Job satisfaction of industrial arts teachers in secondary schools in Taiwan, Republic of China

Jui-Chen Yu
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Job satisfaction of industrial arts teachers in secondary schools in Taiwan, Republic of China

Yu, Jui-Chen, Ph.D.

Iowa State University, 1991
Job satisfaction of industrial arts teachers in secondary schools in Taiwan, Republic of China

by

Jui-Chen Yu

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of DOCTOR OF PHILOSOPHY

Major: Industrial Education and Technology

Approved:

Signature was redacted for privacy.

In Charge of Major Work

Signature was redacted for privacy.

For the Major Department

Signature was redacted for privacy.

For the Graduate College

Iowa State University
Ames, Iowa

1991
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CHAPTER I. INTRODUCTION

What makes a teacher want to teach? How can we motivate and keep the most capable teachers in the classroom? Is it possible to enrich teachers' professional lives? Answering these questions gives us the key to keeping the best teachers and attracting the most promising newcomers to the classroom (Ellis, 1989). The answers to these questions are also the key for education moving toward excellence.

Schlechty and Vance (1983) have shown that factors which discourage the more capable young people from entering or remaining in education were: 1) salary limitations, 2) the lack of different career stages within the profession, and 3) tendency of administration against sharing decision-making.

Schlechty (1984) further showed that the majority of potential teachers are threatened by teacher's preparation, teacher's certification, teacher's evaluation, teacher's salaries, and public education in general. He also provided solutions to change these situations: (1) a new channel for new teachers entering the field and for continuing career opportunities, (2) simplifying certification, and (3) reconceptualizing the role of teachers. Schlechty believed the teacher should be considered as a manager or executive, a clinical supervisor.

Chapman (1983) asserted that the attitude of teachers
toward their jobs is an issue of increasing research interest. There are three factors which have contributed to the importance of this issue. First, the social status and respect which the general public assigns to teachers has diminished. Educators are understandably concerned about this negative opinion and desire to better understand the reasons which lead to job satisfaction. Second, evidence shows that a teacher's level of job satisfaction may affect student learning. For example, Chapman, Kelly, and Holloway (1977) pointed out that teachers' enthusiasm in classroom teaching was significantly related to student achievement. Third, teachers are significantly less confident than non-teachers in their belief that they can find other jobs which provide comparable benefits (Stark, 1981). Although these factors are not totally comparable to the situation in Taiwan, the concepts that the influence of teachers' job satisfaction on student learning activities cannot be ignored.

Russell (1975) said "job satisfaction is a positive function of the attainment of need expectations" (p. 305). If teachers' primary needs are generally met by the school, teachers will report high job satisfaction; but if these needs are not generally met by the school, teachers will indicate low job satisfaction (dissatisfaction). Therefore, teachers' needs are the key for obtaining high job satisfaction.

However, what do teachers need? Shreeve and his
colleagues (1988) said teachers want to be seen and treated as professionals. Schneider (1985) found teachers need more opportunities for decision-making involvement. Sim (1988) stated that teachers want a good work environment, opportunities for professional development, and a good teacher-pupil rapport. Shreeve, Schneider, Sim and others lend some insight as to what teachers feel are necessary for them to perceive themselves as being fulfilled in their chosen profession. These insights are valuable data for the educational researchers in the search to determine teachers' needs.

In Taiwan, there are two teacher preparation programs for preparing industrial arts teachers for secondary schools. More than one thousand industrial arts teachers have graduated from these two programs. Generally, the educational goal is "to prepare competent secondary school industrial arts teachers, with the abilities to do research and development in their fields" (Lin & Bender, 1990, p. 4). An important issue for educators has emerged with the increasing number of industrial arts teachers in Taiwan, the issue of job satisfaction.
Statement of the Problem

The problem of this study was to investigate the degree of job satisfaction of industrial arts teachers who graduated from National Kaohsiung Normal University since 1975-1989 in Taiwan, R.O.C. and who are teaching in the secondary schools in Taiwan.

Purpose of the Study

The purpose of this study was to analyze the relationships between the relative factors and degree of job satisfaction of industrial arts teachers who graduated from National Kaohsiung Normal University in Taiwan. Specifically, the objectives of the study were:

1. to identify the factors which contribute to job satisfaction of industrial arts education graduates from National Kaohsiung Normal University in Taiwan,
2. to investigate and analyze factors which contribute to job satisfaction of industrial arts education graduates from National Kaohsiung Normal University in Taiwan,
3. to develop a flow diagram for predicting overall job satisfaction of industrial arts teachers who graduated from National Kaohsiung Normal University in Taiwan, and
4. to provide suggestions for the practical application
of the findings and the enhancement of industrial arts teachers job satisfaction in Taiwan, R.O.C.

Need for the Study

Industrial arts teacher education has played an important role in preparing teachers with the necessary competencies to teach students to understand our technological world and to prepare them for work in the Republic of China. Furthermore, industrial arts teacher education has contributed significantly to the economic development of Taiwan since its founding in 1953 (Land, 1976). In 1969, a second industrial arts education program was established. This program was the Department of Industrial Arts Education at National Kaohsiung Normal University. A change was made to increase the number of industrial arts teachers in Taiwan.

However, in Taiwan today’s industrial arts teachers encounter many problems as a result of the influence of the yearly College Joint Entrance Examination. For every young student between the ages 13 to 18, his/her first priority is to pass the entrance examination. Since both the entrance examinations for senior high schools and college/university admission are very competitive and industrial arts is not included in the required subjects for these examinations, most parents, principals, teachers, and even students in secondary schools view industrial arts as a subordinate subject, not
worthy to make much of a contribution in preparation for the College Joint Entrance Exam (Lee, 1990). This causes many industrial arts teachers to feel as though they are not contributing to the educational system (Lin & Bender, 1990).

Moreover, the teaching load for industrial arts teachers is heavier than those teachers in other subjects. Without considering the time for preparation of curriculum, tests and homework, correction of tests and homework, and teacher personal development, the industrial arts teachers spend approximately 18-24 teaching hours per week, while other teachers spend only 12-18 teaching hours. This may vary in different cities and with the size of the school (Lin & Bender, 1990). Additionally, the class size—on average 46 students per classroom—is far beyond the teacher/student ratio industrial arts teachers can handle. However, the problem is these factors discourage industrial arts teachers. The young ambitious teacher's ideals are almost dissipated during the first year of teaching (Lin & Bender, 1990). In order to solve the four problems identified above, it is important to find out how industrial arts teachers think and feel about industrial arts education.

Because teaching is unique (Lortie, 1975), there are great differences among professions, value systems, and specific job features. It is, therefore, essential to explore the nature of the educational work setting and characteristics
of teachers in order to understand teacher’s job satisfaction. Clearly, there is a growing need to create a more exact measure of job satisfaction that can be applied specifically to an educational setting (Lester, 1987).

Questions of the Study

This study attempted to answer the following questions:

1. Does the age of the respondent affect the degree of job satisfaction?
2. Does the sex of the respondent affect the degree of job satisfaction?
3. Does the marital status of the respondent affect the degree of job satisfaction?
4. Is there a relationship between the rank/position of the respondent and job satisfaction?
5. Is there a relationship between the salary of the respondent and the degree of job satisfaction?
6. Is there a relationship between the work itself and the degree of job satisfaction?
7. Does supervision at the respondent’s school affect the degree of job satisfaction?
8. Is there a relationship between the opportunity of advancement/promotion and job satisfaction?
9. Is there a relationship between the geographic location of the school of the respondent and the
degree of job satisfaction?

10. Does the teaching experience of the respondent affect the degree of job satisfaction?

11. Is there a relationship between teacher preparation and the degree of job satisfaction of the respondent?

12. Is there a relationship between working conditions of the respondent and the degree of job satisfaction?

13. Does recognition affect the degree of job satisfaction of the respondent?

14. Does fellowship with colleagues affect the degree of job satisfaction of the respondent?

Assumptions of the Study

The assumptions for this study were:

1. The sample (approximately n=200) drawn in this study constitute an adequate representation of the population (approximately N=480).

2. The respondents are knowledgeable about the questions and will reply honestly.

Delimitations of Investigation

The delimitations of this study were:

1. This study investigated only industrial arts education graduates from National Kaohsiung Normal University in Taiwan.
2. Only teachers who have worked for more than one year were eligible to participate in this study.

Procedures of the Study

The procedures of this study were:

1. Identify a research problem.

2. Review the related literature on job satisfaction.

3. Write a proposal that will be discussed with the graduate advisor, the graduate committee, and the graduate students of industrial education and technology department at Iowa State University.

4. Identify the population and sample for this study.

5. Construct test hypotheses.

6. Identify and label dependent and independent variables.

7. List all the sample subjects.

8. Select, develop, and modify an instrument for the study.

9. Present the proposal to the graduate committee members.

10. Translate the questionnaire into Chinese.

11. Submit proposal and instrument to Human Subjects Review Committee for approval.

12. Perform a pilot study with a sample of eligible teachers in Taiwan.
13. Discuss the pilot study with the committee members and revise the instrument based on their recommendations and the study results.

14. Mail the questionnaires to the selected sample participants.

15. Follow-up with additional questionnaires and letters in case of inadequate or non-returns of the initial mailing.

16. Collect data from the questionnaires, code and analyze the data.

17. Develop a model for predicting overall job satisfaction.

18. Write a final report, summary, conclusion, and make recommendations based on the findings.

Definition of Terms

The following terms were defined for use in this study:

**Education**: refers to all schools, colleges, universities, or school/education affiliated institutions where graduates may be employed (including local, state and national education agencies).

**Industrial Arts Education**: refers to a comprehensive educational program concerned with technology, its evolution, utilization, and significance; with industry, its organization, personnel, systems, techniques, resources, and
products; and their social/cultural impact (Snyder & Hales, 1981).

**Job Satisfaction:** refers to the individual's response to the work place. The term includes activities such as unionization and its impact on workers' perceptions of their work setting (Hopkins, 1983).

**Motivation:** refers to internal states of the organism that lead to the instigation, persistence, energy, and direction of behavior (Corsini & Ozaki, 1984).

**Work:** refers to paid employment. It does not include household maintenance activities or the pursuit of hobbies.
CHAPTER II. LITERATURE REVIEW

Introduction

Job satisfaction has been a major concern in industry and business for more than fifty years, but has only been considered in the field of education within the past few decades. Generally, researchers have found that the relationship between job satisfaction and such factors as age, gender, education, job security, and productivity. Also, researchers believe happy workers are productive workers. Initially, researchers were interested in the topic of job satisfaction because it influences productivity. However, today more researchers are involved in studying job satisfaction because they are attempting to determine its causes (Ashbaugh et al., 1982).

Furthermore, studies related to job satisfaction have another serious concern, the quality of life. Material possessions and economic growth do not necessarily result in a high quality of life. However, how can we improve the affective quality of life? "Job satisfaction is one measure of the quality of life in organizations and is worth understanding and increasing, even if it doesn't relate to performance" (Lawler, 1973, p. 62). Anything that happens to people during the work day can have a profound influences on the individual employee's life, family, or society.
Therefore, these events cannot be ignored if the quality of life in a society is to be high.

This review of the literature is organized into five sections: (a) theoretical framework, (b) measurement of job satisfaction, (c) studies related to job satisfaction, (d) studies related to teacher job satisfaction, and (e) summary.

Theoretical Framework

Howell and Dipboye (1982) described two common unifying themes of various theories of motivation and satisfaction. First, most of these theories try to explain "why people of roughly equivalent skill differ in the ways they perform their work roles" (p. 42). Second, to understand the vigor, persistence, and direction of human behavior, these theories "look inside the person for causes, such as needs, expectations, drives, and other presumed internal motivating state" (p. 42).

Geering (1980) divided contemporary motivation theories into three major categories: content theories, process theories, and the reinforcement theory. Content theories are concerned with the content issues of motivation and satisfaction, such as the need-hierarchy and two-factor theory. Process theories focus on the developmental process of motivation and satisfaction, like valence-instrumentality-expectancy theory and equity theory. Reinforcement theory,
developed by Skinner in 1953, pointed out that the study of motivation should be focused on measurable and observable behaviors rather than needs or goals.

Six theoretical approaches have been reviewed for this study of job satisfaction: (1) Need-hierarchy theory, (2) Two-factor theory, (3) Expectancy theory, (4) Equity theory, (5) Reinforcement theory, and (6) Discrepancy theory.

Need-hierarchy theory


1. Physiological needs. This is the lowest level of human needs including food, rest, exercise, shelter, and clothing. These physiological needs are the most important of all needs and the major motivation of job satisfaction. When a person lacks food, safety, love, and self-esteem, he/she would most probably hunger for food more strongly than for anything else.

2. Safety needs. When physiological needs are satisfied, the needs at the next higher level tend to dominate behavior. The next higher level is in the area of safety such as security, stability, dependency, protection, and so on.
3. Belongingness and love needs. When no longer concerned about physiological needs and physical welfare, social needs become important to motivation. These are the needs for belonging, for association, for acceptance, for giving and receiving friendship and love.

4. Esteem needs. Most people in our society desire a stable, firmly-based, usually high evaluation about themselves, for self-respect, or self-esteem, and for the esteem of others. Satisfaction of the self-esteem need leads to feelings of self-confidence, worth, strength, capability, and adequacy, of being useful and necessary in the world.

5. Need for self-actualization. "A musician must make music, and an artist must paint, and a poet must write" (Maslow, 1970, p. 46). What a person can be, he/she must be. The need we may call self-actualization occurs after the satisfaction of the physiological, safety, love, and esteem needs are achieved.

Maslow's need-hierarchy theory has two related aspects. First, it assumes that needs are activated in a sequential way with a need at a higher level emerging only when the next lower-level need has been satisfied. Chang and Lin (1981) graphically demonstrated the relationships among human needs based on the first assumption (see Figure 1). Therefore, safety needs emerge only after physiological needs have been satisfied, and so on. Second, when a need is satisfied, it
decreases in strength and ceases to dominate behavior; the next higher need in the hierarchy then increases in strength and assumes control of behavior. Thus, when physiological needs are satisfied, they decrease in strength and the strength of the safety needs increases (Robertson & Smith, 1985).

Figure 1. Maslow's hierarchy of needs

Howell and Dipboye (1982) suggested the implications of Maslow's theory for organizational management have two broad directions. First, it is necessary to determine which level of employees' needs cannot be satisfied so a decision can be made as to how to motivate the employees. Second, the most concern of any organization is to satisfy all the employees' lower-order needs so they will be motivated by self-esteem and self-actualization needs.
Two-factor theory

As Russell (1975) pointed out, it is possible to classify research on the issue of job satisfaction into two broad theoretical orientations. First, the "unidimensional" orientation views job satisfaction as a one-factor concept. Historically before 1959, the one-factor approach to job satisfaction was found in all the studies which researched "job attitudes" as the "unidimensionality" of the concept of "job satisfaction." This is to say, feelings toward the job were classified as either positive (satisfaction) or negative (dissatisfaction). Second, the "multi-dimensional" orientation views job satisfaction as a two-factor concept. Since Herzberg and his colleagues (1959) argued that job satisfaction is not a unidimensional attitude, the multidimensional orientation has replaced the traditional "unidimensional" concept.

According to Hill's (1987) description, in Herzberg's theory the differences between two factors that contribute to job satisfaction or dissatisfaction can be summarized as follows:

**Job Content Factors** These are called "intrinsic factors" or "motivators." They are elements related to the actual content of work and contribute to job satisfaction.

**Job Context Factors** These are referred to as "extrinsic factors" or "hygienes," and are elements associated
with the work environment. Herzberg maintains that these items are associated with job dissatisfaction because they frequently fail to meet the individual's needs for avoiding unpleasant situations.

