chosen for a number of reasons. They were adults and were certified teachers with several years of teaching experience. They were, therefore, assumed to resemble trainers in business and industry in age, length of work experience and level of education. An additional and equally important reason for using the B.Ed. students was the similarity of their profession to training. Besides responding to the

Table 1. Internal consistency reliability estimates of the instruments in the pilot studies

Scale	Reliability	
	Iowa test	Zimbabwe test
ABI		
Attitude about self	.80 (N=20)	.77 (N=97)
Attitudes about other people	.68 (N=18)	.66 (N=97)
T-CT Inventory	.64 (N=18)	.96 (N=97)
TJC	.82 (N=23)	.89 (N=97)

scale for trainers, the B.Ed. students also rated their instructors, thus they assisted in estimating the reliability of the training manager rating scale.

Subsequent to the pre-testing, the researcher-developed research instrument was modified through the addition of more instructions only. According to Aitken (1996), rating scales characteristically tend to have lower reliabilities than achievement or intelligence tests. Aitken (1996) further argued that rating scales with reliabilities as low as .65 still make significant contributions to understanding the issues under investigation. For these reasons, material modification of the ABI was considered unnecessary.

Data Collection Procedure

Prior to data collection, the research-designed instrument and the plan for data collection were reviewed and approved by the major professor associated with this study. Then it was submitted for approval by the Human Subjects Review Committee at Iowa State

University to ensure that the rights and welfare of the human subjects were adequately protected, risks were outweighed by the potential benefits and expected value of the knowledge sought, confidentiality of data was assured, and that informed consent was obtained by appropriate procedures. The signed approval form is shown in Appendix C.

Data were collected through researcher visits to business and industrial organizations. Telephone appointments were first made with training managers for the purpose of seeking their organization's participation in the study. With permission given, the researcher then personally distributed the research instruments to both the managers and trainers, taking the opportunity to invite the trainers to participate in the study and to explain the requirements of the exercise, even though a cover letter was also included in the package of instruments.

Training managers rated the trainers' job competency. To ensure the anonymity of the trainers' responses, managers were requested to write their trainers' names on a form after which the researcher gave each trainer a code number taken from a table of random numbers. Questionnaires were then coded before distribution to the trainers.

To encourage participation, a raffle drawing, with three prize monies of US\$50.00, US\$30.00 and US\$20.00 was organized for the participants. An entry card to the raffle drawing was distributed with the questionnaires. Participants returned the filled-in entry card with their completed questionnaires. In addition to the raffle drawing, an appeal was also made in the cover letter to the trainers' patriotic sentiment by inviting them to participate in the building of knowledge that could be used in their country. According to Borg and Gall (1983), the use of raffle drawings and appealing to the patriotic sentiments of the research

participants are legitimate practices that research has shown to have a positive effect on rates of participation in studies.

Questionnaires were distributed to a total of 160 trainers and their managers. Arrangements were also made for the researcher to collect the completed questionnaires. Participants who did not have their returns ready on the agreed upon date were given additional time, roughly one week. After rescheduling at least two times with some participants, 92 trainers (57.5% of the accessible population) and 30 training managers returned completed questionnaires. The number of trainers rated by each manager varied from one to eight.

Modification to the Original Research Design

In the original research plan, data were also to be collected from the trainers' trainees. Once in the field, however, it proved difficult to access most trainees during company time. As a result, the trainees' rating of the trainers' job competence was dropped from the study.

Data Analysis

The main question addressed by the study was: What are the distinguishing characteristics of exemplary trainers? The review of literature indicated a number of factors that have been found to be related to job competence. The main purpose of this study was to test the extent to which these identified factors predicted job competence among trainers. The specific research objectives were to:

1. determine the extent to which selected demographic variables (work experience, training experience, academic ability and level of education) predict job competence among industrial and business trainers;
2. determine the extent to which selected psychological variables (extroversion, creativity and enterprise) predict job competence among industrial and business trainers;
3. determine the extent to which selected interpersonal variables (caring and assertiveness) predict job competence among industrial and business trainers;
4. determine the extent to which selected belief and attitude variables (self perception, attitude towards students and trainee-content orientation) predict job competence among industrial and business trainers;
5. determine the extent to which selected research variables differentially predict a trainer's job competence by field of training; and
6. develop a profile of the psychological and interpersonal attributes of an exemplary industrial and business trainer for use in selection and training.

Data were analyzed using discriminant function analysis (DFA) to answer the research objectives, and hierarchical linear models (HLM) to determine the partition of variance in training job competence between trainers, their managers and the fields of training in which the trainers worked.

Rationale for using Discriminant Function Analysis

The choice of statistical procedures used in a study depends on the research question. Where the purpose of the study is to identify factors by which given populations of research

units differ, discriminant function analysis, (DFA) or (DISCRIM), is one of the statistical tools to consider. According to Tabachnick and Fidell (1983), "The primary goals of DISCRIM are to find the dimension or dimensions along which groups are maximally different and to predict membership on the basis of those predictor variables used to create the dimensions" (p. 294). In real life, research is rarely confined to one trait or attribute and its relationship to a grouping variable. Data sets typically involve measures on a number of variables (chosen either on the basis of theory or expert opinion), or on the basis of which group differences are investigated (Huberty, 1994). Where the grouping variable is nominal or dichotomous, discriminant function analysis is an appropriate statistical tool for data analysis.

Prior to the use of DFA, exploratory data analyses were carried out to check whether there was evidence of serious violation of the assumptions underlying the chosen statistical procedures, and where such violation was found, to decide on the appropriate corrective measures to take.

Rationale for using the Hierarchical Linear Model

In the preface to a book on the use of multilevel statistical analysis in education, Bock (1989) stated:

The information needed to guide educational improvement requires not only accurate information of student performance, but also knowledge of how that performance is influenced by factors over which policy makers and administrators have some control. These factors undoubtedly act at more than one level—in the guidance of individual students, through the activities of teachers in the classroom, as effects of school organization and programs, in response to staffing and resource allocation at the district level, and following upon local and state directives for the school system as a whole. To identify

and predict these influences requires the statistical modeling of variation and relationships at each of these levels. Although some analytical methods for this purpose already exist for balanced hierarchical sampling designs, they are not directly applicable to the typically irregular designs of educational field research, nor do they easily accommodate the fallible measures that educational tests and indicators provide. (pp. xi-xii)

Although the above citation pertains to an educational setting, one can clearly see the similarity of the situation to the difficulties of the measurement of job competence among trainers in business and industry. Trainers are the measurement units within which job competence lies. However, the variance in job performance among trainers is invariably a function of not only individual differences among trainers, but also of the supervisors who do the job rating, the organizations in which the trainers work, and possibly the industry in which their organization is found. Therefore, there is need to find statistical tools appropriate for analyzing nested data so that the relative contribution of each nesting to variance in job performance can be estimated. HLM models are one such statistical design (Bryk & Raudenbush, 1989). Writing in support of the use of multilevel analysis models, Bryk and Raudenbush (1989), contended that the continued use of single level models of data analysis, leads to many spurious inferences. Field (1997) also provided extensive citations and references in support of the use of multilevel analysis techniques, HLM specifically, in dealing with nested data.

Selective use of Data from the API

As indicated previously, psychological and interpersonal characteristics of the trainers were limited to selected variables. For this reason only the data from the scales of the API were used in the present study. Although items in the API were not grouped according to

sub-scales, the marketers of the scale provided reliabilities of each sub-scale together with results of data analysis, thus allowing for independent use of the sub-scales. This selective use of data from standardized scales is not without precedent (Centra, 1994). The results of the data analysis are presented in Chapter 4.

CHAPTER 4: ANALYSIS AND RESULTS

Introduction

The results of the data analysis are presented in this chapter. The reliabilities of the instruments are reported first, followed by the sample. Reported next are the results of exploratory data analysis conducted on the sample data to test the tenability of the assumptions underlying the statistical design of the study. Presented last are the results of the data analysis.

Reliability of the Research Instruments

According to Aitken (1996), the acceptable level of reliability of an instrument depends, among other things, on the extent of knowledge that already exists on the research area. Where a great deal of knowledge already exists, a high instrument reliability is required. On the other hand, where little is known an instrument with a reliability of .65 can still be adequate. In light of this position, the instruments used in this study (pilot study reliabilities of which were reported in Chapter 3) were considered to have adequate reliability. Table 2 shows the reliabilities (Cronbach's alpha) of the Attitude and Belief Inventory (ABI), Trainee-Content Training Inventory (T-CT), and Training Job Competence (TJC) instruments as estimated for the present study. The "Attitude about self" sub-scale had the highest reliability (.93, N=88) whereas the T-CT Inventory had the lowest (.77, N=88). The number of respondents for the TJC was 75 because of missing data.

Table 2. Reliability estimates of the instruments used in the study

Scale	Reliability
ABI	
Attitude about self (15 items)	.93 (N=88)
Attitudes about other people (9 items)	.80 (N=88)
T-CT Inventory (40 items)	.77 (N=88)
TJC (6 items)	.88 (N=75)

Reliability estimates of the API

As reported previously, the first time the API was used in Africa was with the present study. For this reason it is important that the reliability estimates from the Zimbabwean study be compared to reliability estimates from American studies. Such a comparison suggests the level of caution to be exercised in interpreting the findings of the present study in terms of the extent to which the instrument may have a cultural bias.

Krug (1996) reported internal consistency reliability (alpha) estimates of the short form of the API from two American studies. Table 3 presents these and the Zimbabwean estimates of the instrument's reliability. The extroverted (.86 vs. .85, .82); creative (.70 vs. .77, .72) and assertive (.81 vs. .85 & .80) sub-scales of the short form of the API appear to have comparable reliability estimates in the Zimbabwean and American studies, while there appear to be differences in the reliabilities of the enterprise (.33 vs. .63 & .51) and caring (.54 vs. .75 & .71) sub-scales. Because of very low reliability ($r = .33$), the sub-scale "Enterprise" was dropped from further data analysis.

Table 3. Reliability estimates of the API from American and Zimbabwean studies

API sub-scale	American		Zimbabwean
	(1)	(2)	
Extroverted	.82	.85	.86
Creative	.77	.72	.70
Enterprise	.51	.63	.33
Caring	.71	.75	.54
Assertive	.80	.85	.81
N	(281)	(612)	(88)

Although the Zimbabwean sample (N=88) was comparatively smaller than in the other studies (N = 612, N = 281) (a situation that tends to make the results of such a comparison less meaningful), omitting the comparison would leave the reader without any idea of the comparative consistency of the results obtained on the API. It should also be noted that the reliability of the enterprise sub-scale was also low in the American studies which may be indicative of deficiencies in this sub-scale of the API.

Demographic Characteristics of the Sample

Of the 92 trainers who responded to the questionnaires, 4 returned responses that were not usable resulting in a sample of 88 respondents. The majority of the trainers (76.1%, N=67) were male, with females making up 18.2% (N=16). Five trainers (5.7%) did not indicate their gender.

The ages of the trainers ranged from 23 years to 65 years, with a mean age of 37.25 years (SD = 8.53). The majority of the trainers (N=60) were between 30 and 49 years of age. Table 4 shows the distribution of the trainers by age category.

Table 4. Distribution of trainers by age

Age category	Frequency	Percent	Cumulative percent
20-29	14	15.91	15.91
30-39	40	45.45	61.36
40-49	20	22.73	84.09
50 and over	6	6.82	90.91
Missing data	8	9.09	100.00
Total		88.00	100.00

Mean = 37.25; SD = 8.53

Of the 88 trainers with usable data, 40 had graduated with a Baccalaureate or Masters degree, and another 40 had Zimbabwean "O" or "A" levels of education (see Table 5).

Twenty-two of the trainers without university education had "O" level education (equivalent to a High School Diploma) and 18 had "A" level education (equivalent to the first two years of a four-year degree program). The majority of the university-educated trainers had a baccalaureate degree (N = 24). Among the trainers with college degrees (see Table 6), the majority had either a social science degree (N= 15) or a degree in education (N=11)

Table 5. Distribution of trainers by education

Educational level	Frequency	Percent	Cumulative percent
"O" level	22	25.00	25.00
"A" level	18	20.46	45.46
Baccalaureate degree	24	27.27	72.73
Master's degree	16	18.18	90.91
Missing data	8	9.09	100.00
Total		88.00	100.00

Table 6. Distribution of university-educated trainers by degree type

Degree type	Number
Social Science	15
Education	11
Engineering	7
Business	4
Computer Science	2
Law	1
Total	40

There was a big range in the number of years trainers had been at work, ranging from 1 year to 50 years, with a mean of 14.31 years, a median of 13.50 and a standard deviation of 9.09. As shown in Table 7, the majority of the trainers had more than 10 years of experience working.

Training experience among the trainers ranged from 4 months to 30 years. Thirty-eight of the trainers had five or less years of job experience as trainers, and the majority (N=64) of the trainers had 10 or less years of experience as trainers (see Table 8).

Trainers were asked to name the field in which they offered training, on the basis of which they were then classified. Forty were business trainers, 26 were technical trainers and 22 were management trainers (see Table 9). The business category included trainers who offered training in such skill areas as insurance, computers, accounting, marketing, banking, and general business courses. Management included all courses that had to do with leadership, conflict resolution, change management and trust-building. All courses that were aimed at improving the technical competence of trainees in industry, such as in aircraft

Table 7. Distribution of trainers according to years of experience working

Category	Number	Percent	Cumulative percent
1-5	11	12.15	12.50
6-10	21	23.87	36.37
11-15	22	25.00	61.37
16-26	14	15.91	77.28
20-25	10	11.36	88.64
26 and over	5	5.68	94.32
Missing data	5	5.68	100.00
Total	88	100.00	

Mean = 14.33; SD = 9.09; Min = 1; Max = 50

Table 8. Distribution of trainers by years of training experience

Category	Number	Percent	Cumulative percent
Up to 5 years	38	43.18	43.18
6 to 10 years	26	29.55	72.73
11 to 16 years	13	14.77	87.50
Above 16 years	5	5.68	93.18
Missing data	6	6.82	100.00
Total	88	100.00	

Mean = 7.55; SD = 5.94

maintenance, telephone system maintenance, and automobile assembly, were grouped as technical. Owing to the difficulty of trying to collect missing data in Zimbabwe from the USA, and because of a desire to use as much of the collected data as possible, a decision was made to randomly assign two of the six trainers for whom data was missing, to each of the three categories of trainers.

Table 9. Distribution of trainers by field in which they offered training

Category	Number	Percent	Cumulative percent
Business	40	45.45	45.45
Management	22	25.00	70.45
Missing data	26	29.55	100.00
Total	88	100.00	

Performance on the API

The API on which the trainers' psychological and interpersonal attributes were measured had not been used in Africa before (telephone communication with MetriTech marketing manager, July, 1997). Therefore, it was necessary that the trainers' performance on the scale be compared with the performance of the norming population. The norming population were Americans aged 16 years and older, with a reading ability of fourth-grade and higher (Krug, 1996). According to MetriTech (personal communication, May 1998), the mean performance of the norming population on all the personality and interpersonal variables was set at 50.00 with the standard deviations set at 10.00. Table 10 displays a comparative analysis of the sample's means and standard deviations from the study versus those of the norming population on the API sub-scales of interest in this study. The Zimbabwean sample had a higher mean score for creativity ($M = 53.44$, $SD = 10.59$) and lower mean scores in caring ($M = 44.88$, $SD = 10.29$) and assertiveness ($M = 47.26$, $SD = 10.52$). There were no significant differences between the Zimbabwean sample and the norming population in terms of their extroversion ($M = 49.94$, $SD = 11.18$). Note that

Table 10. Means, standard deviations and variances of study sample on API sub-scales

Variable	Mean	SD	Valid t	p (t)	N
Extroverted	49.94	11.18	-.05	.96	88
Creativity	53.52	9.66	3.46	.00	88
Caring	44.88	10.29	-4.72	.00	88
Assertive	47.26	10.52	-2.28	.02	88

according to the literature (Leach, 1991a), trainers are expected to have higher values in the above characteristics than the general population on which the API was normed.