The first set of job factors includes achievement, recognition for achievement, work itself, responsibility, advancement, and the possibility of growth. The other set of job factors includes supervision, company policy and administration, working conditions, interpersonal relations, status, job security, salary, and personal life. Herzberg and his associates (1959, p. 116) concluded that "the motivators fit the need for creativity, the hygiene factors satisfy the need for fair treatment, and thus, the appropriate incentive must be present to achieve the desired job attitude and job performance."

Pinder (1984) suggested that in order to produce positive job attitudes and motivate an employee, motivators identified by Herzberg must be built into an employee's job environment. The content of the work is a very important thing. Work must allow the individual opportunities to feel achievement and receive recognition for that achievement. The work should be interesting, provide for advancement, and require responsibility. When jobs are designed according to these principles, motivation and positive attitudes will be forthcoming.
Furthermore, Fincham and Rhodes (1988) described that Herzberg’s theory provided some principles for employers to redesign jobs by involving more motivators (see Table 1).

Table 1. Herzberg’s principles of vertical job loading

<table>
<thead>
<tr>
<th>Principles</th>
<th>Motivators Involved</th>
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<tr>
<td>Increasing employees’ autonomy while retaining accountability</td>
<td>Responsibility and achievement</td>
</tr>
<tr>
<td>Increasing the accountability of employees for their own work</td>
<td>Responsibility and recognition</td>
</tr>
<tr>
<td>Providing employees with a complete natural unit of work</td>
<td>Responsibility, achievement, and recognition</td>
</tr>
<tr>
<td>Making performance feedback available to employees</td>
<td>Recognition</td>
</tr>
<tr>
<td>Introducing new and more difficult tasks to employees’ work</td>
<td>Growth and learning</td>
</tr>
<tr>
<td>Assigning employees specific or specialized tasks at which they can become expert</td>
<td>Responsibility, growth, and advancement</td>
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If a theory provides information about what factors motivated people and how jobs can be modified to achieve a good working environment, it will attract a great deal of interest from managers who are seeking methods of motivating staff.

Based on the motivator-hygiene theory of job satisfaction, Schmidt (1980) designed an organizational model to improve job satisfaction of teachers and administrators.
This model is based on the following assumptions:

1. Nothing in the organizational structure of education requires the work of educators to be limiting or frustrating.
2. Educational work should be congenial, absorbing, motivating, and exciting.
3. Educators want to understand their environment, to make things happen, and to create events rather than to merely await them and then react.
4. The power of educators to regulate their working methods, to set their goals and standards, and even to have a role in determining their rewards, is a key to sustained productivity.

This model is graphically presented in Figure 2. Such a model may provide a strategy for employee job satisfaction in education and increase the educator's desire to stay and be productive.

**Expectancy theory**

In general, Maslow's and Herzberg's theory deal with the content (i.e., specific needs) of human motivational systems. Expectancy theory, an alternative approach to understanding motivation, examines the psychological processes that are involved in motivation (Robertson & Smith, 1985).
Vroom first proposed valence-instrumentality-expectancy theory or expectancy theory in 1964 in the book *Work and Motivation*. Two propositions were specified:

**Proposition 1.** The valence of an outcome to a person is a monotonically increasing function of the algebraic sum of the products of the valences of all other outcomes and his conceptions of its instrumentality for the attainment of these other outcomes (p. 17). Symbolically, the proposition should be specified as follows:

\[
V_j = f_j \left[ \sum_{k=1}^{n} (V_k I_{jk}) \right] \quad (j=1\ldots n)
\]

\[
f_j > 0; \quad iI_{jj} = 0
\]
where $V_j$ = the valence of outcome $j$, and

$I_{jk} =$ the cognized instrumentality ($-1 \leq I_{jk} \leq 1$) of outcome $j$ for the attainment of outcome $k$.

**Proposition 2.** The force on a person to perform an act is a monotonically increasing function of the algebraic sum of the products of the valences of all outcomes and the strength of his expectancies that the act will be followed by the attainment of these outcomes (p. 18). In equation form, this proposition is described as follows:

$$F_i = f_i \left[ \sum_{j=1}^{n} (E_{ij}V_j) \right] (i=n+1...m)$$

where $F_i =$ the force to perform act $i$,

$E_{ij} =$ the strength of the expectancy ($0 \leq E_{ij} \leq 1$) that act $i$ will be followed by outcome $j$, and

$V_j =$ the valence of outcome $j$.

To understand Vroom's two propositions, it is necessary to examine the four key components: Valence, Expectancy, Force, and Instrumentality.

1. **Valence:** Vroom (1964) defined the term valence as affective orientations toward particular outcomes. The valence of an outcome is positive when people prefer achieving the result, to not achieving the result. The valence of an outcome is zero when people have no preference about attaining or not
attaining the outcome. The valence of an outcome is negative when people prefer not to gain the outcome rather than gain it. As Vroom described, however, "there are many outcomes which are positively or negatively valent to a person, but are not in themselves anticipated to be satisfying or dissatisfying" (p. 15). For instance, most people would like to perform their jobs successfully because they know that success on the jobs will lead to advancement.

2. Expectancy: An expectancy was defined by Vroom (1964) "as a momentary belief concerning the likelihood that a particular act will be followed by a particular outcome" (p. 17). The value of expectancy ranges from zero (which means psychologically zero—the person does not believe he/she can attain an outcome) to 1.0 (which means the person has no doubt about his/her ability to attain an outcome).

3. Instrumentality: According to Vroom (1964), "Expectancy is an action-outcome association; and instrumentality is an outcome-outcome association" (p. 18). Instrumentality can be considered as a belief connecting one outcome to other outcomes, ranging from -1.0, indicating a belief that attaining
the second outcome will be possible without the first outcome, through +1.0, indicating a belief that the first outcome is required for attaining the second outcome.

4. **Force**: The psychological interactions among valences, instrumentalities and expectancies create a motivation force. The force leads a person to act in ways that seem to bring pleasure or to avoid pain. Pinder (1984) provided an example: if a person decides to strive for a particular level of job performance, it would indicate that the person's decision causes the greatest amount of force to reach that level.

Based on these concepts, Nadler and Lawler (1979) constructed a general model of behavior in organizational settings (Figure 3). In this model, motivation is considered as the force on the individual to exert effort. But, effort alone is not enough. Effort should be combined with the individual's ability to perform at a given level. As a result of performance, the individual gains particular outcomes. Sometimes as this process of performance-reward occurs, people do not get expected outcomes (as shown by the outlined arrow). However, the process provides information which influences the individual's expectancies and motivation in the future.
A person's motivation is a function of:
- Effort-to-performance expectancies
- Performance-to-outcome expectancies
- Perceived valence of outcomes

**Figure 3. The basic motivation-behavior sequence**

**Equity theory**

Several theories related to motivation have emerged during the past 30 years that are concerned with the "social comparison process." Generally, these theories suggest an individual is heavily motivated by the feelings how he/she is being treated as compared to those around him or her (Steers & Porter, 1979). Also, these theories are based on three assumptions: First, workers believe that they can receive a fair, just, or equitable return for their contributions to the job. Second, workers tend to compare their inputs (skills, education, effort, etc.) and outcomes (pay, promotion, job status, etc.) with those of their co-workers (comparison
persons), and then decide what their equitable return should be. Finally, when workers feel themselves in an inequitable situation, they will try to reduce the inequity (Carrell & Dittrich, 1978).

According to Adams (1963), inequity, rather than equity, occurs whenever an individual perceives that the ratio of his/her outcomes to inputs is unequal to the ratio of others' outcomes to inputs. People usually believe about the nature and quantity of outcomes they receive as a result of doing their work. Pay, fringe benefits, job satisfaction, status, opportunities to promotion, etc., can be considered as outcomes. Therefore, when unequal treatment happens to a person, he/she will try to achieve equity or to reduce inequity. The following actions, provided by Adams (1965), are available for people to achieve equity.

1. Altering inputs: People may increase their inputs if their inputs are low as compared to others' inputs and to their own outcomes. On the other hand, people may decrease their inputs if their inputs are high when compared to others' inputs and to their own outcomes.

2. Altering outcomes: People may change their outcomes, either decreasing or increasing them, depending on which way such outcomes have more advantages or disadvantages.
3. Distorting inputs or outcomes: People may psychologically distort the inputs or outcomes, increasing or decreasing them as they want.

4. Leaving the field: People may choose to leave the current job when they experience unequal treatment of any type, including quitting the job or obtaining a transfer or reassignment.

5. Taking actions on others: People may attempt to change others' inputs or outcomes, or try to force others to leave the field.

6. Changing the object of comparison: The person may change reference objects with whom he/she compares himself/herself when he/she experiences inequity. Also, the person and the object remain in an exchange relationship with a third group.

7. Choice among modes of inequity reduction: When inequity exists, any of the means of reduction described above are potentially available. However, the uses of methods of reducing inequity vary. It is necessary to have a general guideline for governing the adoption of one method over another.

One important area related to equity theory is to understand how individuals choose comparison referents which are used to evaluate inputs and outcomes. Goodman (1977) postulated that the selection of a referent is determined by
both availability of information and relevance or attractiveness of referent. Availability of information is decided by both structural characteristics of the comparer's role and individual characteristics. Relevance of attractiveness of referent is established by both member and strength of needs related to referent and instrumentality of referent for satisfying needs. Finally, instrumentality of referent for satisfying needs is determined by both computational ease in evaluating referent and appropriateness of referent.

Mowday (1977) graphically presented a model to analyze Goodman's propositions which showed factors that may influence the selection of comparison person or standard (see Figure 4).

Reinforcement theory

The basic concept of reinforcement theory is that human behavior can be controlled, shaped, or changed by using the reward structures of different types of behavior. The process is called "positive reinforcement" or "behavior modification" (Steers & Porter, 1979). Skinner (1953) defined "a positive reinforcer is a stimulus which, when added to a situation, strengthens the probability of an operant response" (p. 73). Reinforcers, either positive or negative, are classified into two categories: (1) unconditioned or primary reinforcers, such as food, water, and sex, and (2) conditioned or secondary
reinforcers, such as job advancement, praise, recognition, and money. No matter whether the positive reinforcer is primary or secondary, it can be used to improve the worker's performance.

According to Luthans and Kreitner (1975), reinforcement theory relied on three fundamental principles:

1. It has to deal with observable behavioral events only, not attitude, perceptions, or feelings.

Figure 4. Factors influencing the selection of a referent in social comparison processes
2. Behavior should be measured in terms of response frequency, or the extent to which individuals repeat desired behaviors.

3. It is necessary to build clear contingency relationships for employees between behaviors and rewards.

Based on these principles, Luthans and Kreitner (1974) developed a behavioral contingency management or BCM model which could be applied to organizational behaviors. This model begins with the identification of performance-related behavioral events which may be classified into desirable, undesirable, or irrelevant categories. The manager should identify which behaviors are desirable and need to be strengthened and maintained, and also which behaviors are undesirable and must be weakened and extinguished. The second step is to measure the frequency of response and establish a baseline which can be used to determine whether the behavior has to be changed. The third step is to identify existing contingencies through functional analysis. The manager should involve careful observations of what normally precedes and follows various types of work behavior. The fourth step is to develop intervention strategies. To develop strategies, there are some environmental variables which need to be considered: the structure of organization, internal organizational processes, the use of technology, the nature of groups, and
the nature of task. The final step is to evaluate the intervention by observing the impact on performance and organizational consequences. The BCM model must be able to improve performance in terms of effectiveness.

Discrepancy theory

Many researchers have focused on the discrepancy approach to think about satisfaction for thirty years. According to Locke (1969), "Job satisfaction and dissatisfaction are a function of the perceived relationship between what one wants from one’s job and what one perceives it as offering or entailing" (p. 316). It is a surprise to experience a discrepancy between what one gets and what one expects. If the outcome is what one "values," it is an enjoyable surprise. On the other hand, if the outcome is what one "disvalues," it is not an enjoyable surprise. Moreover, the same degree of discrepancy between perception and value could lead to different degrees of satisfaction, depending on how the individual views this discrepancy.

Porter (1961) stated a different approach from Locke’s. He considered the difference between how much of a given outcome there should be for the job and how much of a given outcome there actually is to be a measure of satisfaction. He emphasized satisfaction is influenced by how much a person feels he/she should receive, not by how much he/she wants.
Katzell (1964) argued that "people differ markedly in the degree of job satisfaction. In addition to errors of measurement, the variance in job satisfaction may be attributed to (a) differences in stimuli, i.e., features of jobs (such as pay or supervision), and (b) differences in the job incumbents" (p. 342). Katzell also constructed an equation to describe the relationship among job satisfaction, stimuli, and value.

\[ s_x = 1 - f\left(\frac{X_x - V_x}{V_x}\right) \]

where \( s_x \) = the relative satisfaction,

\( X_x \) = the magnitude of a stimulus,

\( V_x \) = that magnitude of a stimulus of type X which evokes the most pleasurable affect, i.e., the value, and

\( f \) = an increasing functional relationship rather than an exact specification of the relationship between the terms on both sides of the equality sign.

Lawler (1973) presented a discrepancy model to analyze what determines a person's satisfaction with any facet of the job (see Figure 5). The model shows two variables: a and b. "a" indicates what a person feels he/she should receive, and "b" indicates what he/she perceives that he/she actually receives. When "a" equals "b," the person will be satisfied. When "a" is greater than "b," the person will be
Figure 5. Model of the determinants of satisfaction

dissatisfied. However, when "a" is less than "b," the person will have feelings of guilt, inequity, and sometimes discomfort.

Lawler (1973) also summarized the implications of the model about who should be dissatisfied:

1. People with high perceived inputs will be more dissatisfied with a given facet than people with low perceived inputs.
2. People who perceive their job to be demanding will be
more dissatisfied with a given facet than people who perceive their jobs as undemanding.

3. People who perceive their job as similar to others as having a more favorable input-outcome balance will be more dissatisfied with a given facet than people who perceive their own balance as similar to or better than others.

4. People who receive a low outcome level will be more dissatisfied than those who receive a high outcome level.

5. The more outcomes a person perceives his/her comparison-other receives, the more dissatisfied he/she will be with his own outcomes. This is particularly true when the comparison-other is seen to hold a job that demands the same or fewer inputs.

Measurement of Job Satisfaction

Katzell (1964) noted that "Job satisfaction is a response to the activities, events, and conditions which compose the job" (p. 348). There are three methods to measure these characteristics: first, the use of interviews or questionnaires which report workers' satisfaction toward their job; second, the investigator could determine these characteristics either from records or by direct observation; and the third, measure the job characteristics through
experimental manipulation and structuring of the work setting. However, the most widely used and inexpensive method is the questionnaire approach.

Seashore and Taber (1975) argued that "no instrument exists for job satisfaction measurement that has, as yet, all of the properties and points of flexibility we assert to be achievable and desirable" (p. 344). In addition, Wanous and Lawler (1972) addressed that it is necessary to examine the relationship between different ways of measuring job satisfaction and various independent and dependent variables.

**Indicators of job satisfaction**

Behaviorists have distinguished two types of feelings people have about their jobs: global and facet. Global satisfaction indicates a person's overall feeling toward his/her job. On the other hand, people may have feelings about particular aspects or facets of their jobs. For example, they may complain about the lack of opportunity for promotion but feel good about their salary and working conditions (Fincham & Rhodes, 1988).

Similarly, there are two basic ways to measure job satisfaction (Seashore & Taber, 1975). The most common are facet-free measurement of job satisfaction, by asking respondents directly the question, "In general, what do you think of your job? ... (1) very dissatisfied; (2) mostly
dissatisfied; (3) neither; (4) mostly satisfied; (5) very satisfied" (Kalleberg, 1974, p. 301). The advantages of facet-free measure is straightforward and easily understood in a common-sense format and costs little to use (Blauner, 1966). But, it tends to overestimate the degree of job satisfaction (Kalleberg, 1974).

The second general method of measuring job satisfaction is facet-specific measures. Essentially, faceted job satisfaction measures ask the respondents to assess their satisfaction with a series of job facets. According to Seashore and Taber (1975), facet-specific measures allow the investigator some control over the range of facets to be included, an added degree of comparability among different respondents, and closer and more confident linkage between the response obtained and actual job environment presented or between the response obtained and the person under investigation.

Besides, Kalleberg (1974) pointed out there is another way frequently used to measure satisfaction by asking the respondent: "Would you rather do some other kind of work than you are now doing? ... (1) Yes (dissatisfied response); (2) No (satisfied response)" (p. 301). This indicator is indirect in that the respondent is not specifically asked whether or not he/she is satisfied with his/her job, but rather this is inferred from his/her response. Probably, it is a more
sensitive indicator of latent dissatisfaction and frustrations (Blauner, 1966).

Development of instruments

Usually, investigators "adapt" or revise old instruments to meet their requirements for a given situation (Jones, 1984; Shih, 1984; Li, 1990). Hopkins (1983) mentioned that two research instruments have been frequently selected: the Job Diagnostic Survey (Hackman & Lawler, 1971; Hackman & Oldham, 1975) and the Job Characteristics Inventory (Sims, Szilagyi, & Keller, 1976). The Job Diagnostic Survey refers to the work of Turner and Lawrence (1965) and Hackman and Lawler (1971). It was designed for diagnosing existing jobs to determine the need to be redesigned to improve employee motivation and productivity, and to evaluate the effects of job changes on employees (Hackman & Oldham, 1975).

Job Characteristic Inventory was developed by Sims, Szilagyi, and Keller (1976). Development of Job Characteristic Inventory was also based on the work by Turner and Lawrence (1965), and Hackman and Lawler (1971). Some of the questions in the instrument were taken from the Hackman-Lawler research. It contains six dimensions of job characteristics: variety, autonomy, task identity, feedback, dealing with others, and friendship opportunities. In order to determine reliability and validity of the instrument,
investigations were conducted in many different organizations. The results seem acceptable. Finally, the authors suggested that "The perceptual measurement of job characteristics does indeed provide a starting point to gain needed theoretical and empirical evidence of the effect of job design over a wide variety of organizational settings" (p. 210).

Since both research instruments were based on theories provided by Turner and Lawrence, and by Hackman and Lawler, it is necessary to review their work. Turner and Lawrence (1965) developed a method of measuring job attributes, calling it a "Requisite Task Attributes Index," (RTA). The RTA Index was separated into two categories: requisite task attributes and associated task attributes. The requisite task attributes were divided into three parts: (1) Activity (such as object variety, motor variety, and autonomy); (2) Interaction (such as, required interaction, optional interaction on-the-job, and optional interaction off-the-job); (3) Mental (such as knowledge and skill, and responsibility). The associated task attributes included: task identity, pay, working conditions, cycle time, level of mechanization, and capital investment.

Hackman and Lawler (1971) reviewed the RTA Index and carried out six dimensions of job characteristics as follows:

1. Variety: The degree to which a job requires employees to perform a wide range of operations in their work and/or the degree to which employees must
use a variety of equipment and procedures in their work.

2. Autonomy: The extent to which employees have a major say in scheduling their work, selecting the equipment they will use, and deciding on which procedures to follow.

3. Task Identity: The extent to which employees do an entire or whole piece of work and can clearly identify the results of their efforts.

4. Feedback: The degree to which employees receive information as they work which reveals how well they perform on the job.

5. Dealing with Others: The degree to which a job requires employees to deal with other people to complete the work.

6. Friendship Opportunities: The degree to which a job allows employees to talk with one another on the job and to establish informal relationships with other employees at work.

Techniques of data treatment

According to Rosen and Rosen (1955), there were two different statistical techniques applied to compare the data and to obtain the result. One was parametric analysis in terms of arithmetic means. The other was non-parametric
analysis in terms of proportions. Rosen and Rosen (1955) also suggested that "if the two methods gave equivalent results, the more popular and easier parametric analysis could be used with greater assurance of its accuracy in future attitude surveys" (p. 312).

Seashore and Taber (1975) indicated six different kinds of treatments of raw responses and discussed three. First, weighting of item responses is based upon the differential importance of the facets, with importance determined either by the respondent's own report of importance or upon an empirically derived weight that maximizes the correlation between the indicator and some external criterion. Second, the hierarchical organization of raw data into factors, dimensions, or subindexes may be constructed on either rational or empirical grounds. "The former reflects the designer's intentions or interpretations with respect to the meaning of facet items, and the latter reflects the empirical statistical clustering or factorial weights of the items" (p. 338). Third, discrepancy scoring measures facet job satisfaction by subtracting the reported degree of facet fulfillment from the individual's report of how much he/she would like to have, or how much he/she thinks there should be, or his/her rating of its importance.
Studies Related to Job Satisfaction

Quinn (1980) reviewed 11 national surveys of American workers conducted between 1962 and 1977 and tried to find out the relationship between the level of education and job satisfaction. Generally, the data showed the relationship was small. However, the biggest difference in overall job satisfaction occurred with the category of college degree recipients. Especially associated with educational differences, challenge and financial rewards were two important aspects positively related to satisfaction. In contrast, overeducated workers seem to be particularly dissatisfied with their jobs, even more than workers with little education.

Waxman, Carner, and Berkenstock (1984) conducted an interview survey concerning job turnover rate, job satisfaction, and perception of milieu of nursing home aides in the area of Philadelphia. Surprisingly, they found that greater turnover rates occurred in better quality homes offering better wages and benefits. And also, these were the homes in which job satisfaction scores were highest. A positive correlation between turnover rate and aides’ perceptions of the homes’ order, organization, and rigid control was found. Therefore, the authors suggested that more involvement in the decision-making process would reduce the job turnover rate.
Brush, Moch, and Pooyan (1987) conducted research to test the relationships between individual demographic variables and job satisfaction. Twenty-one independent organizations were drawn from three types of organizations: manufacturing corporations, service-oriented organizations, and governmental organizations. The demographic variables in this investigation include age, race, gender, education, job tenure and organizational tenure. Results indicate that age and organizational tenure were associated with job satisfaction in all types of organizations. In addition, gender and job tenure seem to interact with organizational type (private versus public/government). Finally, the authors suggested that future research on job satisfaction should control for age and organizational tenure and for gender in private sector organizations.

Jaeger and Tesh (1989) used a nationwide survey to examine the degree and dimensions of professional satisfaction among practicing counselors. One of their most interesting results suggested that effective preparation of professional counselors requires that they be realistically informed about the contexts and major tasks of their jobs.

In an earlier study, Dean and others (1985) explained that organizational socialization is the process by which a person learns the values, norms, and required behaviors that allow an individual to function as a member of an
organization. The individual has his/her own expectations of job content, job context, and career expectations. Therefore, reality shock usually happens when a newcomer has different expectations from his/her experience in the organization. Based on this point of view, they conducted a survey on accountants. A sample of 162 new accountants was assessed pre-employment expectations on the first period of employment. One year later, a second questionnaire, measuring perceptions, was administrated. The results reported significant levels of reality shock.

Studies Related to Teacher Job Satisfaction

Chapman and Lowther (1982) proposed a conceptual model for describing the factors affecting teachers' career satisfaction and used this model as a framework to investigate the relationship between selected skills, values, and professional accomplishments. The model is presented in Figure 6. This framework indicates that "career satisfaction is influenced by 1) a teacher's personal characteristics, 2) a teacher's skills and abilities, particularly in organizing time and activities, and communicating effectively, 3) the criteria a teacher uses to judge his or her professional success, particularly with respect to job challenge and rewards, and 4) professional accomplishments to date, with particular respect to job challenge and recognition by other"
Figure 6. A model of the influences affecting teacher satisfaction.

(p. 241).

The sample for this investigation was randomly selected from teaching certificate recipients from 1946 to 1976. The results tend to support the proposed model: personal characteristics, skills and abilities, criteria for judging professional success, and professional achievement were significantly related to the level of teachers' career satisfaction.

Shih (1984) applied the Chinese version of the Short Form
Minnesota Satisfaction Questionnaire to investigate the job satisfaction of special and regular school teachers. The results showed that special school teachers’ job satisfaction was lower than regular school teachers. Particularly, the individual contributions in relation to the type of school, social status, teacher-principal relations, and school facilities and services were statistically significant in predicting the job satisfaction of special school teachers. The findings also support the theory of job satisfaction developed by Herzberg, which can be generalized to the Chinese educational setting.

Driscoll and Shirey (1985) investigated job satisfaction of elementary teachers in the aspects of work, pay, promotion, recognition, benefits, working conditions, supervision, co-workers, and school management. The samples were selected from three teacher groups: pre-service, beginning (first and second year), and experienced (five to ten years) elementary teachers. In their responses to job satisfaction ratings, the data from the three teacher groups indicated that promotion, pay, and supervision would be the sources of highest satisfaction in their work as teachers, and that co-workers and benefits would offer the least reward. In other words, the findings did not demonstrate significant differences among preservice, beginning, and experienced teachers.

Lester (1987) designed an instrument to measure teacher
job satisfaction. The sample was randomly drawn from the population which included elementary, junior high school, and senior high school teachers in New York City, Nassau, Suffolk, and Westchester counties. A factor analysis technique was used to discover underlying factors and patterns among variables. This technique also was undertaken as a psychometric procedure for developing and refining the teacher job satisfaction questionnaire. Finally, a terminal nine-factor solution was obtained including supervision, colleagues, working conditions, pay, responsibility, work itself, advancement, security, and recognition.

As Lester suggested, "school administrators can use this instrument to find out how their teachers feel about what they do" (p. 232). By carefully examining the results, useful information may be obtained about the characteristics of individuals and their work situation.

Hill (1987) conducted research to investigate job satisfaction of full-time college faculty in Pennsylvania. Also, he assessed the application of Herzberg’s two-factor theory in explaining faculty job satisfaction. The results support Herzberg’s theory that "intrinsic" factors, such as teaching, recognition-support, and convenience factors, significantly contribute to job satisfaction and "extrinsic" factors, such as administrative, economic, and collegial factors, affect job dissatisfaction.
With critical teacher shortages projected and competition from business increasing, Shreeve and his colleagues (1988) called for the collaboration of principals, school districts, education schools, and teachers to provide opportunities for teacher job satisfaction. Their recommendations were: (1) recognize and treat teachers as professionals, (2) project realistic career expectations for teachers, (3) utilize teachers in decision-making roles, (4) encourage principals in collaborative leadership, and (5) provide with teachers motivation for self-actualization. They also concluded that the importance of the opportunity for teachers to advance in their field without the necessity of leaving it can hardly be questioned. The goal is for teachers to achieve the need of self-actualization.

Summary

Researchers focused attention on the topic of job satisfaction not only for influencing productivity, but also for improving the quality of life. Contemporary motivation-satisfaction theories have tried to explain why people perform differently in their work roles and to look at demographic variables of the person for understanding human behavior. There are three categories of motivation theories: 1) content theories (e.g., need-hierarchy theory and two-factor theory), 2) process theories (e.g., expectancy theory, equity theory,
and discrepancy theory), and 3) the reinforcement theory.

Maslow's need-hierarchy theory pointed out five basic needs of human being: physiological needs, safety needs, belongingness and love needs, esteem needs, and self-actualization needs. When a lower-level need has been satisfied, the next higher-level need will emerge. And also, when a need is satisfied, it decreases in strength and ceases to dominate human behavior. Therefore, for a manager in the organization, determining which level of employees' needs have not been satisfied is the first thing that needs to be done. Then, the concern of the organization should be to satisfy all the employees' lower-level needs so they will be motivated by higher-level needs.

Herzberg's two-factor theory argued that job satisfaction is a multidimensional orientation. The two factors are job content factors and job context factors. Job content factors, so-called intrinsic factors or motivators, relate to the actual content of work and how they contribute to job satisfaction. They included achievement, recognition for achievement, work itself, responsibility, advancement, and the possibility of growth. Job context factors, so-called extrinsic factors or hygiene factors, are associated with the work environment and job dissatisfaction. They include supervision, company policy and administration, working conditions, interpersonal relations, status, job security,
salary, and personal life.

Vroom first proposed valence-instrumentality-expectancy theory or expectancy theory in 1964. He thought the valence of an outcome to a person is a monotonically increasing function of the algebraic sum of the products of the valences of all other outcomes and his conceptions of its instrumentality for the attainment of these other outcomes. In addition, he indicated that the force on a person to perform an act is a monotonically increasing function of the algebraic sum of the products of the valences of all outcomes and the strength of his expectancies that the act will be followed by the attainment of these outcomes.

Equity theory suggested that an individual is heavily motivated by the feelings how he/she is being treated as compared to those who work around him/her. Equity theory is based upon three assumptions: (1) workers believe they can receive a fair, just, or equitable return for their contributions to the job, (2) workers tend to compare their inputs and outcomes with their co-workers, and then decide what their equitable return should be, and (3) when workers feel themselves in an inequitable situation, they will try to eliminate inequity. The following actions are available for people to achieve equity or reduce inequity: altering inputs, altering outcomes, distorting inputs or outcomes, leaving the field, taking actions on others, changing the object of
comparison, and choice among modes of inequity reduction.

The basic concept of reinforcement theory is that human behavior can be controlled, shaped, or changed by using the reward structures for different types of behavior. Moreover, reinforcers, either positive or negative, are classified into two categories: (1) unconditioned or primary reinforcers, such as food, water, and sex, and (2) conditioned or secondary reinforcers, such as job advancement, praise, recognition, and money. Regardless, if the positive reinforcer is primary or secondary, it can be used to improve the worker’s performance.

In discrepancy theory, job satisfaction and dissatisfaction are a function of the perceived relationship or the difference between what one wants (or feels) from one’s job and what one actually perceives. Lawler (1973) developed a discrepancy model and indicated that if what people feel they should receive from their jobs is equal to what they actually receive, they will be satisfied. If they are not equal, people will be dissatisfied or feel guilty and uncomfortable.

The questionnaire technique is the most widely used and inexpensive method to measure job satisfaction. There are three basic types of measurement: facet-free, facet-specific, and indirect indicator. By using different types of questions to estimate the degree of job satisfaction. Two instruments have been frequently used: (1) the Job Diagnostic Survey,
developed by Hackman and Oldham (1975), and (2) the Job Characteristic Inventory, designed by Sims, Szilagyi, and Keller (1976). Both surveys are based on the work of Turner and Lawrence (1965), and Hackman and Lawler (1971).

There are many studies related to job satisfaction. Clearly, there is no consistent agreement between various studies and no result from a single study can be generalized into all kinds of different situations. Therefore, it is necessary to select and apply the findings of these studies carefully for a particular work setting.
CHAPTER III. METHODOLOGY

This chapter includes the following sections: (1) description of population and sample, (2) development of the instrument, (3) data collection, (4) hypotheses and statistical methods, (5) data analysis, and (6) development of the flow diagram.

Description of Population and Sample

The target population included industrial arts teachers who graduated from National Kaohsuing Normal University (NKNU) from 1975 to 1989 and who are teaching industrial arts in secondary schools of Taiwan. A stratified random sampling technique was used to select appropriate proportions of the sample in terms of sex, year of graduation, and school location. According to Hinkle, Wiersma, and Jurs (1988), stratified random sampling yields a representative sample. By providing for sampling throughout the entire population, it ensures that members from each subpopulation are included in the sample.