Exploratory Data Analysis

The research data were tested for any serious violations of the assumptions underlying the use of discriminant function analysis. However, before reporting the tests on the assumptions underlying the use of the chosen statistical procedures, it is appropriate to discuss the issue of missing data and outliers, and the measures taken to address them.

Dealing with missing data

Missing data is the bane of nearly all research (Tabachnick & Fidell, 1983) and this study was no exception. In discussing this problem, Tabachnick and Fidell stated: "One of the nastiest problems in data analysis is that of missing data. ... Unfortunately, there are as yet no firm answers to questions regarding how much missing data can be tolerated for a sample of a given size" (p. 68). Tabachnick and Fidell further argued that, when the missing data points are randomly distributed among variables in the data set, the impact of missing data on interpretation of research results is rarely serious. They advised that a reasonable way

to proceed when faced with the problem is to test the effect of the missing data in the variables considered critical to the study.

In the present study, and based on earlier studies, academic ability was considered a major variable in predicting job competence among the trainers. However, it turned out to be the variable with the largest number of missing data points (N=21), probably due to respondents' perception that this particular item was intrusive. The magnitude of the number of missing data necessitated testing for differences on other variables between the responding participants and the non-respondents, with a view to determining whether the mean academic ability score for the rest of the sample could be substituted for the missing data. A categorical variable, "ACADEMAB" (academic ability), was created with values "0" for non-response and "1" for a response to the variable, and then used in a multivariate test for differences on psychological and interpersonal variables between trainers who had provided data on their academic ability and those who had not. Johnson and Wichern (1992, p. 239) provided the formula for the Hotelling's T^2 statistic used for testing for differences between two populations based on a number of variables. Table 11 presents the mean values of the two groups of trainers on the psychological and interpersonal variables. The multivariate test of differences showed that the chi-square for samples ($\chi^2_{5(\text{Obs})} = 2.36$) was less than the critical chi-square distribution ($\chi^2_{5(0.95)} = 11.07$), indicating that there were no significant differences between the two groups in their psychological makeup.

Table 11. Means of the psychological variables for the respondents and non-respondents to academic ability

Variable	Mean for respondents	Mean for non-respondents
Assertiveness	4.91	4.94
Caring	4.40	4.81
Creativity	6.25	6.17
Enterprise	6.40	6.38
Extroversion	5.43	5.67

$$\chi^2_{5(\text{Obs})} = 2.37, \chi^2_{5(0.95)} = 11.07$$

Missing data can be treated in a number of ways. Tabachnick and Fidell (1983) suggested treating missing data as an additional variable, deleting cases or variables with missing data points, using pairwise deletion of data, or estimating the missing data. For the current study, a decision was made to estimate the missing data. The mean value per variable for each sub-category of trainers (i.e., business, technical and management) was entered for the missing values. The justification for this approach was that the mean of the sub-sample (based on a logical grouping variable) in which the case is found tends to be a more accurate estimate of the missing value than the mean of the whole sample (Tabachnick & Fidell, 1983).

Detecting outliers and reducing their effect

Outliers are extreme values occurring at one or both ends of a distribution that tend to unduly influence correlation coefficients, the average value for a group, or the variability of scores within a group (Tabachnick & Fidell, 1983). As such, it is desirable that one checks for outliers in one's data set before proceeding to carry out statistical analyses. Appendix D

shows the output of an analysis of the data to check for, among other things, cases that might be classified as outliers. It did not appear that the outliers were due to recording errors during data capture. More likely, the outliers were due to the respondents' misunderstanding of some items on the questionnaires. For the number of outliers for each variable, see the stem and leaf distributions in Appendix D.

The outliers were corrected by replacing them with raw scores, either immediately above or below them, depending on which end of the distribution the outlier was found. The advantage of this option of handling outliers is that the deviancy of a case is preserved without allowing the deviancy to perturb correlations (Tabachnick & Fidell, 1983).

Normality of distribution of the variables

One of the assumptions of multivariate statistics is normality of distribution of the variables. Table 12 shows tests of univariate normal distribution of the study variables. Stem-and-leaf distributions, boxplots and normal Q-Q plots were also used to check normality of distribution among the study variables (See Appendix D). In reference to histograms, frequency tables and stem-and-leaf distributions Howell (1992) remarked:

Although both histograms and frequency distributions are commonly used methods of presenting data, each has its drawbacks. Histograms usually portray grouped data, thus losing the actual numerical values of the individual scores within each interval. Frequency distributions, on the other hand, retain the value of the individual observations but often are difficult to use when they do not summarize the data sufficiently. An alternative approach that avoids both these problems is known as a stem-and-leaf display (p. 19).

Howell (1992) further observed that boxplots "...are particularly handy for screening data for errors and for highlighting potential problems before subsequent analyses are carried out" (p. 51). Boxplots achieve this by revealing outliers that may be in a data set. The other

technique, stem-and-leaf distribution, allows the reader to “eyeball” the distribution to determine if the distribution appears to be normal.

According to Norusis (1989, p. 247), when a K-S (Lilliefors) statistic has a significance greater than .2000, then the assumption of normality of distribution of the variable can be safely made. This assumption was found tenable in seven of the independent variables used in this study: Assertiveness, Attitude towards students, Caring, Creativity, Extroversion, Trainee-Content orientation, and Work experience (see Table 12). The assumption for normality of independent variables is not, however, a requirement for discriminant function analysis. On this issue of assumption of normality, Tabachnick and Fidell (1983) stated:

Table 12. K-S (Lilliefors) tests of normality of distribution of independent variables

Variable	K-S (Lilliefors) Statistic	Significance
Academic ability	.1522	.0000
Assertiveness	.0542	>.2000
Attitude toward self	.0875	.0928
Attitude towards students	.0704	>.2000
Caring	.0564	>.2000
Creativity	.0650	>.2000
Education	.1845	.0000
Extroversion	.0622	>.2000
Trainee-Content orientation	.0821	>.2000
Training experience	.1104	.0099
Work experience	.0775	>.2000

df = 88

In factor analysis, in canonical correlation, and in the dependent variable in multiple regression with continuous independent variables, the assumption refers to the variables themselves if significance tests are to be applied. In the other procedures—MANOVA, discriminant function analysis, and ANOVA applications of multiple regression where inference regarding mean differences among groups is the goal—the assumption refers to sampling distributions of measures of central tendency. Actually, it is the sampling distribution at every level of the continuous independent variables for which the dependent variable is to be normally distributed in multiple regression, but the assumption is untestable. Therefore a conservative requirement is normality of the dependent variable overall. (p. 77)

Although in this study the normality assumption has also been tested with the independent variables, this is more as a measure of building confidence in the interpretation of the research results than it is to meet the requirements of the chosen statistical procedures. The test for the normality assumption of the dependent variable, which is a requirement for discriminant function analysis, was done through a P-P plot and was found to be tenable (see Figure 1). The P-P plot shows the plotting of standardized regression residuals against predicted residuals. Where the dependent variable is normally distributed, the observed residuals plot on or along the straight line.

Tests of bivariate linear relationships between explanatory variables and the dependent variable

Matrix scatter plots were used to test for a bivariate linear relationship between each explanatory variable and the dependent variable (Figures 2 - 5). Interpretation of the scatterplots was a matter of judgment—judgment that was based on the amount of observed spread of the plots along an imaginary line best fitting the data distribution. To understand the relationship between the dependent variable and each explanatory variable, one looks at the last row in the figure. In Figure 2, for example, the relationship between job performance and each of the demographic variables is shown in the box in the same column as the

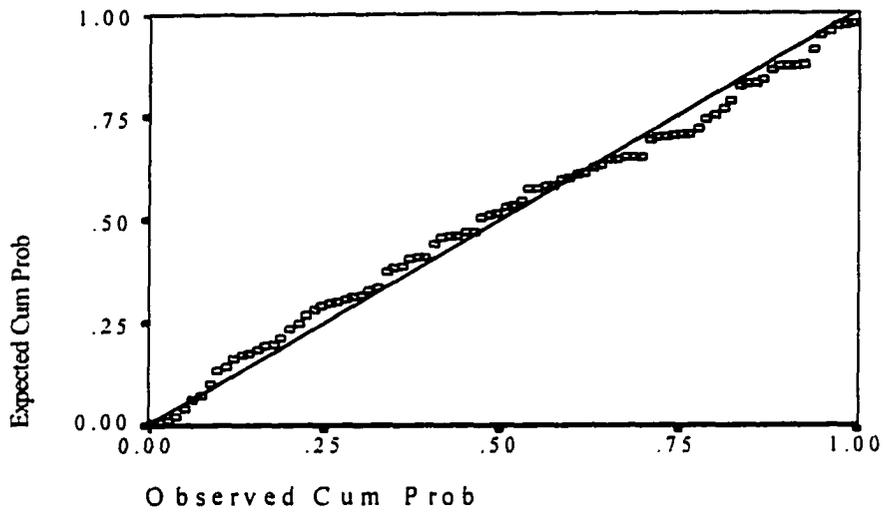


Figure 1. P-P plot of standardized regression residuals

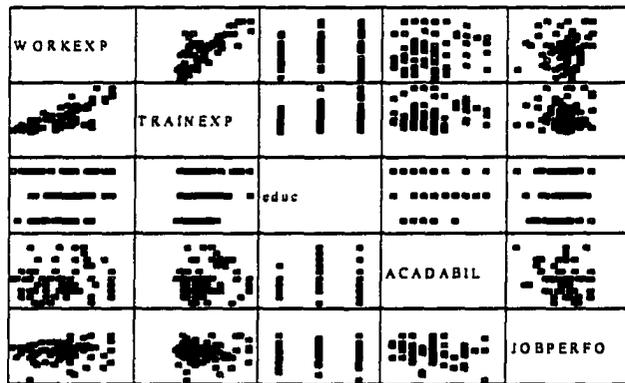


Figure 2. Bivariate linear relationship of demographic variables with job performance

explanatory variable. There appeared to be evidence of a linear relationship between job performance and all the demographic variables except "education" (see Figure 2). Education was a categorical variable, hence the row-like nature of its distribution. Work experience appeared to have the strongest relationship with job performance, judging from the density and linear spread of the scatterplot.

The relationship between the psychological variables and job performance appeared more pronounced, in particular, between creativity and job performance (see Figure 3). The correlation matrix (see Table 13) confirms this relationship ($r = .33$). Figures 4 and 5 show similarly pronounced linear relationships between job performance and interpersonal and attitudinal variables.

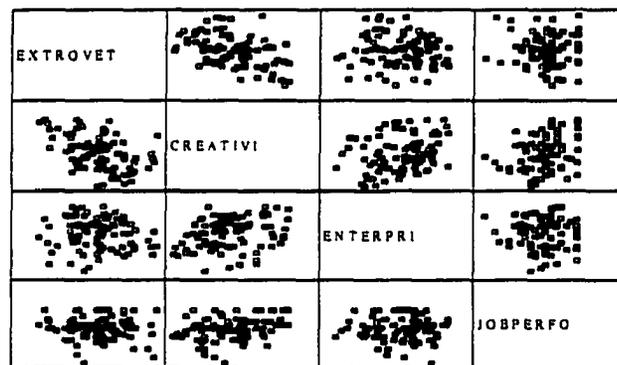


Figure 3. Bivariate linear relationship of psychological variables with job performance

Table 13. Pearson correlation matrix for the 12 variables

	WE	TE	EL	AA	ASE	ATS	TCO	EXT	CRE	ASR	CAR	JP
WE	1.000											
TE	.767**	1.000										
EL	-.036	.054	1.000									
AA	.160	.027	-.083	1.000								
ASE	.026	.033	.030	-.038	1.000							
ATS	-.067	-.128	.239*	.077	.536**	1.000						
TCO	.037	.034	.344**	.004	.218*	.306**	1.000					
EXT	-.077	-.044	.033	.122	.191*	.102	.241*	1.000				
CRE	.088	.092	.286**	-.156	-.066	.063	.038	-.459**	1.000			
ASR	.028	.012	-.053	.133	.341**	.136	.282**	.761**	-.487**	1.000		
CAR	.087	.065	-.060	.144	.254**	.201*	.311**	.239*	.364**	.803**	1.000	
JP	.169	.101	.132	-.199	.191*	.178*	.236*	-.071	.333**	-.070	.127	1.000

N=88

* Significant at $\alpha = .05$ (2-tailed).

** Significant at $\alpha = .01$ (2-tailed).

Key: WE = Work Experience
TE = Training Experience
EL = Education Level
AA = Academic Ability

ASE = Attitude toward Self
AST = Attitude toward Students
TCO = Trainee-Content Orientation
EXT = Extroversion

CRE = Creativity
CAR = Caring
AST = Assertiveness
JP = Job Performance

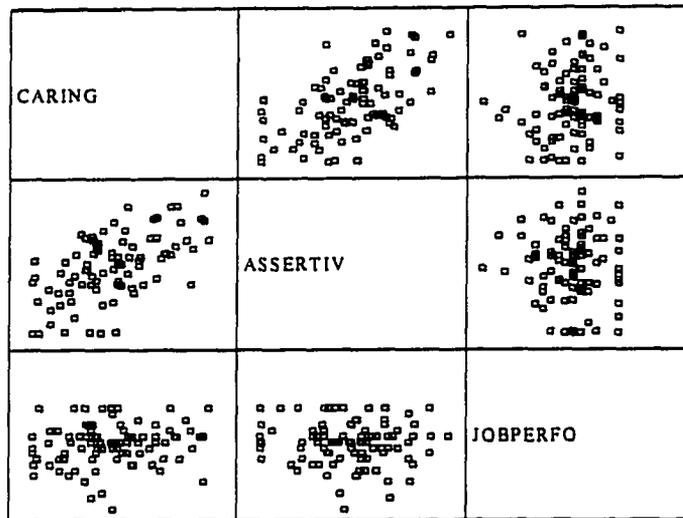


Figure 4. Bivariate linear relationship of interpersonal variables with job performance

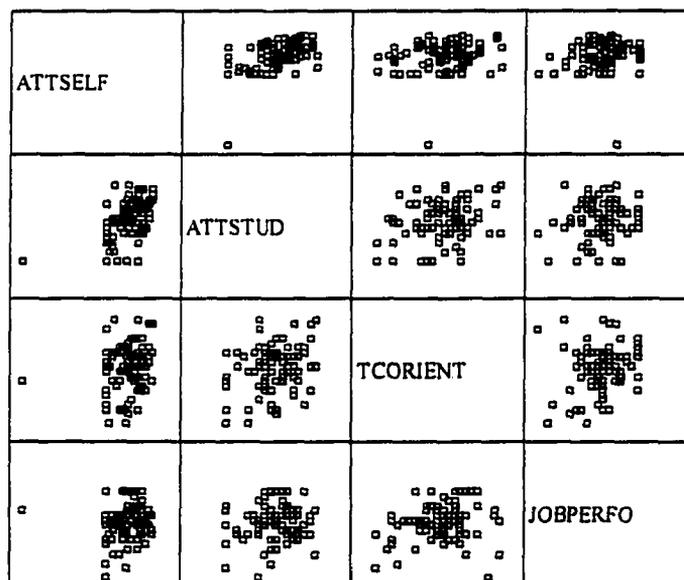


Figure 5. Bivariate linear relationship of attitudinal variables with job performance

Distribution of values of the dependent variable

The dependent variable, job performance, was measured through training manager ratings, using a 5-point Training Job Competence rating scale (See Appendix A). The minimum score was 12 the maximum score was 30 and the mean job performance score was 24 (See Table 14).

Table 14. Descriptive statistics on job performance scores

Mean	Median	Mode	SD	Minimum
24	24	25	3.81	12

Partitioning of variance in Job Competence scores

Hierarchical Linear Modeling (HLM) was used to investigate the relative partitioning of variance in job performance among trainers, training managers, and industries. Scores on the research variables were standardized across the sample before the HLM analysis was conducted. Standardizing the scores removed the risk of over-weighting some variables in the analysis.

The outcome job competence score at each level was modeled as a mean plus a random error component. Table 15 shows the number of data cases used at each level of the model. Bryk and Raudenbush (1992) provided formulas for use at the three levels of the HLM.