A name list of all graduates was provided by Department of Industrial Arts Education at National Kaohsuing Normal University. There were approximately four hundred and eighty graduates teaching in secondary schools in Taiwan. Two hundred subjects were randomly selected which was 41.67% of
the population.

Development of the Instrument

The questionnaire method of data collection was used for this study. The instrument was developed based primarily on Lester’s (1987) study. By using the factor analysis technique, he identified nine factors contributing to teacher job satisfaction. These factors were: supervision, colleagues, working conditions, pay, work itself, advancement, recognition, responsibility, and job security. However, the job security factor was not needed to investigate the teachers in Taiwan, because teaching in Taiwan is a secure job. Once teachers are hired in the schools, they can stay as long as they want. The responsibility factor is also not suitable for the situation in Taiwan. Because the major audience is teacher educators in the teacher preparation institutes in Taiwan, the teacher preparation factor was recommended by the committee members. Hence eight factors were decided as the independent variables to test the dependent variable—job satisfaction. These eight factors were: supervision, colleagues, working conditions, pay, work itself, advancement, recognition, and teacher preparation. In addition, three studies (Jones, 1984; Jong, 1986; Li, 1990), which related to teacher job satisfaction, were selected as references to determine the demographic variables for this study. These
demographic variables were: sex, age, position, marital status, teaching experience, school location, and income level.

The questionnaire was structured into two parts (see Appendix A). Part I included seven fixed-response questions concerning sex, age, position, marital status, teaching experience, school location, and income level. Part II included thirty-eight questions which asked respondents whether they agree with the statements or not. These statements referred to eight factors of job satisfaction: supervision, colleagues, working conditions, pay, work itself, advancement, recognition, and teacher preparation. Approximately 74% of the statements were written in a positive form, and 26% in a negative form. Each item was assigned a number by certain order (see Table 2). Also, the item classification can be found in Appendix B. The instrument was approved by the Human Subjects Review Committee of Iowa State University on July 17, 1990 (see Appendix C).

Part II contained a continuum of five possible responses used to indicate degree of satisfaction. Rating scales for each item included: Strongly Disagree (SD)=1, Disagree (D)=2, Neutral (N)=3, Agree (A)=4, and Strongly Agree (SA)=5.

To obtain data on Chinese teachers' job satisfaction, the English version of the questionnaire was translated to Chinese and administered to the sample subjects. The Chinese version
Table 2. Allocation of items in the instrument

<table>
<thead>
<tr>
<th>Factors</th>
<th>Item numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision</td>
<td>1  8  15&lt;sup&gt;<em>&lt;/sup&gt; 22  29&lt;sup&gt;</em>&lt;/sup&gt; 36</td>
</tr>
<tr>
<td>Colleagues</td>
<td>2  9&lt;sup&gt;*&lt;/sup&gt; 16  23  30  37</td>
</tr>
<tr>
<td>Working conditions</td>
<td>3  10  17&lt;sup&gt;*&lt;/sup&gt; 24  31  38</td>
</tr>
<tr>
<td>Recognition</td>
<td>4  11&lt;sup&gt;<em>&lt;/sup&gt; 18&lt;sup&gt;</em>&lt;/sup&gt;</td>
</tr>
<tr>
<td>Pay</td>
<td>5  12&lt;sup&gt;*&lt;/sup&gt; 25  32</td>
</tr>
<tr>
<td>Work itself</td>
<td>6  13  19&lt;sup&gt;<em>&lt;/sup&gt; 26  33&lt;sup&gt;</em>&lt;/sup&gt;</td>
</tr>
<tr>
<td>Advancement</td>
<td>7  20  27&lt;sup&gt;*&lt;/sup&gt; 34</td>
</tr>
<tr>
<td>Teacher Preparation</td>
<td>14  21  28  35</td>
</tr>
</tbody>
</table>

<sup>*</sup>Indicates reversed items.

of the questionnaire can be found in Appendix D. The Chinese version of the questionnaire was also reviewed and revised by professors in the department of Industrial Arts Education at National Kaohsuing Normal University in Taiwan.

To increase the usability of the questionnaire and to remove ambiguous and inappropriate questions, a pilot study was conducted during the months of June and July 1990. Twenty people were selected from the population. By the middle of July, fourteen questionnaires were returned with comments about the questionnaire. According to these suggestions, the Chinese version of the questionnaire was slightly modified to improve translational understanding. Because initially the questionnaire was translated literally, some of the statements lacked fluency in Chinese. Since these modifications, the Chinese version of the original English questionnaire is not identical verbatim.
Data Collection

The questionnaire was mailed to each subject selected in the sample. A cover letter introducing the investigator and explaining the purpose of the study and assurance of confidentiality of data was enclosed (see Appendix E). The participants were asked to complete the questionnaires within one week and to return it using the stamped, self-addressed envelope provided.

Each questionnaire was coded to certify individual respondents and to assist the researcher in necessary follow-up procedures. Two weeks after the initial mailing, a follow-up letter (see Appendix F) with an additional questionnaire and a stamped, self-addressed return envelop was distributed to each subject who had not replied the initial mailing by September 15, 1990.

By September 15, 1990, 107 questionnaires had been received. Two weeks after the follow-up mailing, 56 more questionnaires were returned. Totally, 163 (81.5%) of the responses, out of 200 possible returns, were received. But, because two respondents returned incomplete questionnaires, the actual number considered for this data analysis was 161 (80.5%). Also, it is necessary to assume that thirty-seven respondents who did not elect to respond had similar characteristics to the ones who did respond.
Hypotheses and Statistical Methods

**Hypothesis 1**

**H$_{0}$:** There is no relationship between job satisfaction and the demographic variables of sex, age, position, marital status, school location, teaching experience, and income.

**H$_{1}$:** At least one of the demographic variables correlated with job satisfaction.

- **H$_{0}$:** $R^2 = 0$
- **H$_{1}$:** $R^2 \neq 0$

The statistical method used to test this hypothesis was multiple regression. The 0.05 alpha level was selected to test the statistical significance. The multiple regression prediction model:

$$\hat{Y} = b_1x_1 + b_2x_2 + \ldots + b_7x_7 + a$$

where $\hat{Y}$ = the predicted value of job satisfaction,

- $b_i$ = regression coefficients for the predictor variables,
- $x_i$ = predictor (demographic) variables, and
- $a$ = constant of the regression equation.

**Hypothesis 1.1**

**H$_{0}$:** There is no difference in the degree of job satisfaction between female and male industrial arts teachers.

**H$_{1}$:** There is a difference in the degree of job satisfaction between female and male industrial arts teachers.
Ho: \( \mu_f = \mu_m \)

Ha: \( \mu_f \neq \mu_m \)

where \( \mu_f \) = the mean score of job satisfaction of female industrial arts teachers, and

\( \mu_m \) = the mean score of job satisfaction of male industrial arts teachers.

The two-tailed t-test for independent samples was used to test this hypothesis. The 0.05 alpha level was selected to test the statistical significance.

**Hypothesis 1.2**

H_0: There is no difference in the degree of job satisfaction among industrial arts teachers in different age groups.

H_a: At least one of the age group of industrial arts teachers is different from the others in the degree of job satisfaction.

H_0: \( \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 \)

H_a: at least one of the above means is different from the others.

where \( \mu_i \) = the mean scores of job satisfaction of industrial arts teachers in different age groups.

An analysis of variance (ANOVA) was used to test this hypothesis. The 0.05 alpha level was selected to test the statistical significance.
Hypothesis 1.3

$H_0$: There is no difference in the degree of job satisfaction among industrial arts teachers in different positions.

$H_1$: At least one of the positions which industrial arts teachers occupy is different from the others in the degree of job satisfaction.

\[ H_0: \mu_1=\mu_2=\mu_3=\mu_4=\mu_5 \]

\[ H_1: \text{at least one of the above means is different from the others.} \]

where $\mu_i =$ the mean scores of job satisfaction of industrial arts teachers in different positions.

An analysis of variance (ANOVA) was used to test this hypothesis. The 0.05 alpha level was selected to test the statistical significance.

Hypothesis 1.4

$H_0$: There is no difference in the degree of job satisfaction among industrial arts teachers with different marriage statuses.

$H_1$: At least one of the marriage status which industrial arts teachers were in is different from others in the degree of job satisfaction.

\[ H_0: \mu_1=\mu_2=\mu_3=\mu_4=\mu_5 \]

\[ H_1: \text{at least one of the above means is different} \]
from the others.

where $\mu_i =$ the mean scores of job satisfaction of industrial arts teachers with different marriage statuses.

An analysis of variance (ANOVA) was used to test this hypothesis. The 0.05 alpha level was selected to test the statistical significance.

Hypothesis 1.5

$H_0$: There is no difference in the degree of job satisfaction among industrial arts teachers with different teaching experience.

$H_1$: At least one of the periods of teaching which industrial arts teachers accumulated is different from others in the degree of job satisfaction.

$H_0$: $\mu_1=\mu_2=\mu_3=\mu_4$

$H_1$: at least one of above means is different from the others.

where $\mu_i =$ the mean scores of job satisfaction of industrial arts teachers with different teaching experience.

An analysis of variance (ANOVA) was used to test this hypothesis. The 0.05 alpha level was selected to test the statistical significance.
Hypothesis 1.6

H₀: There is no difference in the degree of job satisfaction among industrial arts teachers teaching in different geographical areas.

H₁: At least one of the geographical areas in which industrial arts teachers teach is different from the others in the degree of job satisfaction.

H₀: \( \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 \)

H₁: at least one of the above means is different from the others.

where \( \mu_i \) = the mean scores of job satisfaction of industrial arts teachers teaching different geographic areas.

An analysis of variance (ANOVA) was used to test this hypothesis. The 0.05 alpha level was selected to test the statistical significance.

Hypothesis 1.7

H₀: There is no difference in the degree of job satisfaction among industrial arts teachers teaching in different income groups.

H₁: At least one of income groups of industrial arts teachers is different from the others in degree of job satisfaction.

H₀: \( \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 \)
Hₜ: at least one of the above means is different from the others.

where \( \mu_i \) = the mean scores of job satisfaction of industrial arts teachers in different income groups.

An analysis of variance (ANOVA) was used to test this hypothesis. The 0.05 alpha level was selected to test the statistical significance.

**Hypothesis 2**

\( H_0: \) The eight predictor variables do not differ in contribution to the job satisfaction of industrial arts teachers. The variables are supervision, colleagues, working conditions, recognition, pay, work itself, advancement, and teacher preparation.

\( H_1: \) At least one of the above predictor variables differs from the others in contribution to the job satisfaction scores of industrial arts teachers.

\( H_0: \) \( \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 \)

\( H_1: \) at least one of the above means is different from the others.

where \( \mu_i \) = the mean scores of the predictor variables.

An analysis of variance (ANOVA) was used to test this hypothesis. The 0.05 alpha level was selected to test the statistical significance.
Data Analysis

Each returned questionnaire was carefully examined. If at least 90% of the thirty-eight questions had not been completed, the questionnaire was considered invalid and was removed from the analysis. Thus, two questionnaires were classified as invalid and removed from the analysis.

One hundred and sixty-one usable questionnaires were coded and provided as a data file for running statistical analysis by applying Statistical Analysis System (SAS) computer statistical package. In addition, Statistical Package of the Social Science revised version (SPSSx) computer package was used to compute reliability of the instrument. Both packages were run on the mainframe system at Iowa State University.

The statistical methods chosen for analyzing the data in this study were:

1. **Multiple regression analysis:** was used to examine the relationship between a dependent variable and two or more independent variables (Howell, 1987). Multiple R is the correlation coefficient between the scores on the dependent variable (Y) and the predicted scores for the dependent variable (Ŷ) using the linear combination of the independent variables. R² is the proportion of the variation in the dependent variable that can be attributed to the variation of
the combined independent variables (Hinkle, Wiersma, 
& Jurs, 1988).

2. The t-test for independent samples: was used to test 
the difference between the means of two independent 
samples (Howell, 1987). Hinkle, Wiersma, and Jurs (1988) indicated that "when the alternative 
hypothesis is nondirectional (such as $H_i: \mu_i \neq \mu_m$), the 
region of rejection is located in both tails of the 
sampling distribution. The test of the null 
hypothesis against this nondirectional alternative is 
called a two-tailed test" (p. 189).

3. One-way analysis of variance (ANOVA): analyzed of 
one independent variable with two or more levels. In 
addition, the assumptions underlying ANOVA are: (1) 
the observations are random and independent samples 
from the populations, (2) the distributions of the 
populations from which the samples are selected are 
normal, and (3) the variances of the distributions in 
the populations are equal (Hinkle, Wiersma, & Jurs, 
1988).

Generally, the reliability of an instrument must be 
tested to ensure that measurement device is reliable. The 
reliability coefficient of a measure indicates its 
consistency. Cronbach’s alpha, which essentially calculates 
the average of all possible split-half reliability
coefficient, is currently widely used (Bryman & Cramer, 1990). Therefore, the alpha reliability of the instrument was calculated in this study with the aid of the SPSSx package.

Development of the Flow Diagram

The flow diagram for predicting overall job satisfaction of industrial arts teachers who graduated from NKNU in Taiwan was developed after the data were analyzed. The development of the flow diagram was based on the literature reviewed in Chapter 2 and statistical findings reported in Chapter 4. However, the limitation was that this diagram was designed only for industrial arts teachers who graduated from NKNU in Taiwan.
CHAPTER IV. RESEARCH RESULTS AND FINDINGS

The purpose of this study was to analyze the relationship between the related factors and degree of job satisfaction of industrial arts teachers who graduated from National Kaohsuing Normal University (NKNU) in Taiwan. Statistical findings relevant to this purpose are reported in this chapter.

This chapter is organized into four sections: (1) general characteristics of the sample, (2) general description of survey results, (3) findings for each hypothesis, and (4) further testing.

General Characteristics of the Sample

The subjects of the present study are 161 industrial arts teachers who graduated from NKNU. The subjects are 46 females (28.6%) and 115 males (71.4%). Figure 7 presents the sex distribution of the respondents.

These industrial arts teachers were grouped into age ranges of 30 and under (41.0%), 31-40 (54%), 41-50 (5%). There were no teachers over 50 years old. Figure 8 presents the age distribution of the respondents.

Among these teachers, 31.7% were full-time IA teachers, 28.6% were part-time IA teachers, 10.6% were teaching non-IA courses, 1.2% were full-time administrators, and, 28.0% were part-time administrators. Figure 9 presents the position
Figure 7. Distribution by sex

Figure 8. Distribution by age
distribution of the respondents.

In regard to marital status, 58 teachers (36.0%) were single, 4 teachers (2.5%) were divorced, no teachers were widowed, 83 teachers (51.6%) were married and had children, and, 16 teachers (9.9%) were married and had no children. Figure 10 presents the marital status distribution of the respondents.

In regard to years as a teacher, 48 teachers (29.8%) have taught for 1-5 years, 66 teachers (41.0%) have taught for 6-10 years, 39 teachers (24.2%) have taught for 11-15 years, and, 8 teachers (5.0%) have taught for more than 15 years. Figure 11 presents the teaching experience distribution of the respondents.

With respect to geographic location of the schools, 50 (31.1%) respondents work in northern Taiwan, 40 (24.8%) respondents work in central Taiwan, 52 (32.3%) respondents work in southern Taiwan, 16 (9.9%) respondents work in eastern Taiwan, 3 (1.9%) of the respondents work in individual islands around Taiwan. Figure 12 presents the school location distribution of the respondents.

The respondents were grouped also into income ranges. No one made less than NT$20,000. The remaining ranges were NT$20,001-NT$25,000 (19.3%), NT$25,001-NT$30,000 (47.2%), NT$30,001-NT$35,000 (19.9%), NT$35,001-NT$40,000 (7.5%), and NT$40,000 and over (6.2%). The exchange rate in 1990 was 1 US
Figure 9. Distribution by position

Figure 10. Distribution by marital status
Figure 11. Distribution by teaching experience

Figure 12. Distribution by school location
dollar = 27 NT dollars, approximately. Figure 13 presents the income level distribution of the respondents.

Figure 13. Distribution by income level

Table 3 presents a summary of descriptive statistics pertaining to these seven demographic variables.
Table 3. Frequency and percentage distribution of demographic variables of industrial arts teachers

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>115</td>
<td>71.4</td>
</tr>
<tr>
<td>female</td>
<td>46</td>
<td>28.6</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 and under</td>
<td>66</td>
<td>41.0</td>
</tr>
<tr>
<td>31-40</td>
<td>87</td>
<td>54.0</td>
</tr>
<tr>
<td>41-50</td>
<td>8</td>
<td>5.0</td>
</tr>
<tr>
<td>&gt; 51</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Position</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>full-time IA teacher</td>
<td>51</td>
<td>31.7</td>
</tr>
<tr>
<td>part-time IA teacher</td>
<td>46</td>
<td>28.6</td>
</tr>
<tr>
<td>non-IA teacher</td>
<td>17</td>
<td>10.6</td>
</tr>
<tr>
<td>full-time administrator</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>part-time administrator</td>
<td>45</td>
<td>28.0</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>single</td>
<td>58</td>
<td>36.0</td>
</tr>
<tr>
<td>single parent (divorced)</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>single parent (widowed)</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>married (with children)</td>
<td>83</td>
<td>51.6</td>
</tr>
<tr>
<td>married (without children)</td>
<td>16</td>
<td>9.9</td>
</tr>
</tbody>
</table>
Table 3 (continued)

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching experience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5 years</td>
<td>48</td>
<td>29.8</td>
</tr>
<tr>
<td>6-10 years</td>
<td>66</td>
<td>41.0</td>
</tr>
<tr>
<td>11-15 years</td>
<td>39</td>
<td>24.2</td>
</tr>
<tr>
<td>&gt; 15 years</td>
<td>8</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Geographical area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>northern Taiwan</td>
<td>50</td>
<td>31.1</td>
</tr>
<tr>
<td>central Taiwan</td>
<td>40</td>
<td>24.8</td>
</tr>
<tr>
<td>southern Taiwan</td>
<td>52</td>
<td>32.3</td>
</tr>
<tr>
<td>eastern Taiwan</td>
<td>16</td>
<td>9.9</td>
</tr>
<tr>
<td>individual islands</td>
<td>3</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Monthly salary</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>less than NT$20,000</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>NT$20,001-NT$25,000</td>
<td>31</td>
<td>19.3</td>
</tr>
<tr>
<td>NT$25,001-NT$30,000</td>
<td>76</td>
<td>47.2</td>
</tr>
<tr>
<td>NT$30,001-NT$35,000</td>
<td>32</td>
<td>19.9</td>
</tr>
<tr>
<td>NT$35,001-NT$40,000</td>
<td>12</td>
<td>7.5</td>
</tr>
<tr>
<td>&gt; NT$40,001</td>
<td>10</td>
<td>6.2</td>
</tr>
</tbody>
</table>
General Description of Survey Results

The second part of the questionnaire consisted of thirty-eight items regarding teachers' perceptions about their jobs. The respondents were asked to indicate the level of agreement to each item according to their own situation. These items referred to eight factors which were mentioned in Chapter III.

A five-point scale was applied to measure job satisfaction:

5  strongly agree
4  agree
3  neutral
2  disagree
1  strongly disagree

The following is a brief description of each factor and the survey results.

Supervision

Table 4 presents the contents of the supervision factor and the means and standard deviations of teachers' feelings toward each statement of the factor.

As an overall average, industrial arts teachers were satisfied with the supervision situation in their schools. Particularly, IA teachers felt their immediate supervisors gave them assistance when they needed help. Also, they did not feel uncomfortable toward their immediate supervisors. On
the other hand, IA teachers did not agree with the statement 
"When I teach a good lesson, my immediate supervisor notices."

Table 4. Means and standard deviations of each item for the 
supervision factor

<table>
<thead>
<tr>
<th>Supervision</th>
<th>Number</th>
<th>Means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>My immediate supervisor gives me assistance when I need help</td>
<td>161</td>
<td>3.7764</td>
<td>0.9012</td>
</tr>
<tr>
<td>My immediate supervisor explains what is expected of me</td>
<td>161</td>
<td>3.1491</td>
<td>1.0381</td>
</tr>
<tr>
<td>My immediate supervisor is not willing to listen to suggestions</td>
<td>161</td>
<td>3.2733</td>
<td>0.9682</td>
</tr>
<tr>
<td>My immediate supervisor treats everyone equitably</td>
<td>160</td>
<td>2.9875</td>
<td>1.0400</td>
</tr>
<tr>
<td>My immediate supervisor makes me feel uncomfortable*</td>
<td>161</td>
<td>3.6584</td>
<td>0.8374</td>
</tr>
<tr>
<td>When I teach a good lesson, my immediate supervisor notices</td>
<td>159</td>
<td>2.7107</td>
<td>0.8955</td>
</tr>
</tbody>
</table>

Overall: 159 3.2579 0.7281

*This statement was written in the negative form. The scores for this item were reversed before the mean was calculated.

Colleagues

The colleagues factor included six elements. The statements and their means and standard deviations were presented in Table 5.
Table 5. Means and standard deviations of each item for the colleagues factor

<table>
<thead>
<tr>
<th>Colleagues</th>
<th>Number</th>
<th>Means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like the people with whom I work</td>
<td>161</td>
<td>4.1242</td>
<td>0.7311</td>
</tr>
<tr>
<td>I do not get cooperation from the people I work with*</td>
<td>161</td>
<td>3.5839</td>
<td>0.7463</td>
</tr>
<tr>
<td>My colleagues stimulate me to do better work</td>
<td>160</td>
<td>3.0625</td>
<td>0.9562</td>
</tr>
<tr>
<td>I have made lasting friendships among my colleagues</td>
<td>161</td>
<td>4.0373</td>
<td>0.7491</td>
</tr>
<tr>
<td>My interests are similar to those of my colleagues</td>
<td>161</td>
<td>2.9193</td>
<td>0.8513</td>
</tr>
<tr>
<td>My colleagues provide me with suggestions or feedback about my teaching</td>
<td>161</td>
<td>3.2050</td>
<td>0.8596</td>
</tr>
<tr>
<td>Overall</td>
<td>160</td>
<td>3.4886</td>
<td>0.5479</td>
</tr>
</tbody>
</table>

*This statement was written in the negative form. The scores for this item were reversed before the mean was calculated.

It was found that industrial arts teachers are more satisfied with friendships with their colleagues than the other items. Especially, there were two elements higher than 4.0 mean scores. These statements were: "I like the people with whom I work" and "I have made lasting friendships among my colleagues." Moreover, the lowest mean in this category was associated with the statement "My interests are similar to those of my colleagues."
Working conditions

Six items were used in the working conditions factor. Table 6 shows the items, and their means and standard deviations of these items.

Overall, industrial arts teachers feel uncomfortable with the working conditions in their school. In particular, the laboratory budget was not adequate, materials/supplies were not available, and the class sizes were too large.

Table 6. Means and standard deviations of each item of working conditions factor

<table>
<thead>
<tr>
<th>working conditions</th>
<th>Number</th>
<th>Means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working conditions in my school are good</td>
<td>161</td>
<td>3.0000</td>
<td>1.1292</td>
</tr>
<tr>
<td>Working conditions in my school are comfortable</td>
<td>160</td>
<td>2.8438</td>
<td>0.9940</td>
</tr>
<tr>
<td>The class sizes I teach are too large*</td>
<td>161</td>
<td>2.1677</td>
<td>1.0968</td>
</tr>
<tr>
<td>The laboratory budget is adequate</td>
<td>161</td>
<td>2.2919</td>
<td>1.0644</td>
</tr>
<tr>
<td>Materials/supplies which I need for teaching are available</td>
<td>161</td>
<td>2.2112</td>
<td>1.0512</td>
</tr>
<tr>
<td>The procedures for obtaining materials and services are well defined and efficient</td>
<td>161</td>
<td>2.7143</td>
<td>1.2012</td>
</tr>
</tbody>
</table>

Overall 160 2.5375 0.7853

*This statement was written in the negative form. The scores for this item were reversed before the mean was calculated.
Recognition

Table 7 presents the contents of the recognition factor and means and standard deviations of teachers' feelings toward each element of the factor.

Overall, IA teachers are satisfied with the recognition situations in their schools. They not only positively agree that they received full recognition for their successful teaching, but also disagree with the statement "No one tells me that I am a good teacher."

Table 7. Means and standard deviations of each item for the recognition factor

<table>
<thead>
<tr>
<th>Recognition</th>
<th>Number</th>
<th>Means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I receive full recognition for my successful</td>
<td>161</td>
<td>3.3354</td>
<td>0.9148</td>
</tr>
<tr>
<td>teaching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No one tells me that I am a good teacher*</td>
<td>161</td>
<td>3.4845</td>
<td>0.9817</td>
</tr>
<tr>
<td>I receive too little recognition*</td>
<td>161</td>
<td>3.0994</td>
<td>0.9760</td>
</tr>
<tr>
<td>Overall</td>
<td>161</td>
<td>3.3064</td>
<td>0.8071</td>
</tr>
</tbody>
</table>

*These statements were written in the negative form. The scores for these item were reversed before the means were calculated.
Pay

The pay factor included four components. Table 8 shows the contents of this factor, and the means and standard deviations of the components.

In general, IA teachers agree that their teaching jobs provide them with financial security and the income was adequate for normal expenses. But, they did not think the pay was in proportion to their working loads.

Table 8. Means and standard deviations of each item for pay factor

<table>
<thead>
<tr>
<th>Pay</th>
<th>Number</th>
<th>Means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am well paid in proportion to my working load</td>
<td>161</td>
<td>2.7640</td>
<td>1.0399</td>
</tr>
<tr>
<td>Insufficient income keeps me from living the way I want to live*</td>
<td>161</td>
<td>3.0124</td>
<td>1.0185</td>
</tr>
<tr>
<td>Teacher income is adequate for normal expenses</td>
<td>161</td>
<td>3.1491</td>
<td>1.0794</td>
</tr>
<tr>
<td>Teaching provides me with financial security</td>
<td>160</td>
<td>3.2795</td>
<td>0.9631</td>
</tr>
<tr>
<td>Overall</td>
<td>161</td>
<td>3.0512</td>
<td>0.7862</td>
</tr>
</tbody>
</table>

*This statement was written in the negative form. The scores for this item were reversed before the mean was calculated.
Work itself

There were seven elements in the work itself factor. Table 9 indicates the contents of the factor, and the means and standard deviations for its elements.

In general, IA teachers feel comfortable with the work itself factor. Especially, they were satisfied with the opportunity to use a variety of skills provided by teaching and the freedom to make decisions about their own teaching. Also, they thought teaching is very interesting work.

Table 9. Means and standard deviations of each item for the work itself factor

<table>
<thead>
<tr>
<th>Work itself</th>
<th>Number</th>
<th>Means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching encourages me to be creative</td>
<td>161</td>
<td>3.0683</td>
<td>1.0435</td>
</tr>
<tr>
<td>Teaching is very interesting work</td>
<td>160</td>
<td>3.1625</td>
<td>0.8964</td>
</tr>
<tr>
<td>Too many non-teaching responsibilities affect the quality of my teaching*</td>
<td>161</td>
<td>3.0186</td>
<td>1.0516</td>
</tr>
<tr>
<td>Teaching provides an opportunity to use a variety of skills</td>
<td>161</td>
<td>3.3354</td>
<td>0.9215</td>
</tr>
<tr>
<td>I do not have freedom to make decisions about my own teaching*</td>
<td>161</td>
<td>3.1988</td>
<td>0.9541</td>
</tr>
<tr>
<td>Overall</td>
<td>160</td>
<td>3.1538</td>
<td>0.7534</td>
</tr>
</tbody>
</table>

*These statements were written in the negative form. The scores for these item were reversed before the means were calculated.
Advancement

The advancement factor comprised of four elements. Table 10 indicates the contents of the factor, and the means and standard deviations of these elements. On the average, industrial arts teachers feel uncomfortable with the advancement situations in their school. In particular, they are dissatisfied with the situations such as insufficient opportunities for promotion, limited opportunities for advancement, and chances to continue to learn.

Table 10. Means and standard deviations of each item for the advancement factor

<table>
<thead>
<tr>
<th>Advancement</th>
<th>Number</th>
<th>Means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have chances to participate in professional conferences, seminars, workshops, and other related activities</td>
<td>161</td>
<td>3.5155</td>
<td>1.0192</td>
</tr>
<tr>
<td>I have enough opportunities for promotion</td>
<td>161</td>
<td>2.4224</td>
<td>1.0407</td>
</tr>
<tr>
<td>As a industrial arts teacher, I have limited opportunities for advancement</td>
<td>160</td>
<td>2.4188</td>
<td>0.9998</td>
</tr>
<tr>
<td>I have chances to continue to learn</td>
<td>161</td>
<td>2.6335</td>
<td>1.1050</td>
</tr>
<tr>
<td>Overall</td>
<td>160</td>
<td>2.7469</td>
<td>0.8131</td>
</tr>
</tbody>
</table>

*This statement was written in the negative form. The scores for this item were reversed before the mean was calculated.*
Teacher preparation

Table 11 presents the contents of the teacher preparation factor, and the means and standard deviations of teachers' feelings toward each statement of the factor.

Overall, IA teachers feel satisfied with the teacher preparation program in the university. Particularly, they believe the extra-curriculum in the university helps them work in the schools. However, they did not think the university prepared them adequately.

Table 11. Means and standard deviations of each item for the teacher preparation factor

<table>
<thead>
<tr>
<th>Teacher Preparation</th>
<th>Number</th>
<th>Means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel the university prepared me adequately</td>
<td>161</td>
<td>2.9503</td>
<td>1.1113</td>
</tr>
<tr>
<td>I had a realistic picture of my job before I graduated from the university</td>
<td>161</td>
<td>3.0124</td>
<td>1.0954</td>
</tr>
<tr>
<td>The university prepared me to function within school system</td>
<td>161</td>
<td>3.1491</td>
<td>1.0736</td>
</tr>
<tr>
<td>The extra-curriculum in the university helped me to work in the school</td>
<td>160</td>
<td>3.2875</td>
<td>1.0484</td>
</tr>
<tr>
<td>Overall</td>
<td>160</td>
<td>3.0969</td>
<td>0.9167</td>
</tr>
</tbody>
</table>
The reliability of each factor and overall items were tested. The overall reliability was 0.9149 and the eight factors ranged from 0.7504 to 0.8675. Table 12 displayed this information in detail.