Table 15. Number of level 1, 2, and 3 data cases in the HLM analysis of the Training Job Competence scores

Level	Data case	Training Job Competence score
1	Trainers	88
2	Training managers	30
3	Industries	3

Level-1 Unconditional Model. Within each organization, the trainer job performance scores are modeled as a function of a training manager's mean plus a random trainer-level error:

$$Y_{(ijk)} = \pi_{0(jk)} + e_{(ijk)},$$

where:

$Y_{(ijk)}$ is the Training Job Competence score of trainer i under manager j and industry k .

$\pi_{0(jk)}$ is the mean Training Job Competence score for training manager j and industry k .

$e_{(ijk)}$ is a level-1 random effect that represents the deviation of trainer ijk 's score from the training manager's mean score. These residual effects are assumed to be normally distributed with a mean of 0 and a variance of σ^2 .

Level-2 Unconditional Model. Each training manager's mean Training Job Competence score $\pi_{0(j)}$, in level-1 model can be viewed as an outcome varying randomly around some industry mean Training Job Competence score:

$$\pi_{0(j)} = \beta_{00(k)} + \Gamma_{0(jk)},$$

where:

$\beta_{00(k)}$ is the mean Training Job Competence score in an industry.

$r_{0(jk)}$ is a level-2 random effect that represents the deviation of training manager jk 's score from the industry mean score. These residual effects are assumed normally distributed with a mean of 0 and a variance of τ_{π} .

Level-3 Unconditional Model. Each industry mean Training Job Competence score, $\beta_{00(k)}$, in the above level-2 model can be seen as an outcome varying randomly around some grand Training Job Competence score:

$$\beta_{00(k)} = \gamma_{000} + u_{00(k)},$$

where:

γ_{000} is the grand mean Training Job Competence score.

$u_{00(k)}$ is a level-3 random effect that represents the deviation of industry k 's score from the grand mean score. These residual effects are assumed to be normally distributed with a mean of 0 and a variance of τ_{β} .

Bryk and Raudenbush (1992), wrote about a situation that involved research among students in classrooms, classrooms which themselves were within schools. They gave formulas to use in partitioning variance in this three-level model: (1) $\sigma^2/(\sigma^2 + \tau_{\pi} + \tau_{\beta})$ is the proportion of variance within classrooms (within trainers in this study); (2) $\tau_{\pi}/(\sigma^2 + \tau_{\pi} + \tau_{\beta})$ is the proportion of variance among classrooms within schools (among training managers within industries in this study); and (3) $\tau_{\beta}/(\sigma^2 + \tau_{\pi} + \tau_{\beta})$ is the proportion of variance among schools (among industries in this study).

Table 16 presents the results of the fully unconditional three-level analysis of the Training Job Competence scores. Most of the variation (68.74%) in the job competence scores was due to the trainers, while there were essentially no industry-level differences in

Table 16. Three-level fully unconditional model: Training Job Competence scores

Fixed Effects		Coefficients	se	t ratio	
Industry (i.e., grand) mean, γ_{000}		23.36	0.56	41.47	
Random Effects		Component	df	χ^2	p value
Level 1 (Trainers), $e(ijk)$		10.56			
Level 2 (Training managers), $r_{0}(jk)$		4.80	41	221.60	< .01
Level 3 (Industries), $u_{00}(k)$		0.01	2	0.10	> .50
Variance Decomposition (by level)					
Level 1	Trainers	68.74%			
Level 2	Training Managers	31.25%			
Level 3	Industry	0.01%			

training job competence ratings (0.01%). Training managers accounted for 31.25% of the variation in job competence scores.

Answering the Research Objectives

With the above exploration of the data providing the context for understanding and interpreting of the research findings, it is now appropriate to turn to the research objectives. Objectives 1 - 4 were examined through one statistical test: a discriminant analysis on the extent to which the research variables distinguished between those trainers rated exemplary (with job performance scores of 27 and above) by their managers and the rest of the trainers (those with job performance scores of less than 27). The dependent variable—job performance, was dichotomized into exemplary trainers and the rest of the trainers. Recall that job performance was measured on a six-item Likert-type scale with discrete values 1 to 5, five being the highest. The highest possible score for the scale was 30. An initial

discriminant analysis was run using 25 as the minimum score for exemplary trainers. Classification of the trainers using that discriminant model showed that 72.73 % (Table 17) of the trainers were being correctly classified. In an effort to build a model that fit the data better, a decision was made to raise the minimum score for exemplary training job performance to 27. As is reported later, the new classification model fit the data better.

Table 17. Classification results using 25 as the cut-off score for exemplary trainers

Actual Group	Number of Cases	Predicted Group Membership	
		1	2
Group 1	38	26	12
Exemplary		68.4%	31.6%
Group 1	50	12	38
The rest		24.0%	76.0%

Percent of "grouped" cases correctly classified: 72.73%

Table 18 suggests differences between the two groups of trainers in terms of mean values on attitude toward oneself (63.28 vs. 60.87), creativity (7.03 vs. 6.03), trainee-content orientation (27.44 vs. 25.31), training experience (8.17 vs. 6.92) and work experience (16.72 vs. 12.63). These possible differences in the means were tested through univariate F-tests of the Wilks' lambda values (Table 19). When variables are looked at individually, lambda is the ratio of the within-group sum of squares to the total sum of squares. Large values of lambda suggest that there are no differences in the group means, while small lambda values indicate significant group differences (Norusis/SPSS, 1992, p.5). By looking at the variables in this study one by one, it appears the exemplary trainers differed from the rest of the trainers in terms of creativity ($F = 4.20, p < .05$) and work experience ($F = 5.84, p < .05$).

Table 18. Group means by research variables

Job Performance Category	Research Variables			
	Academic Ability	Assertiveness	Attitude to Self	Attitude to Students
Exemplary	6.17	4.83	63.28	36.78
The rest	6.86	4.94	60.87	36.54
Total	6.72	4.92	61.36	36.59
Job Performance Category	Caring	Creativity	Education	Extroversion
	Exemplary	4.69	7.03	2.56
The rest	4.45	6.03	2.36	5.52
Total	4.50	6.23	2.40	5.57
Job Performance Category	Trainee-Content Orientation	Training Experience	Work Experience	
	Exemplary	27.44	8.17	16.72
The rest	25.31	6.92	12.30	
Total	25.75	7.18	13.47	

Table 19. Tests of the equality of the variable means among the groups of trainers

Wilks' Lambda (U-statistic) and univariate F-ratio with 1 and 86 degrees of freedom			
Variable	Wilks' Lambda	F	Significance
Academic ability	.98	1.47	.23
Assertiveness	.99	.04	.84
Attitude towards self	.98	2.07	.15
Attitudes towards students	.99	.04	.83
Caring	.99	.19	.66
Creativity	.95	4.20	.04
Education level	.99	.47	.49
Extroverted	.99	.26	.61
Trainee-Content orientation	.97	2.79	.10
Training experience	.99	1.01	.32
Work experience	.94	5.84	.02

One should remember, however, that univariate analysis of variables does not indicate the discriminating power of the variables in a discriminant analysis. In discriminant analysis, a linear combination of variables is formed into discriminant functions which then serve as the basis for assigning cases into groups (Norusis/SPSS, 1992, p. 7).

A single discriminant function is formed in a discriminant function analysis involving a two-group response variable. The explanatory or predictor variables load on this function. The discriminant function is then used to classify trainers into, in this case, two groups. In the absence of a discriminant function analysis classification model, there would have been a 20% chance for the exemplary trainers and an 80% chance for the rest of the trainers to be correctly classified. However, since discriminant function analysis was used, 72% of the exemplary trainers and 83% of the rest of the trainers were correctly classified.

The test of whether there were significant differences in the characteristics under investigation among the two populations from which the groups of trainers were drawn is given by a test of Wilks' Lambda (Norusis/SPSS, 1992). SPSS transformed the Wilks' Lambda distribution (.72) into a chi-square distribution ($\chi^2 = 26.37, df = 12$) with $p < .05$. The above result showed that there were significant differences between the exemplary and other trainers' populations in terms of some of the variables included in the discriminant function analysis for this part of the study.

An indication of the contribution of individual explanatory variables to the discriminant function is given by the pooled within-group correlation coefficients between discriminating variables and the canonical discriminant functions (See Table 20). Variables were ordered by size of correlation within function. Variables whose correlation with the discriminant function was below 0.20 were considered low.

Table 20. Pooled within-groups correlations between discriminating variables and canonical discriminant functions

Variable	Loading on Discriminant Function
Work experience	0.42
Creativity	0.35
Trainee-Content orientation	0.29
Attitude towards self	0.25
Academic ability	-0.21
Training experience	0.17
Education level	0.12
Extroversion	0.09
Caring	0.08
Attitude towards students	0.04
Assertiveness	-0.03

The top five characteristics by which the exemplary trainers differed from the rest of the trainers were “work experience” ($r = .42$), “creativity” ($r = .35$), “trainee-content orientation” ($r = .29$), “attitude toward self” ($r = .25$), and “academic ability” ($r = -.21$). A comparison of the group means of these five variables shows that exemplary trainers rated higher in work experience (6.97 vs. 6.27) and creativity (2.20 vs. 1.77) and lower in attitude toward self (3.08 vs. 6.90), trainee-content orientation (3.11 vs. 5.16) and academic ability (2.31 vs. 2.11) (see Table 21). With academic ability, the reader is reminded that the lower the score the higher was one’s academic ability.

However, one should be reminded that the above correlations should not be looked at in isolation because of the collinearity between some of the research variables (See Table 13). Norusis/SPSS (1992) stated that where there is collinearity between the variables “...you

Table 21. Comparison of group means for the top five discriminating variables

Job Performance Category	Work Experience	Trainee-Content Orientation	Creativity	Attitude to Self	Attitude to Students
Exemplary	6.97	3.11	2.20	3.08	2.31
The rest	6.27	5.16	1.77	6.90	2.11

should exercise care when attempting to interpret the coefficients, since correlations between variables affect the magnitudes and signs of the coefficients" (p. 19).

Discriminant function analysis builds a linear discriminant equation on the basis of which each case's discriminant score is calculated. The equation is:

$$D_i = B_0 + B_1X_1 + B_2 X_2 + \dots + B_pX_p$$

where D_i is the discriminant score for a case. B_s are coefficients from the data and the X_s are the values of the explanatory variables. The classification model built from the research data was used to classify the trainers. As shown in Table 22, 72% of the exemplary trainers and 83% of the rest of the trainers were correctly classified (as compared to 20% and 80%, respectively, if no model had been used), giving an overall classification success rate of 81%. Thus, it appears reasonable to assume that the discriminant function model used was a reasonably good fit for the data. Stated differently, the research variables that loaded significantly on the discriminant function (work experience, creativity, trainee-content orientation, and academic ability) significantly distinguished exemplary trainers from the rest of the trainers in this study.

Table 22. Classification of trainers into groups based on the discriminant function analysis model

Actual Group	Number of Cases	Predicted Group Membership	
		1	2
Group 1	18	13	5
Exemplary		72% (20%)	27.8%
Group 1	70	12	58
The rest		17.1%	83% (80%)

Percent of "grouped" cases correctly classified: 81%

Results: Objectives 1-5

Objective 1: Determine the extent to which selected demographic variables (work experience, training experience, academic ability and level of education), predict job competence among industrial and business trainers in Zimbabwe.

Result: Work experience ($r = .42$) and academic ability ($r = -.21$) had high loadings on the discriminant function, with work experience having the highest loading on the function. Put differently, work experience was the single largest characteristic that distinguished exemplary trainers from other trainers. Academic ability was the fifth best predictor of job performance among the trainers. Training experience, which was highly correlated to work experience ($r = .77$), and level of education did not significantly distinguish between the two groups of trainers.

Objective 2: Determine the extent to which selected psychological variables (extroversion and creativity) predict job competence among industrial and business trainers in Zimbabwe.

Result: Creativity ($r = .35$) loaded second highest to work experience on the discriminant function. It was the only psychological variable that loaded at .20 or higher on the function.

In other words, creativity was the second best distinguishing factor, and the only psychological factor that significantly differentiated between the two groups of trainers.

Objective 3: Determine the extent to which selected interpersonal (caring, assertiveness) variables predict job competence among industrial and business trainers in Zimbabwe.

Result: None of the interpersonal variables significantly differentiated exemplary trainers from the rest of the trainers. The pooled within groups correlation of caring with the discriminant function was .08 and that of assertiveness was -.03, both of which were considered low.

Objective 4: Determine the extent to which selected belief and attitude variables (self perception, attitude towards students, and trainee-content orientation) predict job competence among industrial and business trainers in Zimbabwe.

Result: Trainee-content orientation ($r = .29$) and attitude towards self ($r = .25$) had the third and fourth highest loadings respectively on the discriminant function. In other words, trainee-content orientation and attitude towards self were the third and fourth highest distinguishing characteristics differentiating exemplary trainers from other trainers.

Objective 5: Determine the extent to which selected research variables differentially predict a trainer's job competence by field of training in Zimbabwe.

Result: Discriminant function analysis was also used to determine the extent to which the distinguishing characteristics (work experience, creativity, trainee-content orientation, attitude towards self and academic ability) differentially predicted job competence among trainers by the fields in which they offered training (business, technical and management). The interest here was to find out whether the variables that significantly distinguished exemplary trainers from the other trainers could be used to differentiate between trainer groups. Appendix E gives the full results of the discriminant function analysis. As a reminder, there were 40 business trainers, 26 technical trainers and 22 management trainers

(see Table 9). There appeared to be no significant differences between the means for management trainers, technical trainers and business trainers in terms of their academic abilities ($F = 2.36, \rho > .05$), attitude towards themselves ($F = 2.06, \rho > .05$), creativity ($F = .86, \rho > .05$) and work experience ($F = 1.5, \rho > .05$) (see Table 23). Only the trainers' trainee-content orientation ($F = 7.80, \rho < .05$) seemed to individually differentiate between the groups.

Table 23. Tests of the equality of the variable means among the groups of trainers

Wilks' Lambda (U-statistic) and univariate F-ratio with 1 and 86 degrees of freedom			
Variable	Wilks' Lambda	F	Significance
Academic ability	.95	2.36	.10
Creativity	.98	.86	.43
Attitude towards self	.95	2.06	.13
Trainee-Content orientation	.84	7.80	.00
Work experience	.97	1.51	.23

It should be remembered, though, that the above univariate correlations are not an indication of the relative contribution of the explanatory variables in the discriminant functions that follow. SPSS identified two discriminant functions for the three groups of trainers and the five independent variables. Discriminant function number 1 accounted for 83.5% of the variance between the three groups of trainers (Figure 6), while discriminant function 2 accounted for the remaining 16.5% of the variance. Furthermore, Figure 6 shows that discriminant function 1 significantly differentiated between the groups ($\chi^2=25, df = 10, \rho < .05$). In other words, discriminant function 1 showed that there were significant

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chi-square	df	Sig
1	.30	83.52	83.52	.47	0	.74	25.03	10	.0053
2	.06	16.48	100.00	.23	1	.95	4.48	4	.3453

Figure 6. Canonical discriminant functions for classifying trainers into the categories of exemplary and others

differences between the populations from which the three groups of trainers were drawn, in terms of the trainers' trainee-content orientation ($r = .81$) and academic ability ($r = .43$) (see Table 24). Discriminant function 2 did not achieve significance at the .05 level. Therefore, work experience, attitude towards self and creativity (factors that significantly contributed to function 2) were not a significant basis for distinguishing between the groups of trainers.

The mean discriminant function for each group of trainers (called centroid), was calculated (see Table 25). The correlation with a different sign from the rest under each function identifies the group of trainers that is markedly different from the rest of the groups.

Table 24. Pooled within-groups correlations between discriminating variables and canonical discriminant functions

Variable	Discriminant Function	
	1	2
Trainee-Content orientation	0.81*	-0.01
Academic ability	0.43*	0.25
Work experience	0.18	0.69*
Attitude towards self	0.34	-0.54*
Creativity	-0.16	0.49*

Table 25. Canonical discriminant functions evaluated at group means (group centroids)

Group	Discriminant Function	
	1	2
Business	0.13	-0.25
Technical	-0.74	0.14
Management	0.64	0.28

Table 25, thus, shows that discriminant function 1 distinguished technical trainers from business and management trainers more than it distinguished between business and management trainers. Since discriminant function 1 scores were comprised mainly of a trainer's score on trainee-content orientation and academic ability, it follows that these two independent variables appeared to more differentially predict job performance between technical trainers (group 2) on one hand, and the business (group 1) and management trainers (group 3) on the other than they did between business and management trainers.

Extending the interpretation of the results in Table 25 further, the negative sign of discriminant function 1 for technical trainers means that technical trainers had lower scores on trainee-content orientation and academic ability than the other two groups. One should keep in mind that for academic ability, the lower the score the more academically able the trainer was. Therefore, technical trainers had, in fact, the highest academic ability but lowest trainee-content orientation. Management trainers, however, had the highest trainee-content orientation scores.

Table 26 shows the classification of the trainers based on their individual discriminant function scores on each discriminant function. The trainer was classified into a group for which he/she had the highest discriminant score. The diagonal percentages in Table 26 show

Table 26. Classification of trainers based on discriminant functions scores

Actual Group	No. of Cases	Predicted Group Membership		
		Business	Technical	Management
Business	40	20 50.0% (45.5%)	9 22.5%	11 27.5%
Technical	26	4 15.4%	16 61.5% (29.5%)	6 23.1%
Management	22	7 31.8%	3 13.6%	12 54.5% (25%)

Percent of "grouped" cases correctly classified: 54.6%

cases correctly classified. These percentages should be viewed against the a priori probability of each case being correctly classified (given in parenthesis). Overall, 54.6% of the trainers were correctly classified.

Considerable time has been spent in examining whether the assumptions underlying the use of discriminant function analysis and hierarchical linear models were tenable. According to Tabachnick and Fidell (1983), such exploration of the data "...is fundamental to an honest analysis of data—or an analysis of honest data" (p. 66). The exploratory data analysis done in the present study showed that the assumptions underlying the statistical procedures used were tenable, thus the data satisfied the assumptions of discriminant function analysis. A discussion of the results of the study follows in Chapter 5.

CHAPTER 5: SUMMARY, DISCUSSION AND RECOMMENDATIONS

Introduction

The preceding four chapters presented the research question, the state of the knowledge in the field of identification of job performance predictors in general and among trainers in particular, the methodology of the study, and the findings of the present research. Chapter 5 presents a discussion of the findings and recommendations for future study. As background to the discussion, a brief summary of the study is first presented.

Summary of the Study

The study was an investigation of the factors that distinguished exemplary business and industry trainers from the rest of the trainers in Zimbabwe. A review of relevant literature revealed a paucity of empirical knowledge on what distinguishes exemplary trainers. Literature on related studies suggested that some demographic factors (work experience, training experience, academic ability, level of education), psychological factors (extroversion, creativity, enterprise), interpersonal factors (caring, assertiveness) and life philosophy factors (self perception, attitude towards students, training content/student orientation) were reliable predictors of job performance. The extent to which these factors could explain differences in job performance ratings between two groups of trainers (exemplary, and the rest of the trainers) in Zimbabwe was investigated. An additional research objective was to investigate whether the research factors differentially predicted job performance among trainers grouped by the field in which they offered training. The last objective of the study was to develop a profile of an exemplary trainer using these factors.

Methodology

Data were collected from 88 Harare business and industry trainers and their managers using a survey. Three instruments: the Adult Personality Inventory (API), Attitude and Belief Inventory (ABI), and Training Job Competence (TJC) inventory were used to collect the data which were then analyzed using discriminant function analysis. Hierarchical linear modeling was used to estimate the proportion of variance in job performance ratings that was due to the trainers, training managers and the industries in which the trainers worked.

Summary of findings

The members of the sample were mainly male ($N = 67$) and well-educated (all had at least the equivalent of a high school diploma), and the majority of the college-educated trainers ($N = 40$) had degrees either in social science ($N = 15$) or education ($N = 11$). The trainers varied widely in age ($M = 37.25$, $SD = 8.53$), length of work experience ($M = 14.44$, $SD = 9.09$), and length of training experience ($M = 7.55$, $SD = 5.94$). The data were analyzed using discriminant function analysis.

Of the four demographic variables, work experience and academic ability were the only two factors that significantly distinguished exemplary trainers from the rest of the trainers. Creativity was the only psychological variable that significantly distinguished exemplary trainers from other trainers and none of the interpersonal variables significantly differentiated exemplary trainers from the rest of the trainers. Last, trainee-content orientation and attitude towards self were the third and fourth highest distinguishing characteristics differentiating exemplary trainers from the rest of the trainers.

One objective of the study was to determine the extent to which the five variables (work experience, creativity, trainee-content orientation, attitude towards self, and academic ability) that had loaded highly on discriminant function 1 differentially predicted job performance among trainers grouped by the industry in which the trainers offered training. Trainee-content orientation and academic ability were the only two variables that significantly differentiated between trainers by their industries, with technical trainers showing the highest academic ability and lowest trainee-content orientation. These findings of the study are now discussed in the light of earlier research findings.

Discussion

In studies where some research hypotheses are confirmed, there is always the danger of drawing very wide implications that ignore the limitations of the study. This temptation is to be guarded against, and should be borne in mind as one discusses the findings of the present study.

The relationship of job performance to work experience and academic ability

Exemplary trainers were different from the rest of the trainers, in terms of work experience. Exemplary trainers, on average, had more work experience than the rest of the trainers. Indeed, work experience was the single highest predictor of job performance. Leach (1996) had similar findings. In a study on the distinguishing characteristics of business and industrial trainers, Leach found that the mean age of trainers who had been nominated by managers, colleagues and students as exemplary trainers was about nine years, while that of the rest of the trainers was four. In the present study, exemplary trainers had a mean length of work experience of 16.72 years compared to the rest of trainers whose mean work experience

was 12.3 years. These findings suggest that, up to a point unknown as yet, one learns and understands one's job better the longer one is at the job. There is more internalization of job knowledge and skills the longer one works in the same or similar job within the same profession. The findings are thus in line with a commonly held belief that job experience is a reliable predictor of future job performance.

While the finding that work experience was a significant discriminator between the two groups of trainers was not unexpected, that it turned out to be the highest predictor of group differences was contrary to expectations. Earlier studies (Hoiberg & Pugh, 1978; Hunter & Hunter, 1984; Monahan & Muchinsky, 1983) have demonstrated that intelligence (measured as cognitive ability) is possibly the best predictor of job performance. Other studies (Cortina et al., 1992) comparing cognitive ability and personality as predictors of job performance concluded that cognitive ability was such a consistent predictor of job performance that personality seemed to have hardly any incremental validity over cognitive ability. The expectation in the present study was that cognitive ability (measured as academic ability) would be a more significant discriminant than work experience, and trainers' psychological attributes.

There may be more than one way of interpreting the above findings. It can be argued that the unexpected result is due to methodological differences between earlier studies and the present one. Most of the earlier studies used Pearson product-moment correlation coefficients to determine the relative contribution of independent variables to variance in job performance. Again, the dependent variable was measured on a continuous scale. In the present study, the method of data analysis was discriminant function analysis, and the dependent variable was dichotomous. Where research variables are non-standardized, and

given the problem of collinearity commonly found between independent variables in social science research, it is possible that Pearson product-moment correlations between independent variables and the dependent variable do not reflect the true nature of the relationship. They carry much "noise". On the other hand, in discriminant function analysis, correlations of the independent variable with the discriminant functions are reported as standardized canonical correlations. Where scores are standardized, correlation coefficients tend to reflect a more accurate relationship between the independent variable and the discriminant function. Additionally, discriminant function analysis seeks to make the correlations between discriminant functions maximally different. One can thus safely say that the loading of a variable on a discriminant function represents an accurate estimation of the distinguishing power of the variable. It is thus possible that the results of the present study may be closer to the true relationship of the said variables to job performance than had been suggested by many previous studies.

Another possible interpretation of the results is simply that work experience is indeed a powerful predictor of job performance among trainers in business and industry. Yet another possible interpretation of the results is that to the extent that missing data, particularly in the academic ability variable, affected the results of this study, the results do not reflect the true nature of the relationship of the demographic variables to differences between the job competence of the trainers. Academic ability suffered the highest number ($N = 21$) of missing data points. With such a high level of missing data, the reliability and credibility of results of the subsequent data analyses can be questionable.

The relationship between job performance and level of education and training experience

The results of this study suggest that the level of education, and the length of training experience of trainers in business and industry are not the top predictors of job performance. In other words, given work experience and academic ability, the rest of the demographic variables do little to improve the predictability of job performance among trainers in business and industry. These results also suggest that while education may be a necessary condition for someone to perform well as a trainer, there is a point beyond which the level of education of the trainer has no significant effect on the trainer's job competence. While the present study does not indicate what that level is, the fact that there were no significant differences in job performance between trainers with a high school diploma and those with graduate degrees may be taken as suggestive of the fact that job knowledge, and not level of education, may be a better predictor of job performance.

The relationship between job performance and psychological factors

The results of the present study indicated that, of the initial three psychological variables studied (extroversion, enterprise and creativity), only creativity significantly distinguished exemplary trainers from the rest of the trainers. Its correlation with the discriminant function was second only to that of work experience. It has been stated previously that research findings on the relationship between personality and job performance are, at best, tenuous, and that, notwithstanding, the tenuous relationship so far established, personality studies, continue to occupy the attention of researchers in education and personnel psychology. Modern statistical procedures such as meta-analysis (Hunter & Hunter, 1994; Ones, Mount, Barrick, & Hunter, 1994), and improved research designs in the

last 30 years (Verbeke, 1994) have, however, shown that psychological traits have a higher distinguishing power relating to job performance than hitherto realized. The results of the present study suggest that creativity has a direct and positive relationship with job performance. In other words, creativity can significantly distinguish exemplary trainers from other trainers.

Krug (1996) described creative people as imaginative, sensitive, liberal in their views, and with an inclination to explore new ideas and imaginative ways of doing things. In the context of this definition, it appears logical that trainers high on the attribute should have higher job performance ratings than the rest of the trainers. It can thus be assumed that creative trainers use their creativity to vary their approaches to training and facilitation of learning, that they are sensitive to the learning needs of their trainees, and that they use experiential methods of learning in their work.

Earlier studies applying sophisticated research and statistical designs (e.g., Kegel-Flom, 1983; Verbeke, 1994) have come to similar conclusions. In a study of exemplary college professors, Kegel-Flom (1983) found that professors rated as exemplary had higher achievement drive, greater initiative, more self confidence and higher ability to adapt than their colleagues. In the Verbeke (1994) study, "self-monitoring", "adaptation" and "openers" significantly distinguished exemplary salespeople from their colleagues, with self-monitoring being the highest predictor of sales performance. In that study, self-monitoring was defined (p. 51) as "a trait which refers to their (salespeople) tendency to adapt their behavior to the social situation. People who score high in self-monitoring seem to be able to tailor their personality to any situation". To do that they need to be adaptable, sensitive to changes in the mood of their trainees, and imaginative—all of which are characteristics of creative trainers.

Creativity and self-monitoring appear to have much in common, hence the complimentary findings. The Kegel-Flom (1983) and Verbeke (1994) studies, however, suggest that such psychological factors as enterprise (which is the same as achievement orientation) and extroversion should have been significant contributors to the discriminant function. In the present study, measurement of enterprise was so unreliable ($r = .33$) that it became necessary to drop the variable from further analysis. The failure of extroversion to significantly distinguish between the two groups of trainers, however remains unexpected. No easy explanation of this finding presents itself. It is still noteworthy, however, that a psychological attribute (creativity) correlated higher than academic ability with the discriminant function distinguishing between exemplary trainers and the rest.

Put another way, creativity was more closely associated with job excellence among the trainers than academic ability. A possible explanation for this result, which is different from results of earlier studies, is that there were methodological differences between the present and the previous studies. All of the reviewed studies except one did not use discriminant function analysis for data analysis. In the study where discriminant function analysis was used (Verbeke, 1994), the typology of psychological variables used was different from the one used in the present study. One is, thus, hard put to find a comparison for the present finding. Another possible explanation is that academic ability may still be a more superior predictor of job competence, and that the large number of missing data in that variable in the present study precluded the revelation of this superiority.

The relationship between job performance and interpersonal factors

Both interpersonal variables used in the study (caring and assertiveness) did not correlate highly with the discriminant function that distinguished exemplary trainers from other trainers ($r = .08$, $r = -.03$). Yet, quite a number of earlier studies and expert opinion (Bennett, 1985; Leach, 1992, 1996; O'Connor & Seymour, 1994; Smith, 1995) suggested a significant and positive relationship between these variables and job performance among trainers. One possible explanation for this finding is methodological differences. In some of the earlier studies (e.g., Leach, 1992) the trainers were not being compared among themselves but with the general population. In other studies (e.g., Centra, 1996; Evans & Associates, 1989), measurement of research variables was through a third person whereas in the present study these variables were measured on the trainers themselves. These methodological differences exemplify the difficulty of measuring abstract constructs.

It is also possible that the lack of a significant relationship between caring and the trainers' job competence was due to the unreliability of the API in measuring the construct in the study sample ($r = .54$). Given this level of unreliability of the measuring instrument, it is possible that the results of the discriminant function analysis, where it concerns caring, can be no more than a chance occurrence.

The relationship between job performance and belief and attitude factors

Trainers' trainee-content orientation and self-perception had the third and fourth highest correlation with the discriminant function ($r = .29$, $r = .25$), and were two of the only five variables that substantially made up the discriminant function. According to Rae (1993, p. 50) the trainee-content inventory compares a trainer's preferences, attitudes and activities

in the two dimensions: trainees (how the trainer views students) and the trainer's job (what the trainers views his/her job to be). The inventory also reflects a trainer's personal philosophy since one's personality philosophy determines one's values. Kamp (1996), writing about the theory of neuro-linguistic programming (NLP), made the same argument about how one's behavior is a product of one's life philosophy. She argued that values, in large part, determine behavior. It thus appears logical that self-perception and trainee-content orientation should stand out together as significant discriminants between exemplary trainers and the rest of the trainers. These findings seem to give credence to the theory of NLP. A good trainer believes in the inert goodness of people, has a positive attitude to life and to other people, and has an internal locus of control.

Attitude towards students did not correlate as highly with the discriminant function ($r = .04$) as the other variables in this category. This could be because the variable is highly correlated with the other variables in this category (see Table 13) and is thus subsumed in them. Given trainee-content orientation and self perception, attitude towards students may have no significant additional relation of its own with the discriminant function.

The extent to which selected variables differentially predict job performance among trainers grouped by industry

A discriminant function analysis was performed to determine the extent to which the five variables (work experience, creativity, trainee-content orientation, attitude towards self, and academic ability) differentially predicted job competence among the trainers who were grouped by the fields in which they offered training. The analysis indicated that the significant discriminants were trainee-content orientation and academic ability, with trainee-content orientation being the more effective of the two. Technical trainers showed the highest

academic ability and lowest trainee-content orientation, while the management trainers had the highest trainee-content orientation.

A number of interpretations of the above results are possible. The reader is once again reminded that the trainers' academic ability was measured through the composite score of the trainers' grades in mathematics, a science subject, and English. Mathematics and the science subject belonged to the hard sciences category of school subjects. It can thus be argued that the measurement for academic ability had an over-representation of the hard sciences, the result of which could be a bias in favor of technical trainers. It is conventional practice in Zimbabwe to emphasize high academic performance in the natural science subjects when recruiting trainees for the technical fields both at technical colleges and universities. On the other hand, management trainers tend to be people with orientation towards the social science disciplines.

The finding that technical trainers had the lowest trainee-content orientation, reflecting a low sensitivity to trainee needs can be taken to suggest that technical trainers tend to be more subject matter driven than management and business trainers. This orientation may be more a product of the nature of their training fields than it may be indicative of the trainers' inherent disposition to trainees and people in general. The finding that management trainers had the highest trainee-content orientation appears consistent with the above line of argument: that the nature of the field in which one offers training, in part, determines one's training orientations. Management training is a human relations domain. It thus appears that to excel in that training field one needs to be sensitive to the needs of the trainees, as well as retain a high commitment to the organizational training requirements.