Table 12. Reliability of each factor and overall items

<table>
<thead>
<tr>
<th>Factor</th>
<th>Reliability Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision</td>
<td>0.8576</td>
</tr>
<tr>
<td>Colleagues</td>
<td>0.7504</td>
</tr>
<tr>
<td>Working conditions</td>
<td>0.8151</td>
</tr>
<tr>
<td>Recognition</td>
<td>0.7955</td>
</tr>
<tr>
<td>Pay</td>
<td>0.7655</td>
</tr>
<tr>
<td>Work itself</td>
<td>0.8298</td>
</tr>
<tr>
<td>Advancement</td>
<td>0.7838</td>
</tr>
<tr>
<td>Teacher Preparation</td>
<td>0.8675</td>
</tr>
<tr>
<td>Overall</td>
<td>0.9149</td>
</tr>
</tbody>
</table>
Findings for Each Hypothesis

From Table 3, there are only two subjects in the position of full-time administrator, four subjects in the category of single parent (divorced), and three subjects work in individual islands. Because these numbers of respondents were too low to represent each category of population, these subjects are removed from the analyses of the following tests.

Hypothesis 1

$H_0$: There is no relationship between job satisfaction and the demographic variables of sex, age, position, marriage status, school location, teaching experience, and income.

$H_1$: At least one of the demographic variables correlates with job satisfaction.

The null hypothesis was rejected in favor of the alternative hypothesis, which is that at least one of the demographic variables highly correlated with job satisfaction. Table 13 presents the results of the overall multiple regression. The $F$ value, with 18 and 127 degree of freedom, is 3.73, which is significant at .05 level. Also, $R^2$ value is 0.3460, which shows how strong is the correlation between the dependent and the independent variables.

Table 14 presents the results of the $F$ test for testing the unique contribution of each demographic variable on the
overall job satisfaction. Findings show that income factor was found significant at .05 level.

Table 13. Summary table of the overall multiple regression for testing relationship between job satisfaction and demographic variables.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>18</td>
<td>11.3718</td>
<td>0.6318</td>
<td>3.73</td>
<td>0.0001*</td>
<td>0.3460</td>
</tr>
<tr>
<td>Error</td>
<td>127</td>
<td>21.4973</td>
<td>0.1693</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>145</td>
<td>32.8691</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .05 level.

Hypothesis 1.1

H₀: There is no difference in the degree of job satisfaction between female and male industrial arts teachers.  
H₁: There is a difference in the degree of job satisfaction between female and male industrial arts teachers.

This null hypothesis was retained. Table 15 indicates the results of the t-test for the two groups. The t value, with 107.4 degree of freedom, is 0.9683 which was not significantly different at 0.05 level. In other words, the job satisfaction of male industrial arts teachers was no
different from the job satisfaction of female industrial arts teachers.

Table 14. Summary of the F test for testing the unique contribution of each demographic variable for overall job satisfaction

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Type III SS</th>
<th>F</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>0.1556</td>
<td>0.92</td>
<td>0.3395</td>
</tr>
<tr>
<td>Age</td>
<td>2</td>
<td>0.2658</td>
<td>0.79</td>
<td>0.4583</td>
</tr>
<tr>
<td>Position</td>
<td>3</td>
<td>0.6715</td>
<td>1.32</td>
<td>0.2701</td>
</tr>
<tr>
<td>Marital Status</td>
<td>2</td>
<td>0.3721</td>
<td>1.10</td>
<td>0.3363</td>
</tr>
<tr>
<td>Teaching Experience</td>
<td>3</td>
<td>0.3579</td>
<td>0.70</td>
<td>0.5509</td>
</tr>
<tr>
<td>School Locations</td>
<td>3</td>
<td>1.0853</td>
<td>2.14</td>
<td>0.0988</td>
</tr>
<tr>
<td>Income</td>
<td>4</td>
<td>4.0253</td>
<td>5.95</td>
<td>0.0002*</td>
</tr>
</tbody>
</table>

*Significant at .05 level.

Table 15. The t-test for the means of male and female industrial arts teachers for job satisfaction scores

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Means</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Prob</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>104</td>
<td>3.0941</td>
<td>0.5155</td>
<td>0.9683</td>
<td>107.4</td>
<td>0.3351</td>
<td>0.0048</td>
</tr>
<tr>
<td>Female</td>
<td>42</td>
<td>3.0213</td>
<td>0.3609</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 1.2

$H_0$: There is no difference in the degree of job satisfaction among industrial arts teachers in different age groups.

$H_1$: At least one of the age groups of industrial arts teachers is different from the others in the degree of job satisfaction.

From hypothesis 1.2 through hypothesis 1.7, a one-way ANOVA was used to test these hypotheses. Also, Duncan's multiple-range test was used to compare, pairwisely, means within predictor variables when the overall ANOVA test was significant.

Table 16 presents the results of the analysis of variance between job satisfaction and age. According to Table 16, this null hypothesis was retained. The F value, with 2 and 143 degrees of freedom, was 0.02. It is not significant at .05 level. In other words, there is no significant difference in the degree of job satisfaction among industrial arts teachers in different age groups.

Hypothesis 1.3

$H_0$: There is no difference in the degree of job satisfaction among industrial arts teachers in different positions.

$H_1$: At least one of the positions which industrial arts teachers occupied is different from the others in the
degree of job satisfaction.

Table 16. ANOVA summary table for testing differences among age groups of industrial arts teachers for job satisfaction scores

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>2</td>
<td>0.0070</td>
<td>0.0035</td>
<td>0.02</td>
<td>0.9850</td>
<td>0.0002</td>
</tr>
<tr>
<td>Error</td>
<td>143</td>
<td>32.8621</td>
<td>0.2298</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>145</td>
<td>32.8691</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The null hypothesis was rejected. Table 17 presents the results of the ANOVA test. The F value, with 4 and 149 degree of freedom, was 7.21, which was significant at .05 level. In other words, at least one of the position groups was significantly different from the others in the degree of job satisfaction for industrial arts teachers.

Table 18 shows the results of Duncan's test. By examining the means, a difference was found between part-time administrators and the other groups.
Table 17. ANOVA summary table for testing the difference among position groups of industrial arts teachers for the job satisfaction scores

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>4.3445</td>
<td>1.4482</td>
<td>7.21</td>
<td>0.0002*</td>
<td>0.1322</td>
</tr>
<tr>
<td>Error</td>
<td>142</td>
<td>28.5246</td>
<td>0.2009</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>145</td>
<td>32.8691</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .05 level.

Table 18. Duncan's multiple-range test for the job satisfaction scores among position groups

<table>
<thead>
<tr>
<th>Duncan Grouping</th>
<th>Means</th>
<th>SD</th>
<th>Number</th>
<th>Position groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.3533</td>
<td>0.4841</td>
<td>40</td>
<td>(part-time administrator)</td>
</tr>
<tr>
<td>B</td>
<td>2.9842</td>
<td>0.4191</td>
<td>40</td>
<td>(part-time IA teacher)</td>
</tr>
<tr>
<td>B</td>
<td>2.9616</td>
<td>0.4398</td>
<td>50</td>
<td>(full-time IA teacher)</td>
</tr>
<tr>
<td>B</td>
<td>2.9441</td>
<td>0.4512</td>
<td>16</td>
<td>(Non-IA teacher)</td>
</tr>
</tbody>
</table>

Hypothesis 1.4

H₀: There is no difference in the degree of job satisfaction among industrial arts teachers with different marital status.
H_1: At least one of the marriage status which industrial arts teachers occupied is different from the others in the degree of job satisfaction.

According to Table 19, the null hypothesis was retained. The F value, with 2 and 143 degree of freedom, was 1.52, which was not significant at .05 level. Therefore, there was no significant difference in the degree of job satisfaction among industrial arts teachers with different marital status.

Table 19. ANOVA summary table for testing the differences among marital status groups of industrial arts teachers for job satisfaction scores

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>2</td>
<td>0.6861</td>
<td>0.3430</td>
<td>1.52</td>
<td>0.2213</td>
<td>0.0209</td>
</tr>
<tr>
<td>Error</td>
<td>143</td>
<td>32.1830</td>
<td>0.2251</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>145</td>
<td>32.8691</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 1.5
H_0: There is no difference in the degree of job satisfaction among industrial arts teachers with different teaching experience.
H_1: At least one of the periods of teaching which industrial
arts teachers accumulated is different from the others in the degree of job satisfaction.

The null hypothesis was retained. Table 20 indicates the results of the ANOVA test. The F value, with 3 and 142 degree of freedom, was 2.19, which was not significant at .05 level. In other words, there was no significant difference in the degree of job satisfaction among industrial arts teachers with different teaching experience.

Table 20. ANOVA summary table for testing the differences among teaching experience groups of industrial arts teachers for job satisfaction scores

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>1.4518</td>
<td>0.4839</td>
<td>2.19</td>
<td>0.0922</td>
<td>0.0442</td>
</tr>
<tr>
<td>Error</td>
<td>142</td>
<td>31.4173</td>
<td>0.2212</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>145</td>
<td>32.8691</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 1.6

H₀: There is no difference in the degree of job satisfaction among industrial arts teachers teaching in different geographical areas.

H₁: At least one of the geographical areas in which
industrial arts teachers teach is different from the others in the degree of job satisfaction.

The null hypothesis was retained. Table 21 shows the results of the ANOVA test for this hypothesis. The F value, with 3 and 142 degree of freedom, was 2.64, which was significant at .05 level. This means that there was no difference in degree of job satisfaction among industrial arts teachers in different geographical areas.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>1.7338</td>
<td>0.5779</td>
<td>2.64</td>
<td>0.0521</td>
<td>0.0521</td>
</tr>
<tr>
<td>Error</td>
<td>142</td>
<td>31.1353</td>
<td>0.2193</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected</td>
<td>145</td>
<td>32.8691</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 1.7

H₀: There is no difference in the degree of job satisfaction among industrial arts teachers teaching in different income groups.

H₁: At least one of the income groups of industrial arts
teachers is different from the others in the degree of job satisfaction.

The null hypothesis was rejected. Table 22 presents the results of the ANOVA test. The F value, with 4 and 141 degree of freedom, was 7.15, which was significant at .05 level. Hence, at least one of the income groups of industrial arts teachers was significantly different from the others in the degree of job satisfaction.

Table 22. ANOVA summary table for testing the differences among income groups of industrial arts teachers for job satisfaction scores

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>5.5406</td>
<td>1.3851</td>
<td>7.15</td>
<td>0.0001*</td>
<td>0.1686</td>
</tr>
<tr>
<td>Error</td>
<td>141</td>
<td>27.3285</td>
<td>0.1938</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected</td>
<td>total</td>
<td>145</td>
<td>32.8691</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .05 level.

Moreover, Table 23 indicates the results of Duncan's test. A difference was found between income over NT$35,000 and less than NT$35,000.
Table 23. Duncan's multiple-range test for job satisfaction scores among income groups

<table>
<thead>
<tr>
<th>Duncan Grouping</th>
<th>Means</th>
<th>SD</th>
<th>Number</th>
<th>Income Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.5746</td>
<td>0.4613</td>
<td>12</td>
<td>(NT$35,001-NT$40,000)</td>
</tr>
<tr>
<td>A</td>
<td>3.4684</td>
<td>0.3101</td>
<td>10</td>
<td>(NT$40,001 and over)</td>
</tr>
<tr>
<td>B</td>
<td>3.0154</td>
<td>0.4702</td>
<td>72</td>
<td>(NT$25,000-NT$30,000)</td>
</tr>
<tr>
<td>B</td>
<td>2.9990</td>
<td>0.3916</td>
<td>26</td>
<td>(NT$30,001-NT$35,000)</td>
</tr>
<tr>
<td>B</td>
<td>2.9241</td>
<td>0.4286</td>
<td>26</td>
<td>(NT$20,001-NT$25,000)</td>
</tr>
</tbody>
</table>

In summary, Table 24 presents a comparison of the results of the overall multiple regression and ANOVA for individual variables. For the overall multiple regression, the unique contribution of each factor was analyzed. Only income factor was identified as contributors of the overall job satisfaction score.

In the analysis of variance for each individual variable, the total contribution of each variable was tested. Two factors, position and income, contributed significantly to the job satisfaction scores.
Table 24. A comparison of the results of overall multiple regression and ANOVA for individual variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Overall Regression Type III</th>
<th>Individual Variables ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>F(1,127)=0.92</td>
<td>0.3395</td>
</tr>
<tr>
<td>Age</td>
<td>F(2,127)=0.79</td>
<td>0.4583</td>
</tr>
<tr>
<td>Position</td>
<td>F(3,127)=1.32</td>
<td>0.2701</td>
</tr>
<tr>
<td>Marital Status</td>
<td>F(2,127)=1.10</td>
<td>0.3363</td>
</tr>
<tr>
<td>Teaching Experience</td>
<td>F(3,127)=0.70</td>
<td>0.5509</td>
</tr>
<tr>
<td>School Locations</td>
<td>F(3,127)=2.14</td>
<td>0.0988</td>
</tr>
<tr>
<td>Income</td>
<td>F(4,127)=5.95</td>
<td>0.0002*</td>
</tr>
</tbody>
</table>

*Significant at .05 level.

Hypothesis 2

H₀: The eight predictor variables do not differ in the contribution to the job satisfaction of industrial arts teachers. The variables are supervision, colleagues, working conditions, recognition, salary, work itself, advancement, and teacher preparation.

H₁: At least one of the above predictor variables differs from the others in contribution to the job satisfaction scores of industrial arts teachers.
The null hypothesis was rejected. Tables 25 and 26 present the results of the ANOVA test and Duncan’s test. The F value is 5.44, with 158 and 1051 degrees of freedom. Obviously, it is significant at .05 level. Therefore, the individual contributions of these eight predictor variables are significantly different. Moreover, according to the results of Duncan’s test, the colleagues factor with the highest mean score was satisfied by most of the industrial arts teachers. On the other hand, the working conditions factor with the lowest mean score was dissatisfied by most of the industrial arts teachers.

Table 25. ANOVA summary table for testing the differences among predictor variables for the job satisfaction scores

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>158</td>
<td>362.0825</td>
<td>2.2917</td>
<td>5.44</td>
<td>0.0001*</td>
<td>0.4499</td>
</tr>
<tr>
<td>Error</td>
<td>1051</td>
<td>442.8110</td>
<td>0.4213</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>1209</td>
<td>804.8935</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .05 level.
Table 26. Duncan's multiple-range test for the job satisfaction scores among predictor variables

<table>
<thead>
<tr>
<th>Duncan Grouping</th>
<th>Means</th>
<th>SD</th>
<th>Number</th>
<th>Predictor Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.4879</td>
<td>0.5172</td>
<td>151</td>
<td>(Colleagues)</td>
</tr>
<tr>
<td>B</td>
<td>3.2895</td>
<td>0.8090</td>
<td>152</td>
<td>(Recognition)</td>
</tr>
<tr>
<td>B</td>
<td>3.2561</td>
<td>0.7057</td>
<td>151</td>
<td>(Supervision)</td>
</tr>
<tr>
<td>C</td>
<td>3.1550</td>
<td>0.7519</td>
<td>151</td>
<td>(Work Itself)</td>
</tr>
<tr>
<td>C</td>
<td>3.0927</td>
<td>0.9290</td>
<td>151</td>
<td>(Teacher Preparation)</td>
</tr>
<tr>
<td>C</td>
<td>3.0855</td>
<td>0.7618</td>
<td>152</td>
<td>(Pay)</td>
</tr>
<tr>
<td>D</td>
<td>2.7483</td>
<td>0.7945</td>
<td>151</td>
<td>(Advancement)</td>
</tr>
<tr>
<td>E</td>
<td>2.5166</td>
<td>0.7864</td>
<td>151</td>
<td>(Working Conditions)</td>
</tr>
</tbody>
</table>
A summary of the results of testing each hypothesis was tabulated in Table 27. This table includes statistical methods, t value, F values, and probability of significance, and the results.

Table 27. Summary of the results of each hypothesis

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Statistics Methods</th>
<th>F/t</th>
<th>Prob.</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Multiple Regression</td>
<td>3.73</td>
<td>0.0001*</td>
<td>Reject</td>
</tr>
<tr>
<td>1.1</td>
<td>T-test</td>
<td>0.97</td>
<td>0.3251</td>
<td>Retain</td>
</tr>
<tr>
<td>1.2</td>
<td>ANOVA</td>
<td>0.02</td>
<td>0.9850</td>
<td>Retain</td>
</tr>
<tr>
<td>1.3</td>
<td>ANOVA</td>
<td>7.21</td>
<td>0.0002*</td>
<td>Reject</td>
</tr>
<tr>
<td>1.4</td>
<td>ANOVA</td>
<td>1.52</td>
<td>0.2213</td>
<td>Retain</td>
</tr>
<tr>
<td>1.5</td>
<td>ANOVA</td>
<td>2.19</td>
<td>0.0922</td>
<td>Retain</td>
</tr>
<tr>
<td>1.6</td>
<td>ANOVA</td>
<td>2.64</td>
<td>0.0521</td>
<td>Retain</td>
</tr>
<tr>
<td>1.7</td>
<td>ANOVA</td>
<td>7.15</td>
<td>0.0001*</td>
<td>Reject</td>
</tr>
<tr>
<td>2</td>
<td>ANOVA</td>
<td>5.44</td>
<td>0.0001*</td>
<td>Reject</td>
</tr>
</tbody>
</table>

*Significant at .05 level.
Further Testing

Based on the findings from hypotheses 1.1 through 1.7, two null hypotheses were rejected at the .05 level of significance, which involve position and income variables. These two variables made a significant contribution to the overall job satisfaction of industrial arts teachers. However, the overall job satisfaction was constructed by eight factors: supervision, colleagues, working conditions, recognition, pay, work itself, advancement, and teacher preparation. In order to identify which particular factors made the differences on the overall job satisfaction, more hypotheses were tested.

To assure that further testing was necessary, the intercorrelations among eight factors and their reliability coefficient for each factor were examined. Table 28 presents the correlation and reliability coefficients for each factor. Obviously, these factors did not measure the same thing. Therefore, it is necessary to further test the two variables.

Because, further comparisons were decided after the first set of hypotheses were tested. The probability of Type I error for the second set of hypotheses needs to be reduced. Howell (1987) provided the formula for calculating the new error rate, so called the error rate per experiment. "The error rate per experiment is the number of Type I errors that we expect to make in any given experiment if the null
Table 28. Correlations (upper-right half of matrix), probabilities (lower-left half of matrix) and reliability (underlined)

<table>
<thead>
<tr>
<th></th>
<th>Super</th>
<th>Colle</th>
<th>Workcon</th>
<th>Recog</th>
<th>Pay</th>
<th>Workit</th>
<th>Advan</th>
<th>Teach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super</td>
<td>.8576</td>
<td>.4574</td>
<td>.5411</td>
<td>.1606</td>
<td>.3473</td>
<td>.4401</td>
<td>.4724</td>
<td>.1758</td>
</tr>
<tr>
<td>Colle</td>
<td>.0001*</td>
<td>.7504</td>
<td>.3839</td>
<td>.1428</td>
<td>.3393</td>
<td>.2633</td>
<td>.3222</td>
<td>.3949</td>
</tr>
<tr>
<td>Workcon</td>
<td>.0001*</td>
<td>.0001*</td>
<td>.8151</td>
<td>.1583</td>
<td>.4756</td>
<td>.3901</td>
<td>.4418</td>
<td>.2467</td>
</tr>
<tr>
<td>Recog</td>
<td>.0488*</td>
<td>.0803</td>
<td>.0522</td>
<td>.7955</td>
<td>.0608</td>
<td>.2196</td>
<td>.0690</td>
<td>.1231</td>
</tr>
<tr>
<td>Pay</td>
<td>.0001*</td>
<td>.0001*</td>
<td>.0001*</td>
<td>.4572</td>
<td>.7655</td>
<td>.3564</td>
<td>.4403</td>
<td>.1782</td>
</tr>
<tr>
<td>Workit</td>
<td>.0001*</td>
<td>.0011*</td>
<td>.0001*</td>
<td>.0068*</td>
<td>.0001</td>
<td>.8298</td>
<td>.0027</td>
<td>.0002</td>
</tr>
<tr>
<td>Advan</td>
<td>.0001*</td>
<td>.0001*</td>
<td>.0001*</td>
<td>.4002</td>
<td>.0001*</td>
<td>.0027*</td>
<td>.7838</td>
<td>.0077*</td>
</tr>
<tr>
<td>Teach</td>
<td>.0314*</td>
<td>.0001*</td>
<td>.0023*</td>
<td>.1320</td>
<td>.0286</td>
<td>.0002*</td>
<td>.0077*</td>
<td>.8675</td>
</tr>
</tbody>
</table>

*Super=supervision, Colle=colleagues, Workcon=working conditions, Recog=recognition, Workit=work itself, Advan=advancement, and Teach=teacher preparation.

*Significant at .05 level.
hypothesis is true" (p. 326). The formula is $a' = a/c$ ($c$ represents the number of comparisons for each factor). The alpha value for the first set of hypotheses was set at .05. Hence, the new alpha value was $0.05/8 = 0.00625$ across all the tests.

For hypothesis 3.1 through hypothesis 4.8, a one-way ANOVA was used to test these hypotheses. Also, the Duncan's multiple-range test was used to compare sample means when the null hypothesis was rejected.

**Hypothesis 3.1**

$H_0$: There is no difference in the supervision factor among industrial arts teachers in different positions.

$H_1$: At least one of the positions which industrial arts teachers occupy is different from the others for the supervision factor.

The null hypothesis was rejected. Table 29 presents the results of the ANOVA test. The F value, with 3 and 147 degrees of freedom, was 4.87, which was significant at .00625 level. In other words, at least one of the position groups was significantly different from the others in the supervision factor. Table 30 shows the results of the Duncan's test. The difference occurred in the group of part-time administrators.
Table 29. ANOVA summary table for testing the differences among position groups of industrial arts teachers for the supervision factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>6.7484</td>
<td>2.2494</td>
<td>4.87</td>
<td>0.0030*</td>
<td>0.0903</td>
</tr>
<tr>
<td>Error</td>
<td>147</td>
<td>67.9614</td>
<td>0.4623</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>74.7097</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .00625 level.

Table 30. Duncan’s multiple-range test for the supervision factor among position groups

<table>
<thead>
<tr>
<th>Duncan Grouping</th>
<th>Means</th>
<th>SD</th>
<th>Number</th>
<th>Position groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.5952</td>
<td>0.7518</td>
<td>42</td>
<td>(part-time administrator)</td>
</tr>
<tr>
<td>B</td>
<td>3.1438</td>
<td>0.7219</td>
<td>51</td>
<td>(full-time IA teacher)</td>
</tr>
<tr>
<td>B</td>
<td>3.1220</td>
<td>0.5986</td>
<td>41</td>
<td>(part-time IA teacher)</td>
</tr>
<tr>
<td>B</td>
<td>3.0784</td>
<td>0.5241</td>
<td>17</td>
<td>(non-IA teacher)</td>
</tr>
</tbody>
</table>

Hypothesis 3.2

H₀: There is no difference in the colleagues factor among industrial arts teachers in different positions.

H₁: At least one of the positions which industrial arts
teachers occupied is different from the others for the colleagues factor.

The null hypothesis was rejected. Table 31 presents the results of the ANOVA test. The F value, with 3 and 147 degree of freedom, was 8.47, which was significant at .00625 level. In other words, at least one of the position groups was significantly different from the others in the colleagues factor. Table 32 shows the results of Duncan's test. The difference occurred in the group of part-time administrators.

Table 31. ANOVA summary table for testing the differences among position groups of industrial arts teachers for the colleagues factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>5.9107</td>
<td>1.9702</td>
<td>8.47</td>
<td>0.0001*</td>
<td>0.1473</td>
</tr>
<tr>
<td>Error</td>
<td>147</td>
<td>34.2060</td>
<td>0.2327</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>40.1166</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .00625 level.
Table 32. Duncan's multiple-range test for the colleagues factor among position groups

<table>
<thead>
<tr>
<th>Duncan Grouping</th>
<th>Mean</th>
<th>SD</th>
<th>Number</th>
<th>Position groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.7976</td>
<td>0.5108</td>
<td>44</td>
<td>(part-time administrator)</td>
</tr>
<tr>
<td>B</td>
<td>3.4309</td>
<td>0.4503</td>
<td>41</td>
<td>(part-time IA teacher)</td>
</tr>
<tr>
<td>B</td>
<td>3.3497</td>
<td>0.4936</td>
<td>51</td>
<td>(full-time IA teacher)</td>
</tr>
<tr>
<td>B</td>
<td>3.2745</td>
<td>0.4485</td>
<td>17</td>
<td>(non-IA teacher)</td>
</tr>
</tbody>
</table>

**Hypothesis 3.3**

$H_0$: There is no difference in the working conditions factor among industrial arts teachers in different positions.

$H_1$: At least one of the positions which industrial arts teachers occupy is different from the others for the working conditions factor.

The null hypothesis was rejected. Table 33 presents the results of the ANOVA test. The $F$ value, with 3 and 147 degrees of freedom, was 4.71, which was significant at .00625 level. In other words, at least one of the position groups was significantly different from the others in the working conditions factor. Table 34 shows the results of Duncan’s test. The differences were found between part-time administrator and full-time IA teacher, between part-time
administrator and part-time IA teacher, and between non-IA teacher and part-time IA teacher.

Table 33. ANOVA summary table for testing the differences among position groups of industrial arts teachers for the working conditions factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>8.1284</td>
<td>2.7095</td>
<td>4.71</td>
<td>0.0036*</td>
<td>0.0876</td>
</tr>
<tr>
<td>Error</td>
<td>147</td>
<td>84.6358</td>
<td>0.5758</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>92.7642</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .00625 level.

Table 34. Duncan’s multiple-range test for the working conditions factor among position groups

<table>
<thead>
<tr>
<th>Duncan Grouping</th>
<th>Mean</th>
<th>SD</th>
<th>Number</th>
<th>Position groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>A A</td>
<td>2.8256</td>
<td>0.7444</td>
<td>43</td>
<td>(part-time administrator)</td>
</tr>
<tr>
<td>B A</td>
<td>2.6961</td>
<td>0.6298</td>
<td>17</td>
<td>(non-IA teacher)</td>
</tr>
<tr>
<td>B B</td>
<td>2.4052</td>
<td>0.9039</td>
<td>51</td>
<td>(full-time IA teacher)</td>
</tr>
<tr>
<td>C C</td>
<td>2.2500</td>
<td>0.6027</td>
<td>40</td>
<td>(part-time IA teacher)</td>
</tr>
</tbody>
</table>
Hypothesis 3.4

$H_0$: There is no difference in the recognition factor among industrial arts teachers in different positions.

$H_1$: At least one of the positions which industrial arts teachers occupied is different from the others for the recognition factor.

The null hypothesis was retained. Table 35 indicates the results of the ANOVA test. The F value, with 3 and 148 degrees of freedom, was 2.71, which was not significant at .00625 level. In other words, there was no significant difference in the recognition factor among industrial arts teachers in different positions.

Table 35. ANOVA summary table for testing the differences among position groups of industrial arts teachers for the recognition factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>5.1394</td>
<td>1.7131</td>
<td>2.71</td>
<td>0.0475</td>
<td>0.0520</td>
</tr>
<tr>
<td>Error</td>
<td>148</td>
<td>93.6793</td>
<td>0.6330</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>151</td>
<td>98.8187</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 3.5

H₀: There is no difference in the pay factor among industrial arts teachers in different positions.

H₁: At least one of the positions which industrial arts teachers occupied is different from the others for the pay factor.

The null hypothesis was retained. Table 36 indicates the results of the ANOVA test. The F value, with 3 and 148 degrees of freedom, was 3.14, which was not significant at .00625 level. It can be concluded there was no significant difference in the pay factor among industrial arts teachers in different positions.

Table 36. ANOVA summary table for testing the differences among position groups of industrial arts teachers for the pay factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>5.2382</td>
<td>1.7461</td>
<td>3.14</td>
<td>0.0273</td>
<td>0.0598</td>
</tr>
<tr>
<td>Error</td>
<td>148</td>
<td>82.4000</td>
<td>0.5568</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>151</td>
<td>87.6382</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 3.6

H₀: There is no difference in the work itself factor among industrial arts teachers in different positions.

H₁: At least one of the positions which industrial arts teachers occupy is different from the others for the work itself factor.

The null hypothesis was retained. Table 37 indicates the results of the ANOVA test. The F value, with 3 and 147 degrees of freedom, was 0.49, which was not significant at .00625 level. Hence, there was no significant difference in the work itself factor among industrial arts teachers in different positions.

Table 37. ANOVA summary table for testing the differences among position groups of industrial arts teachers for the work itself factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>0.8331</td>
<td>0.2777</td>
<td>0.49</td>
<td>0.6925</td>
<td>0.0098</td>
</tr>
<tr>
<td>Error</td>
<td>147</td>
<td>83.9807</td>
<td>0.5713</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>84.8138</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 3.7

H₀: There is no difference in the advancement factor among industrial arts teachers in different positions.

H₁: At least one of the positions which industrial arts teachers occupy is different from the others for the advancement factor.

The null hypothesis was retained. Table 38 presents the results of the ANOVA test. The F value, with 3 and 147 degrees of freedom, was 4.14, which was significant at .00625 level. In other words, there was no difference in the advancement factor among industrial arts teachers in different positions.

Table 38. ANOVA summary table for testing the differences among position groups of industrial arts teachers for the advancement factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>7.3834</td>
<td>2.4611</td>
<td>4.14</td>
<td>0.0075</td>
<td>0.0780</td>
</tr>
<tr>
<td>Error</td>
<td>147</td>
<td>87.3037</td>
<td>0.5939</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>94.6871</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 3.8

H₀: There is no difference in the teacher preparation factor among industrial arts teachers in different positions.

Hₐ: At least one of the positions which industrial arts teachers occupy is different from the others for the teacher preparation factor.

The null hypothesis was rejected. Table 39 indicates the results of the ANOVA test. The F value, with 3 and 147 degrees of freedom, was 5.05, which was not significant at .00625 level. Therefore, at least one of the position groups was significantly different from the others in the teacher preparation factor.

Table 39. ANOVA summary table for testing the differences among position groups of industrial arts teachers for the teacher preparation factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>12.0941</td>
<td>4.0314</td>
<td>5.05</td>
<td>0.0023*</td>
<td>0.0934</td>
</tr>
<tr>
<td>Error</td>
<td>147</td>
<td>117.3579</td>
<td>0.7984</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>129.4520</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .00625 level.
Table 40 shows the results of Duncan’s test. The differences were found between part-time administrator and full-time IA teacher, between part-time administrator and non-IA teacher, and between part-time IA teacher and non-IA teacher.

Table 40. Duncan’s multiple-range test for the teacher preparation factor among position groups

<table>
<thead>
<tr>
<th>Duncan Grouping</th>
<th>Mean</th>
<th>SD</th>
<th>Number</th>
<th>Position groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>A A</td>
<td>3.4821</td>
<td>0.8667</td>
<td>42</td>
<td>(part-time administrator)</td>
</tr>
<tr>
<td>B A</td>
<td>3.1341</td>
<td>0.8535</td>
<td>41</td>
<td>(part-time IA teacher)</td>
</tr>
<tr>
<td>B C</td>
<td>2.8922</td>
<td>0.9100</td>
<td>51</td>
<td>(full-time IA teacher)</td>
</tr>
<tr>
<td>C C</td>
<td>2.6324</td>
<td>1.0005</td>
<td>17</td>
<td>(non-IA teacher)</td>
</tr>
</tbody>
</table>

Hypothesis 4.1

H₀: There is no difference in the supervision factor among industrial arts teachers in different income groups.