From the findings, it appears an argument can be made that a trainer's behavior and practices are, to a great extent, shaped by the nature of training one offers.

It is interesting to note that there appeared to be no differences by industry in the work experience, creativity and self perceptions of the exemplary trainers. The literature is scarce on this part of the present study, making it difficult to draw comparisons.

Profile of an Exemplary Trainer

It is now possible to address the sixth objective of the study: *Develop a profile of the psychological and interpersonal attributes of an exemplary industrial and business trainer for use in selection and training.* From the findings of this study, exemplary trainers appear to be people of high academic ability, imaginative, sensitive, liberal in their views, and with an inclination to explore new ideas and imaginative ways of doing things. They also appear to have high self-esteem, to like and respect other people as well as being enthusiastic about their work.

Conclusions

Several conclusions can be drawn from the study:

1. Probably the most significant conclusion to emanate from the study is that there are measurable factors through which trainers who are exemplary in their work can be identified, and that some of these factors can also predict the field in which a trainer offers training . While this finding may not be an earth-breaking revelation, it however is significant in that it adds another block in the puzzle of prediction of job performance, in particular, job performance among trainers (change agents) in

organizations. These findings confirm one of the cornerstones of industrial and organizational psychology—that people are endowed with different levels of traits.

2. Another conclusion to draw from the study is that there appears to be more similarities than differences between exemplary trainers across continents. All the literature reviewed for the study emanated from outside the African continent and yet the findings of the present research, where comparable, confirm the earlier findings.
3. Creativity was the single most powerful personality factor that distinguished exemplary trainers from the other trainers. Equally noteworthy was that the API did not measure the attributes of enterprise and caring very well
4. There were differences in sensitivity to trainees and adherence to subject matter dictates between management and business trainers on one hand, and technical trainers on the other. Management trainers were the most people-sensitive, while the technical trainers were the most likely group to be guided by subject matter dictates in their training practices.

Limitations

Studies that are perfect both in their design and execution are more often found in textbook descriptions than in real life. The present study was not without limitations.

1. The absence of a comprehensive register of business and industrial trainers in Zimbabwe placed limitations on sampling options, and thus limits the extent to which we can generalize the findings. For that reason, the findings of this study are only generalizable to the population from which the sample was drawn.
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2. The difficulties of gaining access to a category of research participants: trainees, resulted in modification of the study where data on the dependent variable was collected from only one source, the training managers. The reliability of the job performance measure could have been higher had we multiple raters per trainer. The fact that nearly a third (31.25%) of the variance in job performance rating was due to managers is indicative of the problems of using single sources of data in studies of this nature.
 3. This study was based on a sample of 88 usable returns. A bigger sample would have given more power to the statistical procedures used.
 4. Although the Adult Personality Inventory through which psychological data were collected may be an extensively validated psychological instrument (Krug, 1996), its inability to reliably measure the construct of enterprise, which led to the subsequent dropping of the that variable from further analysis, and its low measure of caring may be indicative of limitations in the instrument. Additionally, although the API did not appear to exhibit significant cultural biases, research participants generally took more time to respond to the instrument than was given in the instrument manual as an average time. While the instrument manual gives 45 minutes as the average time for answering the short version of the instrument, quite a number of participants in the present study reported taking as much as two hours. This may have fatigued the participants, resulting in less care and thought in the way they may have responded to the rest of the instruments. This may consequently have negatively impacted the reliability of the instruments, and the validity of the given data.
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Recommendations for Practice

The results of the study have implications for performance improvement practices in organizations.

1. It appears the instruments used in the present study (the API and ABI), or some variations of them, could be the basis for recruitment and selection instruments to be used in the identification of job applicants with the potential to become exemplary trainers. The study has suggested that job excellence among trainers may not be a function of technical know-how only. Therefore, consideration of a person for promotion should not be based only on technical job competence but also on distinguishing factors such as those established through this study.
2. The results of the study can also be used in the training and development of trainers. While this may not be the place for a debate on whether training can change a person's psychological orientation, it cannot be denied that awareness of one's psychological disposition at least enables one to make conscious efforts to smoothen the rough edges of one's personality and to maximize use of one's attributes.
3. Career guidance professionals can also use the findings of the study to guide people interested in careers in human resources development and teaching. The psychological and life philosophy characteristics of exemplary trainers that emerged from this study provide a model against which a person's interest in, and suitability for a career in human resources can be evaluated.

Recommendations for Future Studies

The study also has implications for future research. The following suggestions are made to guide future studies in this area:

1. Replication of the study using bigger samples and multiple sources of data on training job performance.
2. Continued effort could be utilized to raise the reliability factors of each of the instruments used in the study.
3. No attempt was made in the present study to determine the influence of organizational factors on training job performance. Hierarchical Linear Models offer the statistical capability to investigate the effect of a number of nesting factors on the dependent variable. It is recommended that future studies should investigate the extent to which organizational factors impact training job competence.
4. There is need to extend the study beyond business and industrial trainers. Studies can be done with trainers in the military and the public sector. Such studies would help indicate the extent to which the findings of the present study are generalizable across industries.
5. There is need to use a more broad-based measure of academic ability than was used in the present study.
6. While the results of the present study do not suggest serious cultural bias in the API, the low reliability of some of its sub-scales, and the amount of time respondents took to respond to the instrument however suggest a need to conduct more API validation studies in Africa.

Concluding Remarks

Organizations today have to deal with change on many fronts—technological, management theories, regulatory, cut-throat competition in the marketplace, and ever-changing customer needs. The need to build flexible organizations, and develop in people the ability to embrace and manage transformative change is the biggest challenge facing all organizational change agents, trainers included. There is an evident need to pay attention to the pivotal role trainers play in organizational change and development. Job excellence in trainers is therefore critical to the success of organizational change efforts. Powers (1992) stated that:

...people will perform with excellence if they have well-defined jobs, are capable of doing the job, know what is expected of them, have the tools to do the job, have the necessary skills and knowledge, receive feedback on how well they perform, and perceive and receive rewards for performing as desired. (p. 8)

It is the contention of this author that the capability to do the job is possibly the most difficult requirement to develop in people because it entails personal attributes that people are born with. Not everyone has the capability to become a competent brain surgeon, gun pilot, classical music composer or computer scientist, just to name a few. The cost of training people for jobs is invariably high, and no organization can afford to expend its resources on a person who is without the attributes for the job for which he or she trains. Organizations need the ability to identify these attributes at the time of hiring. The present study is a contribution to the identification of such attributes. More remains to be known, and with continuing improvements in research methodologies and statistical procedures, studies of this kind should assume even greater relevance to industrial and organizational practice.

APPENDIX A. DATA COLLECTION INSTRUMENTS

COVER LETTER

Iowa State University of Science and Technology (ISU)
 Department of Industrial Education and Technology
 Ames, IA 50011
 USA

30 September, 1997.

Dear Participant

The Department of Industrial Education and Technology, Iowa State University, USA, with the assistance of the Department of Technical Education, University of Zimbabwe, is conducting a study on characteristics of exemplary trainers in business and industry in Zimbabwe. This study is meant not only to advance the frontiers of knowledge in the field of training but, more importantly, to be of benefit to human resources development practitioners in Zimbabwe and beyond. You are, by way of this letter, being requested to participate in the study.

Please complete the rating scale attached as directed on the scale. Your responses will be held in the strictest confidence. You are not required to write your name nor anyone's name anywhere on the scale. Further, no personal nor company names will be used in the write-up of the report. There is therefore no way that your responses can in future be identified with you.

It has been estimated that it will take approximately thirty minutes for training managers and one hour and half hours for trainers to complete the research instruments. The principal investigator will make arrangements with you to collect the completed scale at a time most convenient to you.

We emphasize that the study is not a job performance appraisal of your organization and that the information you provide will not be shared with management. Please answer the questions accurately.

As a measure of our gratitude for your participation we undertake to provide, upon request, results of your response to Part B of the trainer evaluation scale (trainers only) together with information on how to interpret the results. Additionally, a drawing will be conducted in which you will have a chance to win one of three money prizes. The prizes will be US\$50.00 for the first entry card drawn, US\$30.00 for the second and US\$20.00 for the third card drawn. The drawing will held at 1.30 p.m., Wednesday December 3, 1997 in the reception area of the Faculty of Education building, University of Zimbabwe. To enter the drawing, return to the principal investigator your completed rating scale as well as the draw entry card attached.

We value your participation and we hope you will take pride in contributing to the success of the study. If you have any questions feel free to contact the principal investigator on telephone number 303211 Ext. 1699, Harare.

Sincerely,

Onward S. Mandebvu
 (Principal Investigator)

Roger A. Smith, Ph.D.
 (Major Professor, Ind. Ed. & Tech., ISU)

Sisco Gweru, M.A.
 (Dept. Chair, Tech. Ed. UZ)

TRAINING JOB COMPETENCE INVENTORY (*Training managers' rating scale*)

Type of industry: (circle the letter against the correct category)

- | | |
|---|---|
| a. Manufacturing | b. Retail (e.g. Clothing and Food Merchants) |
| c. Financial Services
(e.g. Banking, Building Society,
Insurance) | d. Hospitality (e.g. Hotels, Fast Food Service
Outlets, Restaurants) |
| e. Security (e.g. Police, Army,
Private Security Companies) | f. Service (e.g. Health, Education, Social Work) |
| | g. Other. Specify ----- |

A. Your Job Title: -----

B. Company Code: -----

C. Information

Your company has been chosen to participate in a study on the attributes of excellent trainers in Business and Industry in Zimbabwe being conducted by Iowa State University, Department of Industrial Education and Technology, USA. Your participation is very important to the success of the study. Please assist by responding to this questionnaire.

Operational definition of a trainer: A person in an organization at least a third of whose job time is spent in organized efforts directed at improving human performance largely through training interventions. A trainer organizes activities and delivers instruction through which trainees learn new knowledge, skills and attitudes that enhance their performance in a present or future job.

Instructions

1. On the basis of the definition of a trainer given **above**, please write on the form (**FORM A**) provided, the names of the trainers in your organization who report to you. Each trainer gets the code written in the same line as his/her name. You will find this code name already entered against each name space.
2. Next, write the code name of each trainer on one of the scanner sheets provided then proceed and rate each trainer on the attributes listed in the attached questionnaire. Return **FORM A** to the principal investigator. This information will be used to code the research instruments to the trainers and their trainees, and for follow-up purposes only. The form will be kept in your office (if that is acceptable to you) during the data collection period and will be destroyed once all the research instruments have been returned to the principal investigator.
4. Provide the Principal investigator with names of two people for each trainer who have taken training from each of your trainers. The principal investigator would like to request these trainees to rate the job performance of the trainers
5. Return your trainer evaluations to the Principal investigator sealed in the return envelope provided.

N.B. The Principal investigator will make arrangements convenient to your company and to the trainers regarding the collection of the trainers' returns.

TRAINING JOB COMPETENCE INVENTORY *(Managers' version)***Instructions**

Using the rating scale given, rate the job performance of each trainer under your supervision. Rate the trainers' job performance on the basis of the elements of a trainer's job that are listed below. Write the trainer's code name on the answer sheet before you rate him/her. Use only one answer sheet per trainer.

Scale: 5 4 3 2 1

Where: 5 = Very good 4 = Good 3 = Acceptable
 2 = Poor 1 = Very poor

Critical job competencies

1. Delivery of instruction
2. Facilitation of learning
3. Appropriate use of training media (e.g. chalkboard, flip chart, video, audio, multimedia)
4. Relationship building/interpersonal skills
5. Feedback skills
6. Use of appropriate training techniques (e.g. lectures, role play, outdoor activities, discussion groups)

ATTITUDE AND BELIEF INVENTORY *(Trainer's form)*

Information

You have been selected to participate in a study on the distinguishing characteristics of exemplary trainers in business and Industry being conducted by Iowa State University, Department of Industrial Education and Technology, USA. Your participation is very important to the success of the study. Please provide the information requested below on your beliefs and attitudes towards yourself and other people. The information you will provide will **not** be shared with anybody in your company, and will be used for research purposes only.

SECTION A

Using the scale given below, and using the given scanner sheet for your responses, indicate by shading in pencil, the letter on the scanner sheet that corresponds to the statement of the rating scale that best describes your belief on each given item. extent to which the statements listed below describe what you believe. On the response sheet given, please shade in pencil, the number representing the statement that best describes your belief for each statement.

5 = Describes you exactly 4 = Describes you a lot 3 = Describes you somewhat
2 = Describes you very slightly 1 = Does not describe you at all

Statement	Type
1. I have high confidence in myself	S
2. That people who take your courses have the ability to succeed in the course.	P
3. I enjoy the challenge of learning	S
4. I actively seek opportunities to attend conferences or workshops organized in my professional field	S
5. People learn more by example than by what we teach.	P
6. I am comfortable with trainees holding different viewpoints from mine	S

- | | |
|--|---|
| 7. I make an effort to understand other people's viewpoints to an issue | S |
| 8. Everyone has some special talent(s). | S |
| 9. People learn more when the learning experience is fun. | P |
| 10. People have logical reasons for the behavior choices they take. | P |
| 11. I am comfortable holding a discussion with people at any level in my company. | S |
| 13. People learn best if they can find personal benefit in the learning. | P |
| 14. People can decide for themselves the best way to learn. | P |
| 15. I am willing to try something different if what I am doing is not working. | S |
| 16. I believe that I am a positive influence to those I work and interact with. | S |
| 17. I believe that all people are born free of evil | P |
| 18. I have a genuine interest in what successful colleagues do. | S |
| 19. I do not regret spending personal money on professional literature | S |
| 20. It gives me great satisfaction when I successfully
master a new skill or competence | S |
| 21. People want to develop their potential. | P |
| 22. I feel good about myself, generally | S |
| 23. I do not feel any loss of face to admit to trainees that I do not know the
answer to a given question | S |
| 24. I believe that it is my responsibility to be understood as I intend. | S |

KEY: **S = Attitude about self** **P = Attitude about other people**

SECTION B. TRAINEE-CONTENT TRAINING INVENTORY

The following questions concern your attitudes toward some training practices. Their purpose is to provide some indications about you as a trainer. There are no right or wrong answers: the best answer is the one most descriptive of your attitudes. Therefore, when answering the question below, select the answer you feel to be true for you, as only realistic answers will provide useful information.

Each of the 40 items consists of two statements, either about what a trainer can do or how he/she can behave. For your response, shade on the response sheet the letter of the statement you think is more relevant to your feelings. In the case of some of the items you may think that both alternatives are important, but you should try to choose the statement you feel is more important. Sometimes you may think that both alternatives are unimportant: you

should still choose the statement you think is more important. Do not spend much time thinking about your response. Mark your first response to an item. Respond to ALL statements.

It is more important for trainers to:

25. A. organize their courses around the need and skills of every type of trainee.
B. maintain definite standards of training performance.
26. A. let the trainees have a say in course content and objectives.
B. set definite standards of training performance.
27. A. emphasize completion of the course program.
B. let trainees help set objectives and content.
28. A. maintain trainees' progress by means of tests.
B. allow trainees a voice in setting course objectives and content.
29. A. praise good trainees.
B. allow trainees to evaluate the performance of their trainers.
30. A. allow trainees to make their own mistakes and learn from those experiences.
B. work to cover the course subject matter adequately.
31. A. make it clear that they are the authority in the training situation.
B. allow trainees to make their own mistakes and to learn from their experiences.
32. A. be available outside formal course hours to talk with trainees.
B. be available during course hours only.
33. A. give tests to evaluate trainee progress.
B. tailor the course content to match the needs and abilities of each group.
34. A. stay detached from the trainees.
B. let trainees plan their own program according to their own interests.
35. A. take an interest in the trainees as people.
B. make it clear that they are the authorities in the training situation.
36. A. stay detached from the trainees.
B. be available outside formal course hours to talk with trainees.
37. A. modify their position if one of the trainees shows where they were wrong.
B. maintain standards of performance.
38. A. allow trainees to have a say in evaluating performance.
B. not socialize with the trainees outside course hours.
39. A. see that the group covers the prescribed subject matter for the course.
B. be concerned about the trainees as people.
40. A. let the trainees learn by experience.
B. maintain standards of training performance.
41. A. allow trainees a voice in setting course objectives and content.
B. make it clear that they are the authorities in the training situation.
42. A. discourage unnecessary talking during training sessions.
B. establish an informal atmosphere in the training situation.
43. A. allow trainees to evaluate the training.
B. make it clear that the trainer is the authority in the training situation.

44. A. stay detached from the trainees.
B. let the trainees make mistakes and learn by experience.
45. A. be an authority on the course materials.
B. keep up to date in the field.
46. A. be regarded as a person of high technical skills.
B. update course materials constantly.
47. A. attend to his/her own personal development.
B. be an authority on the course material.
48. A. attend to his/her own personal development.
B. set an example for the trainees.
49. A. ensure that each trainee is working to his full capacity.
B. plan, in detail, all training activities.
50. A. construct fair and comprehensive validation methods.
B. set an example for his/her trainees.
51. A. be known as an effective trainer.
B. ensure that each trainee is working to his full capacity.
52. A. construct fair and comprehensive validation measures.
B. ensure that the trainee is getting something from the course.
53. A. be an authority on the subject matter.
B. plan and organize their course work carefully.
54. A. be a model for the trainees to emulate.
B. try out new ideas and approaches on the course/group.
55. A. ensure that each trainee is working to his full capacity.
B. plan and organize the course content carefully.
56. A. be available outside formal course hours to talk with the trainees.
B. be an expert on the course subject matter.
57. A. set an example for the trainees.
B. try out new ideas and approaches on the group.
58. A. teach on a variety of courses.
B. be a model for the trainees to emulate.
59. A. plan and organize training activities carefully.
B. be concerned with the way the trainees are reacting.
60. A. be an authority on the course content.
B. be known as an effective trainer.
61. A. give tests and evaluate trainee progress.
B. be an authority on the course content.
62. A. read journals relevant to the subject.
B. be respected as a person of high technical skill.
63. A. be respected for knowledge of course subject matter.
B. try out new ideas and approaches on the group.
64. A. be an authority on the course content.
B. construct fair and comprehensive validation measures.

SECTION C

Age: -----years

Gender: M / F (Circle your answer)

Field in which you offer training: -----

Years of working experience: ---

Years of training experience: ----- Years with present employer: -----

Number of years of formal schooling: -----

Highest level of education (Circle the appropriate letter): a. "O" level b. "A" level

c. Bachelor's degree d. Graduate degree

Sum of your grades at "O" level in English, Science and Mathematics (KEY: A = 1, B = 2, C = 3, D = 4, E = 5, F = 6) -----

If you have a college degree, please indicate the field (e.g. education, sociology, business) ---

APPENDIX B. EXTERNAL TEAM OF EXPERTS WHO ASSISTED WITH DEVELOPMENT OF THE INSTRUMENTS

A number of people outside the Program of Study Committee were consulted during the development of the researcher-developed scales. Each expert was sent copies of the instruments to comment on. The instruments were then revised in light of their comments were. The experts were:

1. **Dr. Sharon Drake**
Manager, Training and Development
Iowa State University
Ames, IA 50011
USA
Area of expertise: Human Resources Development
2. **Ms Elizabeth Cooper**
Process Support Services Consultant
BlueCross BlueShield of Iowa
636 Grand Avenue, Sta. 34
Des Moines, IA 50509-2565
USA
Area of expertise: Human Resources Development
3. **Ann Weiss**
Human Resources Director
Mary Greeley Medical Center
1111 Duff Avenue
Ames, IA 50010 USA
Area of expertise: Human Resources
4. **Lois Mberengwa**
University of Lincoln-Nebraska
4910 Dudley Street, Apt. #4
Lincoln, NE 68504
Area of expertise: Education
5. **Davidson M. Mupinga**
Louisiana State University
3560 Nicholson Drive, Apt. # 22148
Baton Rouge, LA 70802
USA
Area of Expertise: Education
6. **Unity Chari**
Human Resources Consultant
Canadian International Development Agency
P.O. Box 2619
Harare, ZIMBABWE
Area of expertise: Human Resources

APPENDIX C. HUMAN SUBJECTS APPROVAL

Last name of Principal Investigator MANDEBVI

Checklist for Attachments and Time Schedule

The following are attached (please check):

- 12. Letter or written statement to subjects indicating clearly:
 - a) the purpose of the research
 - b) the use of any identifier codes (names, #'s), how they will be used, and when they will be removed (see item 17)
 - c) an estimate of time needed for participation in the research
 - d) if applicable, the location of the research activity
 - e) how you will ensure confidentiality
 - f) in a longitudinal study, when and how you will contact subjects later
 - g) that participation is voluntary; nonparticipation will not affect evaluations of the subject
- 13. Signed consent form (if applicable)
- 14. Letter of approval for research from cooperating organizations or institutions (if applicable)
- 15. Data-gathering instruments

16. Anticipated dates for contact with subjects:

First contact	Last contact
<u>09/10/97</u>	<u>12/30/97</u>
Month/Day/Year	Month/Day/Year

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased:

01/15/98
Month/Day/Year

18. Signature of Departmental Executive Officer Date Department or Administrative Unit

Greg G. Smith 8/25/97 Industrial Education and Technology

19. Decision of the University Human Subjects Review Committee:

- Project approved Project not approved No action required

<u>Patricia M. Keith</u>	<u>8/28/97</u>	<u><i>PMKeith</i></u>
Name of Committee Chairperson	Date	Signature of Committee Chairperson

APPENDIX D. OUTPUT OF THE EXPLORATORY DATA ANALYSIS

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
WORKEXP	88	100.0%	0	.0%	88	100.0%
TRAINEXP	88	100.0%	0	.0%	88	100.0%
education	88	100.0%	0	.0%	88	100.0%
ACADABIL	88	100.0%	0	.0%	88	100.0%
ATTSELF	88	100.0%	0	.0%	88	100.0%
ATTSTUD	88	100.0%	0	.0%	88	100.0%
TCORIENT	88	100.0%	0	.0%	88	100.0%
EXTROVET	88	100.0%	0	.0%	88	100.0%
CREATIVI	88	100.0%	0	.0%	88	100.0%
CARING	88	100.0%	0	.0%	88	100.0%
ASSERTIV	88	100.0%	0	.0%	88	100.0%

Tests of Normality

	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
WORKEXP	.151	88	.000
TRAINEXP	.128	88	.001
education	.210	88	.000
ACADABIL	.176	88	.000
ATTSELF	.161	88	.000
ATTSTUD	.169	88	.000
TCORIENT	.138	88	.000
EXTROVET	.065	88	.200*
CREATIVI	.065	88	.200*
CARING	.056	88	.200*
ASSERTIV	.054	88	.200*

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

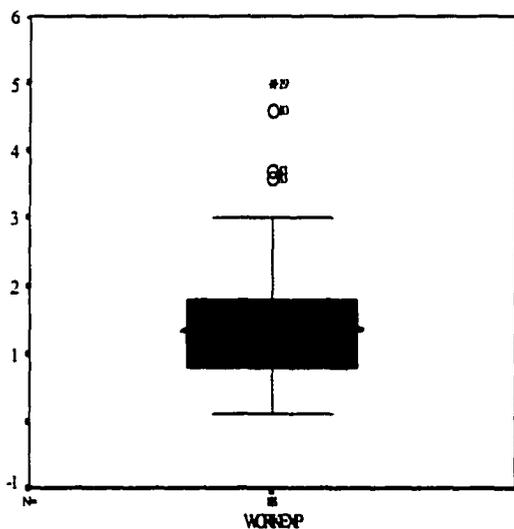
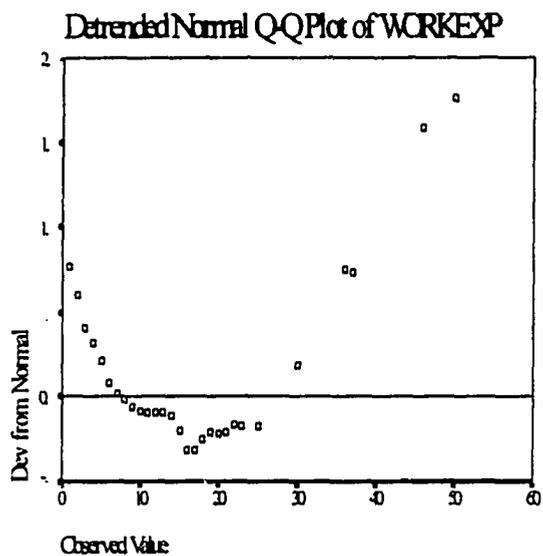
Stem-and Leaf, Q-Q Plots, Detrended Plots and Boxplots of Research Variables

WORK EXPERIENCE Stem-and-Leaf Plot

Frequency	Stem & Leaf
6.00	0 . 123334
22.00	0 . 5555566667777888899999
21.00	1 . 0000111112222333344444
20.00	1 . 55555555566666678899
10.00	2 . 0000122333
4.00	2 . 5555
1.00	3 . 0
4.00	Extremes (>=36)

Stem width: 10.00

Each leaf: 1 case(s)

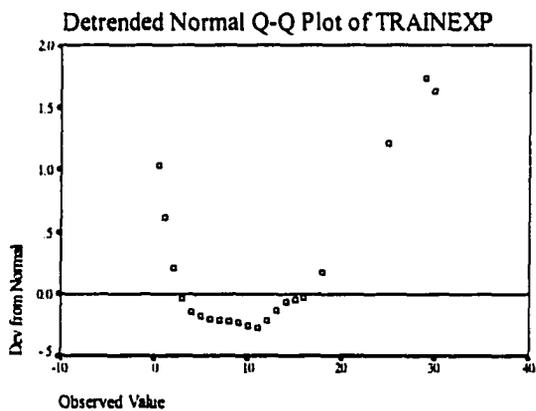
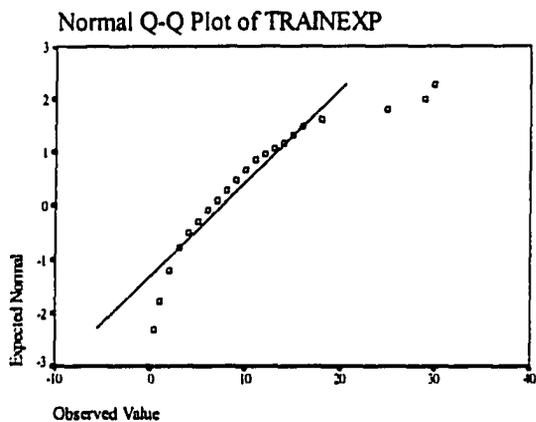


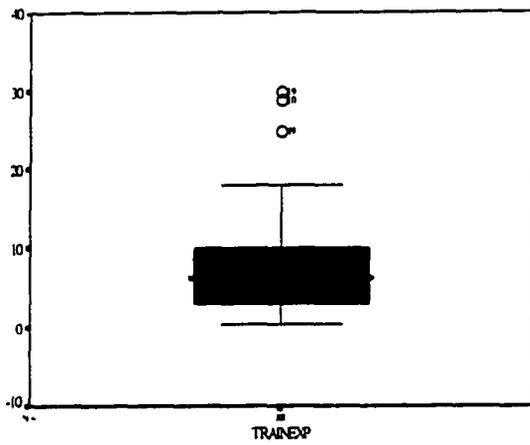
TRAINING EXPERIENCE Stem-and-Leaf Plot

Frequency	Stem & Leaf
5.00	0 . 01111
19.00	0 . 22222222223333333333
14.00	0 . 44444445555555
13.00	0 . 6666666777777
12.00	0 . 888888899999
10.00	1 . 000000111
4.00	1 . 2233
5.00	1 . 44555
1.00	1 . 6
2.00	1 . 88
3.00	Extremes (>=25)

Stem width: 10.00

Each leaf: 1 case(s)



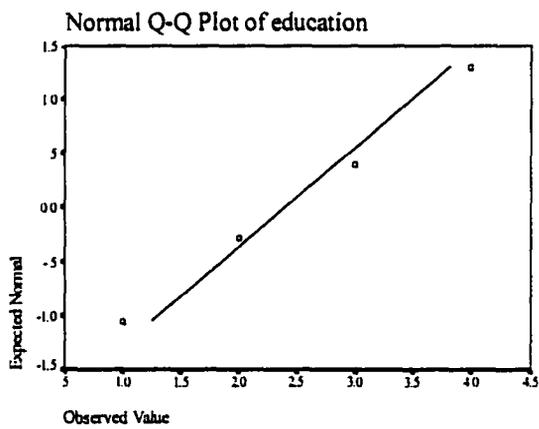


EDUCATION Stem-and-Leaf Plot

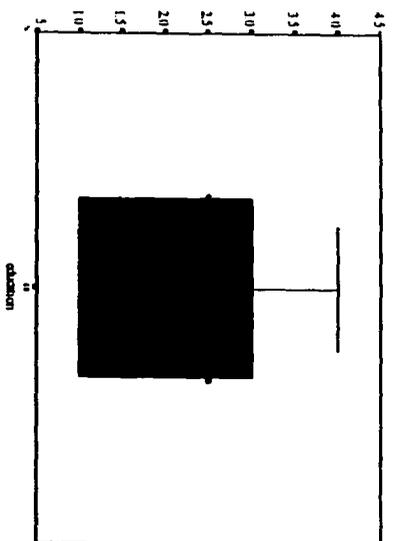
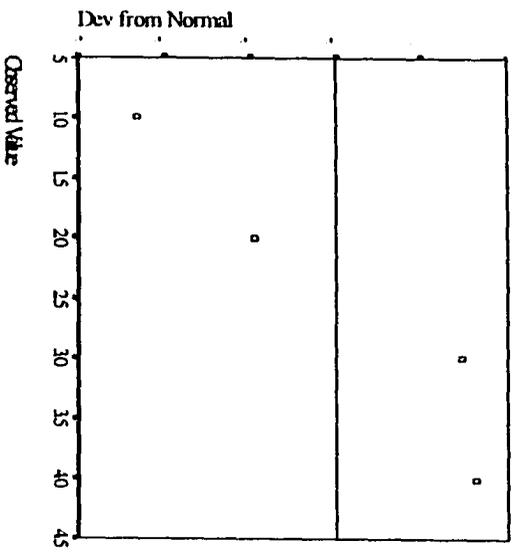
Frequency Stem & Leaf

25.00	1 .	000000000000000000000000
.00	1 .	
19.00	2 .	00000000000000000000
.00	2 .	
28.00	3 .	000000000000000000000000
.00	3 .	
16.00	4 .	0000000000000000

Stem width: 1
Each leaf: 1 case(s)



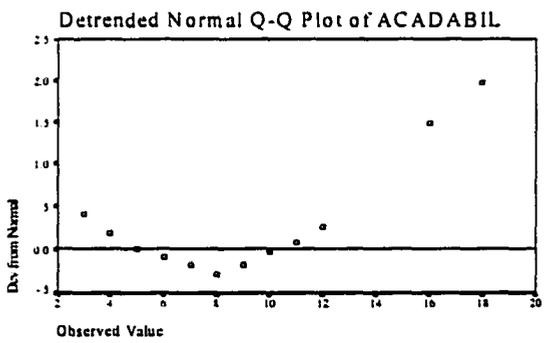
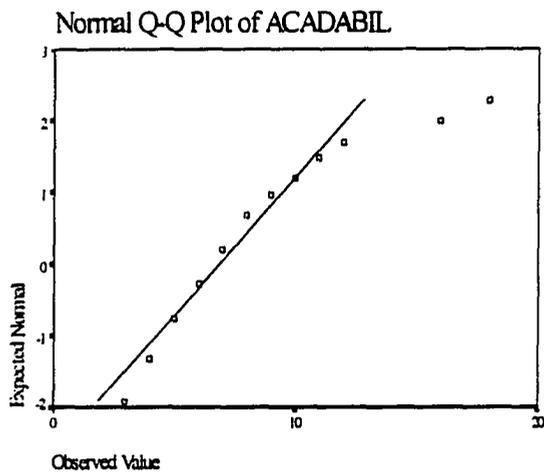
Detrended Normal Q-Q Plot of education

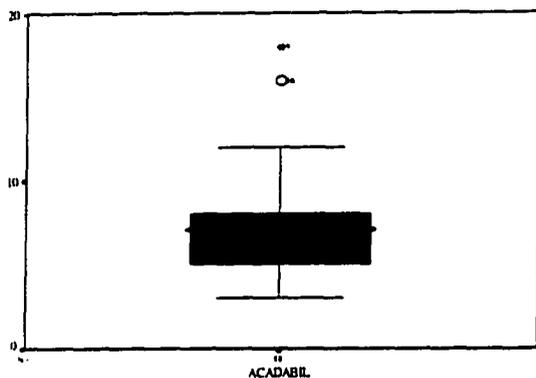


ACADEMIC ABILITY Stem-and-Leaf Plot

Frequency	Stem & Leaf
4.00	3 . 0000
8.00	4 . 00000000
16.00	5 . 0000000000000000
14.00	6 . 00000000000000
19.00	7 . 000000000000000000
12.00	8 . 000000000000
2.00	9 . 00
7.00	10 . 0000000
1.00	11 . 0
3.00	12 . 000
2.00	Extremes (>=16.0)

Stem width: 1.00
 Each leaf: 1 case(s)





ATTITUDE TOWARDS SELF Stem-and-Leaf Plot

Frequency Stem & Leaf

3.00 Extremes (= < 33)

1.00 4 . 7

10.00 5 . 0012234444

14.00 5 . 55666677889999

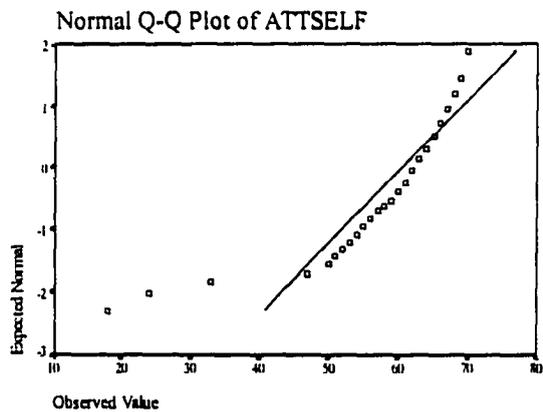
30.00 6 . 0000011111222222222233333444444

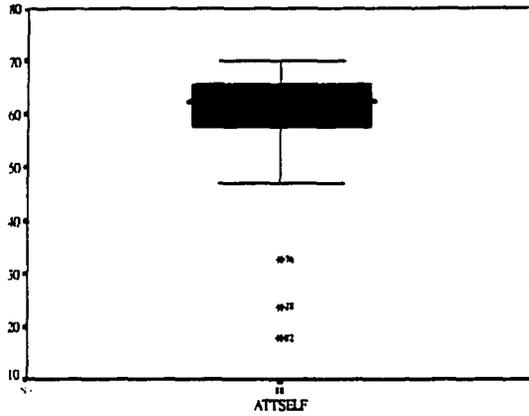
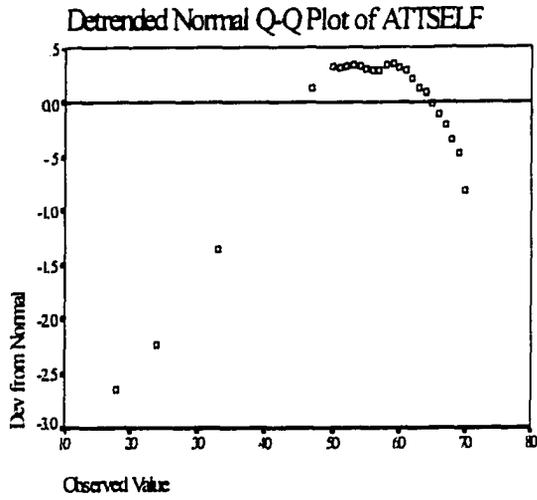
26.00 6 . 5555555566667777778889999

4.00 7 . 0000

Stem width: 10.00

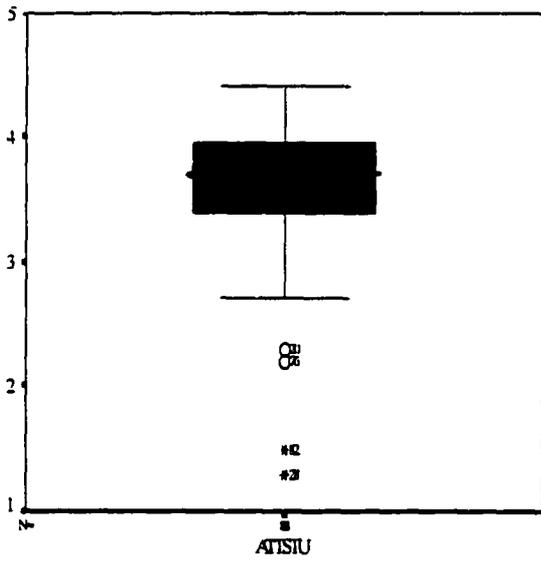
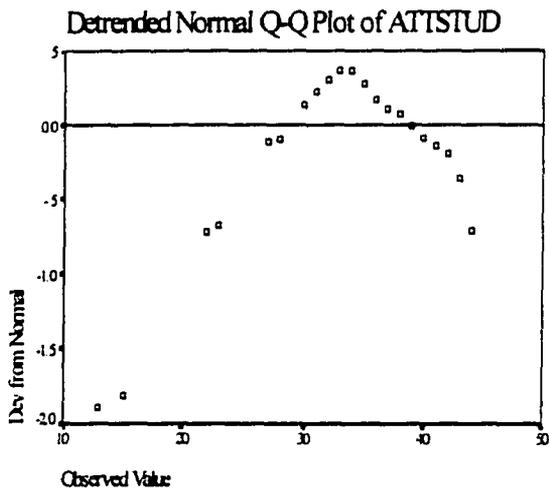
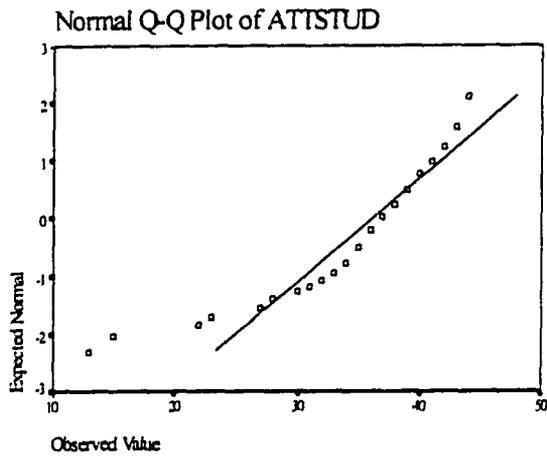
Each leaf: 1 case(s)





ATTITUDE TOWARDS STUDENTS
Stem-and-Leaf Plot

Frequency	Stem & Leaf
4.00	Extremes (= < 23)
4.00	2 . 7788
15.00	3 . 001222334444444
43.00	3 . 555555555666666666677777788888888899999999
22.00	4 . 0000001111122223333344
Stem width:	10.00
Each leaf:	1 case(s)



TRAINEE-CONTENT ORIENTATION Stem-and-Leaf Plot

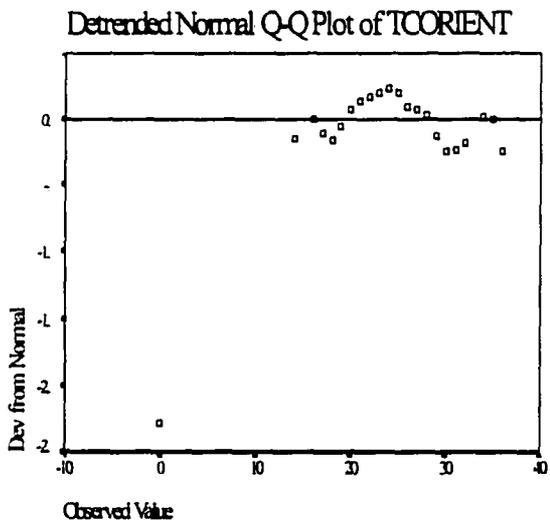
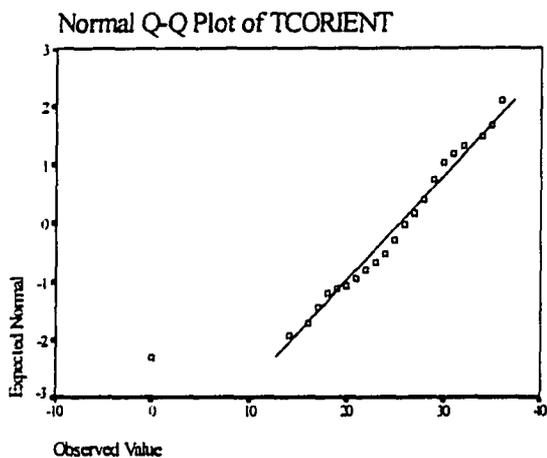
Frequency Stem & Leaf

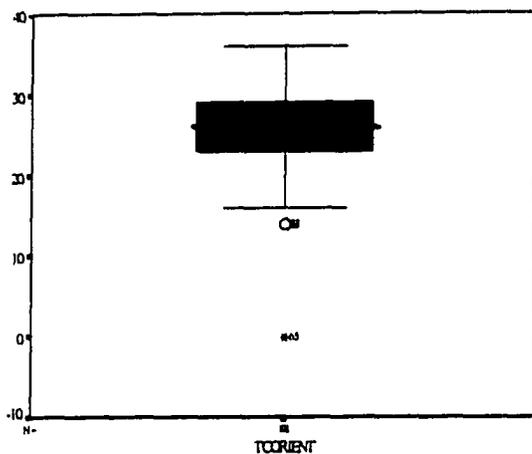
```

3.00 Extremes (= <14)
9.00  1 . 677777889
17.00 2 . 0111122233334444
44.00 2 . 55555555566666666667777888888888899999999
10.00 3 . 0000012224
5.00  3 . 55566
    
```

Stem width: 10.00

Each leaf: 1 case(s)

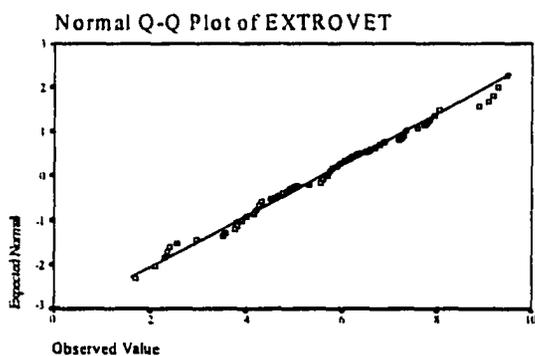


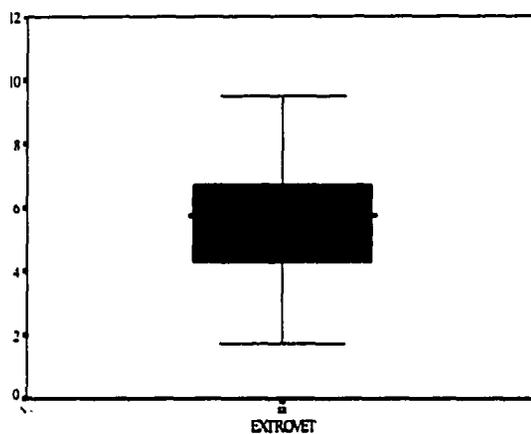
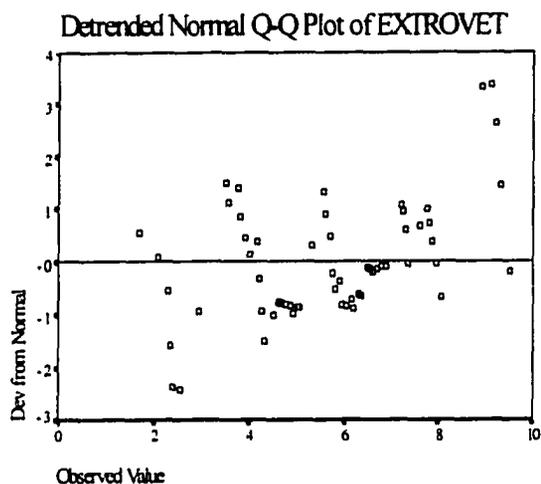


EXTROVERTED Stem-and-Leaf Plot

Frequency	Stem & Leaf
1.00	1 . 7
6.00	2 . 133459
8.00	3 . 55778999
20.00	4 . 01122222333566777899
21.00	5 . 00355666777777899999
14.00	6 . 01123355677899
12.00	7 . 223333678899
2.00	8 . 09
4.00	9 . 1235

Stem width: 1.00
 Each leaf: 1 case(s)





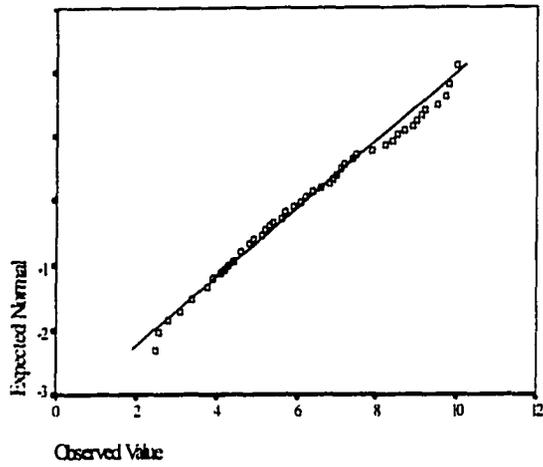
CREATIVITY Stem-and-Leaf Plot

Frequency Stem & Leaf

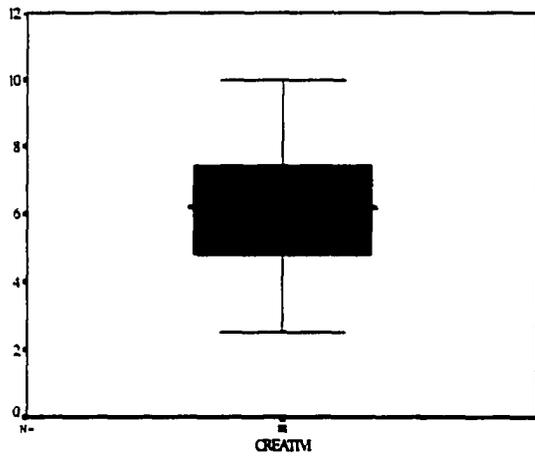
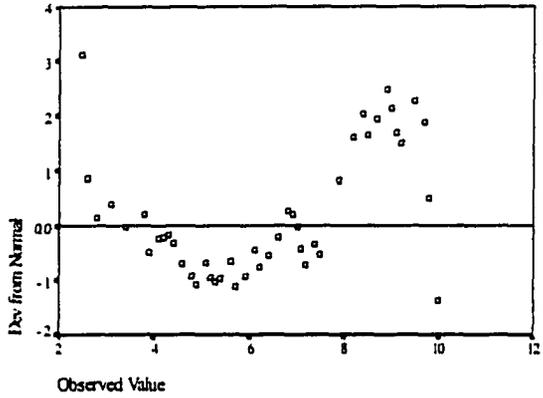
3.00	2 . 568
8.00	3 . 14448899
14.00	4 . 12344666668899
17.00	5 . 1122234466677799
15.00	6 . 112222446668999
14.00	7 . 00111124445999
7.00	8 . 2445579
8.00	9 . 00125778
2.00	10 . 00

Stem width: 1.00
 Each leaf: 1 case(s)

Normal Q-Q Plot of CREATIVI



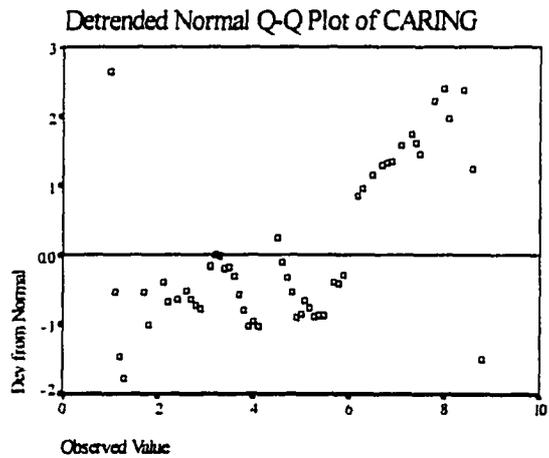
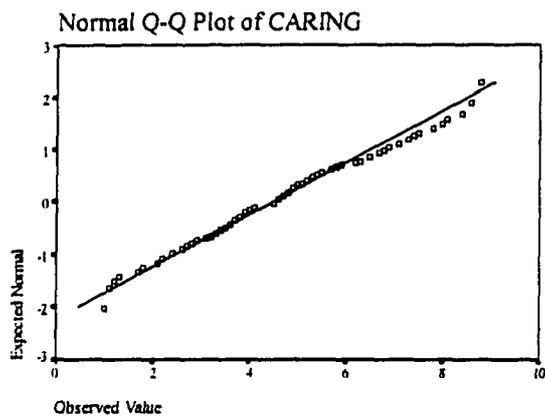
Detrended Normal Q-Q Plot of CREATIVI

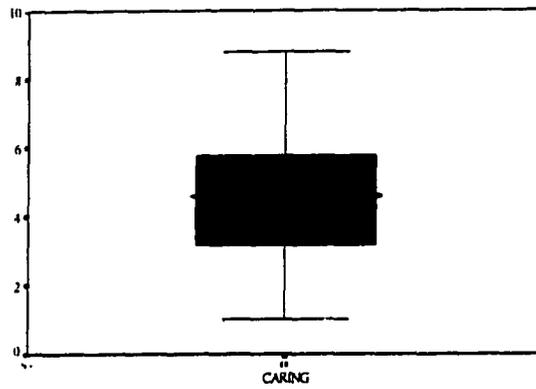


CARING Stem-and-Leaf Plot

Frequency	Stem & Leaf
10.00	1 . 0001123788
11.00	2 . 12244667889
17.00	3 . 12334456667788899
17.00	4 . 01115566667888899
13.00	5 . 0122234457789
8.00	6 . 23555789
6.00	7 . 113458
6.00	8 . 014668

Stem width: 1.00
Each leaf: 1 case(s)





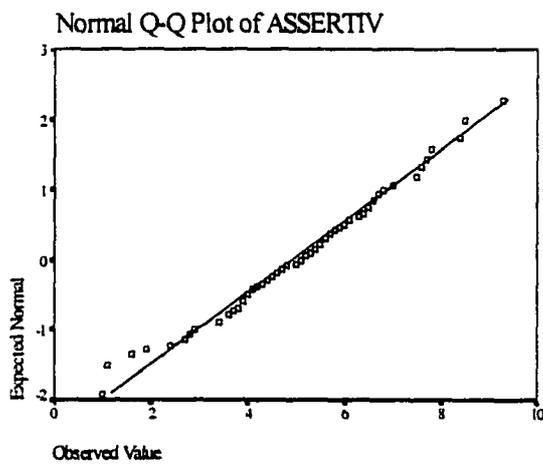
ASSERTIVENESS Stem-and-Leaf Plot

Frequency Stem & Leaf

9.00	1 . 000011169
6.00	2 . 477899
12.00	3 . 444667899999
15.00	4 . 001123445566778
19.00	5 . 0111233455556677789
14.00	6 . 011134555566678
9.00	7 . 005556778
3.00	8 . 445
1.00	9 . 3

Stem width: 1.00

Each leaf: 1 case(s)



APPENDIX E. DISCRIMINANT FUNCTION ANALYSIS

A. DISCRIMINANT FUNCTION ANALYSIS to Find Distinguishing Characteristics of Exemplary Trainers

Following variables will be created upon successful completion of the procedure:

Name	Label

DIS1_1 --- Function 1 for analysis 1

----- DISCRIMINANT ANALYSIS -----

On groups defined by JOBPCAT job competence

88 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
88 (Unweighted) cases will be used in the analysis.

Number of cases by group

JOBPCAT	Number of cases Unweighted	Weighted Label
1	18	18.0 exemplary
2	70	70.0 the rest
Total	88	88.0

Group means

JOBPCAT	ACADABIL	ASSERTIV	ATTSELF	ATTSTUD
1	6.16667	4.83333	63.27778	36.77778
2	6.85714	4.93857	60.87143	36.54286
Total	6.71591	4.91705	61.36364	36.59091

JOBPCAT	CARING	CREATIVI	EDUCATIO
1	4.68889	7.03333	2.55556
2	4.45429	6.02571	2.35714
Total	4.50227	6.23182	2.39773

JOBPCAT	EXTROVET	TCORIENT	TRAINEXP	WORKEXP
1	5.75000	27.44444	8.16667	16.72222
2	5.51643	25.31429	6.92000	12.62857
Total	5.56420	25.75000	7.17500	13.46591

Group standard deviations

JOBPCAT	ACADABIL	ASSERTIV	ATTSELF	ATTSTUD
1	2.30728	2.20507	3.08327	2.92163
2	2.11472	1.90098	6.89869	4.49375
Total	2.15997	1.95397	6.36835	4.20628

JOBPCAT	CARING	CREATIVI	EDUCATIO
1	1.90599	2.19679	1.14903
2	2.05099	1.76879	1.07724
Total	2.01374	1.89510	1.08850

JOBPCAT	EXTROVET	TCORIENT	TRAINEXP	WORKEXP
1	1.92743	3.11018	5.68020	6.96889
2	1.69553	5.16269	4.41032	6.26509
Total	1.73636	4.87605	4.68902	6.58621

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 86 degrees of freedom

Variable	Wilk's Lambda	F	Significance
ACADABIL	.98318	1.4711	.2285
ASSERTIV	.99952	.0411	.8399
ATTSELF	.97650	2.0695	.1539
ATTSTUD	.99949	.0442	.8340
CARING	.99777	.1925	.6619
CREATIVI	.95347	4.1965	.0436
EDUCATIO	.99453	.4729	.4935
EXTROVET	.99702	.2569	.6136
TCORIENT	.96859	2.7888	.0986
TRAINEXP	.98837	1.0122	.3172
WORKEXP	.93642	5.8391	.0178

----- DISCRIMINANT ANALYSIS -----

On groups defined by JOBPCAT job competence

Analysis number 1

Direct method: all variables passing the tolerance test are entered.

Minimum tolerance level..... .00100

Canonical Discriminant Functions

Maximum number of functions..... 1

Minimum cumulative percent of variance... 100.00

Maximum significance of Wilk's Lambda.... 1.0000

Prior probability for each group is .50000

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Wilk's'	Fcn Lambda	Chi-square	df	Sig
1*	.3904	100.00	100.00	.5299	:	0.719197	26.370	12	.0095

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

Discriminant Function 1

ACADABIL	-.35938
ASSERTIV	-.69628
ATTSELF	.61080
ATTSTUD	-.47342
CARING	.43446
CREATIVI	.69244
EDUCATIO	.02841
EXTROVET	.81620
TCORIENT	.22681
TRAINEXP	-.80402
WORKEXP	1.15757

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

Discriminant Function 1

WORKEXP	.41701
CREATIVI	.35352
TCORIENT	.28819
ATTSELF	.24826
ACADABIL	-.20931
TRAINEXP	.17363
EDUCATIO	.11867
EXTROVET	.08747
CARING	.07572
ATTSTUD	.03627
ASSERTIV	-.03498

Canonical discriminant functions evaluated at group means (group centroids)

Group	Discriminant Function 1
1	1.21814
2	-.31324

Classification results -

Actual Group	No. of Cases	Predicted Group Membership	
		1	2
Group 1 exemplary	18	13 72.2%	5 27.8%
Group 2 the rest	70	12 17.1%	58 82.9%

Percent of "grouped" cases correctly classified: 80.68%

Classification processing summary

88 (unweighted) cases were processed.
 0 cases were excluded for missing or out-of-range group codes.
 0 cases had at least one missing discriminating variable.
 88 (Unweighted) cases were used for printed output.
 88 cases were written into the working file.

B. Discriminant function analysis on Differential Prediction of Job Competence

SPSS for MS WINDOWS Release 6.1

Following variables will be created upon successful completion of the procedure:

Name	Label
DIS1_2	--- Function 1 for analysis 1
DIS2_2	--- Function 2 for analysis 1

----- DISCRIMINANT ANALYSIS -----

On groups defined by INDUSTR Industry

88 (Unweighted) cases were processed.
 0 of these were excluded from the analysis.
 88 (Unweighted) cases will be used in the analysis.

Number of cases by group

INDUSTR	Number of cases	
	Unweighted	Weighted Label
1	40	40.0
2	26	26.0
3	22	22.0
Total	88	88.0

Group means

INDUSTR	ACADABIL	CREATIVI	ATTSELF	TCORIENT
1	6.70	5.97	62.48	26.23
2	6.12	6.58	59.31	23.04
3	7.45	6.30	61.77	28.09
Total	6.72	6.23	61.36	25.75

INDUSTRY WORK EXPERIENCE

1	12.50
2	13.23
3	15.50
Total	13.47

Group standard deviations

INDUSTR	ACADABIL	CREATIVI	ATTSELF	TCORIENT
1	2.17444	1.77151	4.76627	4.60483
2	2.32081	1.98105	8.24024	4.67744
3	1.76547	2.02084	6.10177	4.21911
Total	2.15997	1.89510	6.36835	4.87605

INDUSTR WORKEXP

1	6.27572
2	4.81919
3	8.52866
Total	6.58621

Wilks' Lambda (U-statistic) and univariate F-ratio
with 2 and 85 degrees of freedom

Variable	Wilks' Lambda	F	Significance
ACADABIL	.94730	2.3642	.1002
CREATIVI	.98020	.8584	.4275
ATTSELF	.95381	2.0583	.1340
TCORIENT	.84494	7.7995	.0008
WORKEXP	.96561	1.5136	.2260

----- DISCRIMINANT ANALYSIS -----

On groups defined by INDUSTR Industry

Analysis number 1

Direct method: all variables passing the tolerance test are entered.

Minimum tolerance level..... .00100

Canonical Discriminant Functions

Maximum number of functions..... 2
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilk's' Lambda.. .. 1.0000

Prior probability for each group is .33333

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Wilks' Lambda	Chi-square	df	Sig
				:	0 .739685	25.027	10	.0053
1*	.2809	83.52	83.52	.4683 :	1 .947492	4.477	4	.3453
2*	.0554	16.48	100.00	.2291:				

* Marks the 2 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Discriminant Function 1	Discriminant Function 2
ACADABIL	.48628	.19464
CREATIVI	-.14737	.44027
ATTSELF	.22794	-.54075
TCORIENT	.82667	.06373
WORKEXP	.12102	.64402

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Discriminant Function 1	Discriminant Function 2
TCORIENT	.80821*	-.01154
ACADABIL	.43090*	.25005
WORKEXP	.18166	.68947*
ATTSELF	.33829	-.54200*
CREATIVI	-.15773	.48822*

* denotes largest absolute correlation between each variable and any discriminant function.

Canonical discriminant functions evaluated at group means (group centroids)

Group	Discriminant Function 1	Discriminant Function 2
1	.12608	-.24718
2	-.73785	.14232
3	.64276	.28123

Classification results -

Actual Group	No. of Cases	Predicted Group Membership		
		1	2	3
Business 1	40	20 50.0%	9 22.5%	11 27.5%
Technical 2	26	4 15.4%	16 61.5%	6 23.1%
Management 3	22	7 31.8%	3 13.6%	12 54.5%

Percent of "grouped" cases correctly classified: 54.55%

Classification processing summary

88 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
88 (Unweighted) cases were used for printed output.
88 cases were written into the working file.

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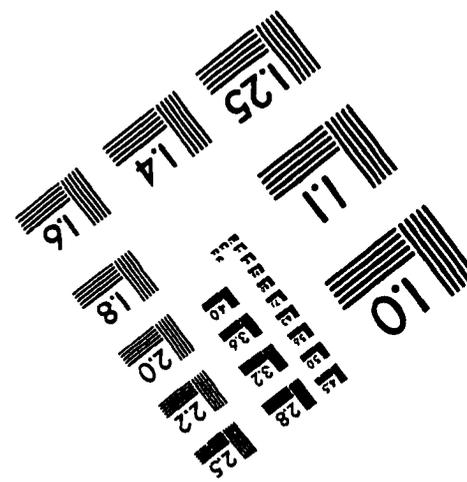
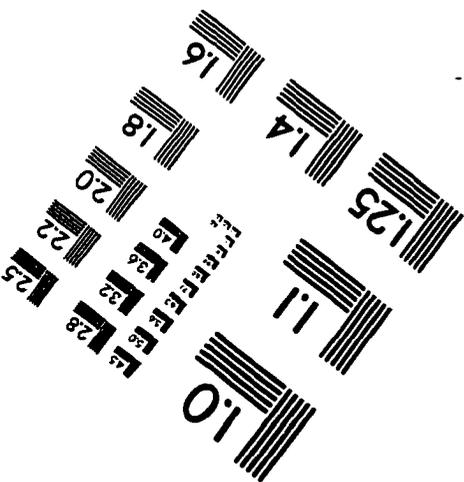
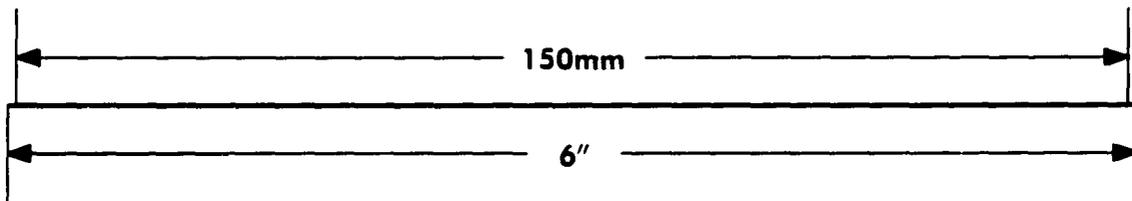
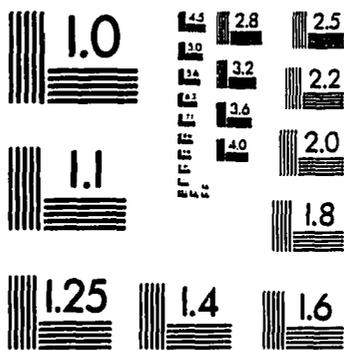
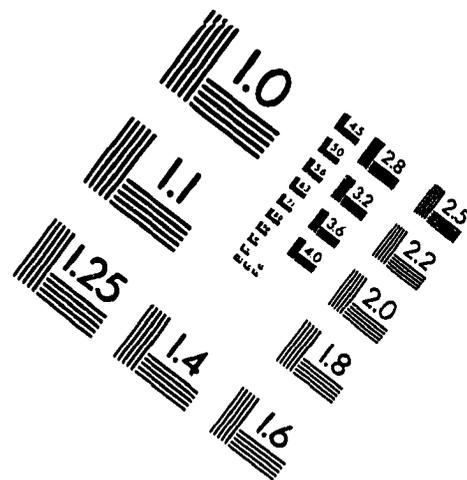
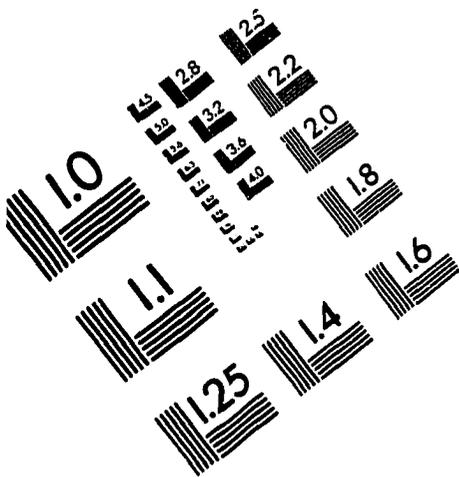
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