H₁: At least one of the income groups of industrial arts teachers is different from the others for the supervision factor.

The null hypothesis was retained. Table 41 indicates the results of the ANOVA test. The F value, with 4 and 146
degrees of freedom, was 1.92, which was not significant at .00625 level. Hence, there was no significant difference in the supervision factor among industrial arts teachers in different income groups.

Table 41. ANOVA summary table for testing the differences among income groups of industrial arts teachers for the supervision factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>3.7361</td>
<td>0.9340</td>
<td>1.92</td>
<td>0.1099</td>
<td>0.0500</td>
</tr>
<tr>
<td>Error</td>
<td>146</td>
<td>70.9736</td>
<td>0.4861</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>74.7097</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 4.2

H₀: There is no difference in the colleagues factor among industrial arts teachers in different income groups.

H₁: At least one of the income groups of industrial arts teachers is different from the others for the colleagues factor.

The null hypothesis was retained. Table 42 indicates the results of the ANOVA test. The F value, with 4 and 146 degrees of freedom, was 1.50, which was not significant at
.00625 level. Therefore, there was no significant difference in the colleagues factor among industrial arts teachers in different income groups.

Table 42. ANOVA summary table for testing the differences among income groups of industrial arts teachers for the colleagues factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>1.5823</td>
<td>0.3956</td>
<td>1.50</td>
<td>0.2056</td>
<td>0.0394</td>
</tr>
<tr>
<td>Error</td>
<td>146</td>
<td>38.5343</td>
<td>0.2639</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>40.1166</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 4.3

H₀: There is no difference in the working conditions factor among industrial arts teachers in different income groups.

H₁: At least one of the income groups of industrial arts teachers is different from the others for the working conditions factor.

The null hypothesis was rejected. Table 43 presents the results of the ANOVA test. The F value, with 4 and 146 degrees of freedom, was 9.01, which was significant at .00625
level. Hence, at least one of the income groups of industrial arts teachers was significantly different from the others for the working conditions. Table 44 indicates the results of the Duncan's test. A difference was found between income level over NT$35,000 and less than NT$35,00.

Table 43. ANOVA summary table for testing the differences among income groups of industrial arts teachers for the working conditions factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>18.3585</td>
<td>4.5896</td>
<td>9.01</td>
<td>0.0001*</td>
<td>0.1979</td>
</tr>
<tr>
<td>Error</td>
<td>146</td>
<td>74.4056</td>
<td>0.5096</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>92.7642</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .00625 level.
Hypothesis 4.4

$H_0$: There is no difference in the recognition factor among industrial arts teachers in different income groups.

$H_1$: At least one of the income groups of industrial arts teachers is different from the others for the recognition factor.

The null hypothesis was retained. Table 45 indicates the results of the ANOVA test. The F value, with 4 and 147 degrees of freedom, was 0.97, which was not significant at .00625 level. In other words, there was no significant difference for the recognition factor among industrial arts teachers in different income groups.
Table 45. ANOVA summary table for testing the differences among income groups of industrial arts teachers for the recognition factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>2.5342</td>
<td>0.6335</td>
<td>0.97</td>
<td>0.4274</td>
<td>0.0256</td>
</tr>
<tr>
<td>Error</td>
<td>147</td>
<td>96.2845</td>
<td>0.6550</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>151</td>
<td>98.8187</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 4.5
H₀: There is no difference in the pay factor among industrial arts teachers in different income groups.
H₁: At least one of the income groups of industrial arts teachers is different from the others for the pay factor.

The null hypothesis was rejected. Table 46 presents the results of the ANOVA test. The F value, with 4 and 147 degree of freedom, was 10.41, which was significant at .00625 level. Hence, at least one of the income groups of industrial arts teachers was significantly different from the others for the pay factor. Table 47 indicates the results of the Duncan’s test. A difference was found between income level over NT$35,000 and less than NT$35,00.
Table 46. ANOVA summary table for testing the differences among income groups of industrial arts teachers for the pay factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>19.3516</td>
<td>4.8379</td>
<td>10.41</td>
<td>0.0001*</td>
<td>0.2208</td>
</tr>
<tr>
<td>Error</td>
<td>147</td>
<td>68.2866</td>
<td>0.4645</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>151</td>
<td>87.6382</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .00625 level.

Table 47. Duncan’s multiple-range test for the pay factor among income groups

<table>
<thead>
<tr>
<th>Duncan Grouping</th>
<th>Mean</th>
<th>SD</th>
<th>Number</th>
<th>Income Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.0000</td>
<td>0.5000</td>
<td>12</td>
<td>(NT$35,001-NT$40,000)</td>
</tr>
<tr>
<td>A</td>
<td>3.7500</td>
<td>0.3333</td>
<td>10</td>
<td>(NT$40,001 and over)</td>
</tr>
<tr>
<td>B</td>
<td>3.1161</td>
<td>0.6104</td>
<td>28</td>
<td>(NT$30,000-NT$35,000)</td>
</tr>
<tr>
<td>B</td>
<td>2.9797</td>
<td>0.7353</td>
<td>74</td>
<td>(NT$25,001-NT$30,000)</td>
</tr>
<tr>
<td>B</td>
<td>2.7054</td>
<td>0.7455</td>
<td>28</td>
<td>(NT$20,001-NT$25,000)</td>
</tr>
</tbody>
</table>
Hypothesis 4.6

$H_0$: There is no difference in the work itself factor among industrial arts teachers in different income groups.

$H_A$: At least one of the income groups of industrial arts teachers is different from the others for the work itself factor.

The null hypothesis was retained. Table 48 indicates the results of the ANOVA test. The F value, with 4 and 146 degrees of freedom, was 2.84, which was not significant at .00625 level. It was concluded there was no significant difference in the work itself factor among industrial arts teachers in different income groups.

Table 48. ANOVA summary table for testing the differences among income groups of industrial arts teachers for the work itself factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>6.1205</td>
<td>1.5301</td>
<td>2.84</td>
<td>0.0265</td>
<td>0.0722</td>
</tr>
<tr>
<td>Error</td>
<td>146</td>
<td>78.6932</td>
<td>0.5390</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>84.8138</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 4.7

Hₜ: There is no difference in the advancement factor among industrial arts teachers in different income groups.

Hᵣ: At least one of the income groups of industrial arts teachers is different from the others for the advancement factor.

The null hypothesis was rejected. Table 49 presents the results of the ANOVA test. The F value, with 4 and 146 degrees of freedom, was 4.58, which was significant at .00625 level. Hence, at least one of the income groups of industrial arts teachers was significantly different from the others for the degree of job satisfaction.

Table 49. ANOVA summary table for testing the differences among income groups of industrial arts teachers for the advancement factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>10.5536</td>
<td>2.6384</td>
<td>4.58</td>
<td>0.0016*</td>
<td>0.1115</td>
</tr>
<tr>
<td>Error</td>
<td>146</td>
<td>84.1335</td>
<td>0.5763</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>94.6871</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .00625 level.
Table 50 indicates the results of the Duncan’s test. Differences were found between income level NT$35,001-NT$40,000 and less than NT$35,000, and between over NT$40,001 and NT$30,001-NT$35,000.

Table 50. Duncan’s multiple-range test for the advancement factor among income groups

<table>
<thead>
<tr>
<th>Duncan Grouping</th>
<th>Mean</th>
<th>SD</th>
<th>Number</th>
<th>Income Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>A A</td>
<td>3.5417</td>
<td>0.6470</td>
<td>12</td>
<td>(NT$35,001-NT$40,000)</td>
</tr>
<tr>
<td>B A</td>
<td>3.1000</td>
<td>0.3575</td>
<td>10</td>
<td>(NT$40,001 and over)</td>
</tr>
<tr>
<td>B B</td>
<td>2.7054</td>
<td>0.7330</td>
<td>28</td>
<td>(NT$20,000-NT$25,000)</td>
</tr>
<tr>
<td>B C</td>
<td>2.6655</td>
<td>0.8613</td>
<td>74</td>
<td>(NT$25,001-NT$30,000)</td>
</tr>
<tr>
<td>C C</td>
<td>2.5370</td>
<td>0.6112</td>
<td>27</td>
<td>(NT$30,001-NT$35,000)</td>
</tr>
</tbody>
</table>

Hypothesis 4.8

H₀: There is no difference in the teacher preparation factor among industrial arts teachers in different income groups.

H₁: At least one of the income groups of industrial arts teachers is different from the others for the teacher preparation factor.
The null hypothesis was retained. Table 51 indicates the results of the ANOVA test. The F value, with 4 and 146 degrees of freedom, was 2.53, which was not significant at .00625 level. Hence, there was no significant difference in the teacher preparation factor among industrial arts teachers for different income groups.

Table 51. ANOVA summary table for testing the differences among income groups of industrial arts teachers for the teacher preparation factor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>PR &gt; F</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>8.3868</td>
<td>2.0967</td>
<td>2.53</td>
<td>0.0431</td>
<td>0.0648</td>
</tr>
<tr>
<td>Error</td>
<td>146</td>
<td>121.0651</td>
<td>0.8292</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>150</td>
<td>129.4520</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A summary of the results of hypotheses which tested the differences among position groups of industrial arts teachers on the work milieu factors are tabulated in Table 52. This table includes independent variables, the F value for each hypothesis, probability of significance, and the results.

Table 52. Summary of the results of hypothesis for testing the differences among position groups of industrial arts teachers for the work milieu factors

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Dependent Variables</th>
<th>F</th>
<th>Prob</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Supervision</td>
<td>4.87</td>
<td>0.0030*</td>
<td>Reject</td>
</tr>
<tr>
<td>3.2</td>
<td>Colleagues</td>
<td>8.47</td>
<td>0.0001*</td>
<td>Reject</td>
</tr>
<tr>
<td>3.3</td>
<td>Working Conditions</td>
<td>4.71</td>
<td>0.0036*</td>
<td>Reject</td>
</tr>
<tr>
<td>3.4</td>
<td>Recognition</td>
<td>2.71</td>
<td>0.0475</td>
<td>Retain</td>
</tr>
<tr>
<td>3.5</td>
<td>Pay</td>
<td>3.14</td>
<td>0.0273</td>
<td>Retain</td>
</tr>
<tr>
<td>3.6</td>
<td>Work Itself</td>
<td>0.49</td>
<td>0.6925</td>
<td>Retain</td>
</tr>
<tr>
<td>3.7</td>
<td>Advancement</td>
<td>4.14</td>
<td>0.0075</td>
<td>Retain</td>
</tr>
<tr>
<td>3.8</td>
<td>Teacher Preparation</td>
<td>5.05</td>
<td>0.0023*</td>
<td>Reject</td>
</tr>
</tbody>
</table>

*Significant at .00625 level.
A summary of the results of hypotheses which tested the differences among income groups of industrial arts teachers on the work milieu factors are tabulated in Table 53. This table includes independent variables, the F value for each hypothesis, probability of significance, and the results.

Table 53. Summary of the results of hypothesis for testing the differences among income groups of industrial arts teachers for the work milieu factors

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Dependent Variables</th>
<th>F</th>
<th>Prob</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Supervision</td>
<td>1.92</td>
<td>0.1009</td>
<td>Retain</td>
</tr>
<tr>
<td>4.2</td>
<td>Colleagues</td>
<td>1.50</td>
<td>0.2056</td>
<td>Retain</td>
</tr>
<tr>
<td>4.3</td>
<td>Working Conditions</td>
<td>9.01</td>
<td>0.0001*</td>
<td>Reject</td>
</tr>
<tr>
<td>4.4</td>
<td>Recognition</td>
<td>0.97</td>
<td>0.4274</td>
<td>Retain</td>
</tr>
<tr>
<td>4.5</td>
<td>Pay</td>
<td>10.41</td>
<td>0.0001*</td>
<td>Reject</td>
</tr>
<tr>
<td>4.6</td>
<td>Work Itself</td>
<td>2.84</td>
<td>0.0265</td>
<td>Retain</td>
</tr>
<tr>
<td>4.7</td>
<td>Advancement</td>
<td>4.58</td>
<td>0.0016*</td>
<td>Reject</td>
</tr>
<tr>
<td>4.8</td>
<td>Teacher Preparation</td>
<td>2.53</td>
<td>0.0431</td>
<td>Retain</td>
</tr>
</tbody>
</table>

*Significant at .00625 level.
CHAPTER V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The first four chapters of this study dealt with the introduction of the study, a review of the literature, methodology and procedures, and analysis of the data and findings of the study. The purpose of this chapter is to summarize the preceding chapters, draw conclusions based on the findings, develop the flow diagram, and present recommendations.

Summary

The purpose of this study is to analyze the relationship between the relative factors and degree of job satisfaction of industrial arts teachers who graduated from National Kaohsuing Normal University in Taiwan.

Specifically, the objectives of the study are:

1. to identify the factors which contribute to job satisfaction of industrial arts education graduates from National Kaohsuing Normal University in Taiwan,
2. to investigate and analyze factors which contribute to job satisfaction of industrial arts education graduates from National Kaohsuing Normal University in Taiwan,
3. to develop a flow diagram for predicting overall job satisfaction of industrial arts teachers who
graduated from National Kaohsuing Normal University in Taiwan, and

4. to provide suggestions for the practical application of the findings and the enhancement of industrial arts teachers job satisfaction in Taiwan.

The target population included industrial arts teachers who graduated from National Kaohsuing Normal University between 1975 and 1989, who are teaching IA in the secondary schools in Taiwan. A stratified random sampling technique was used to select appropriate sample proportions in terms of sex, year of graduation, and school location.

Finally, there were approximately four hundred and eighty graduates teaching in secondary schools in Taiwan. Two hundred subjects were randomly selected, which was 41.67% of the population.

The questionnaire method of data collection was used for this study. The questionnaire was structured into two parts. Part I included seven fixed-response questions concerning sex, age, position, marital status, teaching experience, school location, and salary. Part II included thirty-eight questions which asked respondents whether they agreed with the statements or not. These statements referred to eight factors of job satisfaction: supervision, colleagues, working conditions, pay, work itself, advancement, recognition, and teacher preparation.
There were thirty-three null hypotheses tested in this study. The statistical methods chosen for analyzing the data were multiple regression analysis, t-test independent samples, and one-way analysis of variance. Statistical findings and conclusions for each hypothesis are presented in next section.

The Cronbach's alpha reliability of the instrument was also tested to ensure the measurement device is reliable. The overall reliability was 0.9149 and the eight factors ranged from 0.7504 to 0.8675.

Based on the analyses of data and findings presented in Chapter IV, the following profile is provided for the industrial arts teachers who participated in this study:

1. **Sex.** A majority (71.4%) of the respondents were male, only 28.6% were female.

2. **Age.** Forty-one percent of the respondents were age 30 or under, 54% were in the age group 31-40, only 5% were in the age group 41-50, none of the respondents were over 51. Selecting graduates from 1975 to 1989 was a contributing factor to excluding the last two age group categories.

3. **Position.** Only 31.7% of the respondents were full-time IA teachers, while 28.6% were part-time IA teachers. Another 10.6% taught non-IA courses. Only two (1.2%) respondents were full-time administrators. The remaining 28.0% were part-time administrators.

4. **Marital status.** Fifty-eight teachers (36.0%) were
single. Four teachers (2.5%) were divorced. None of the participants were widowed. More than half of the teachers (51.6%) were married and had children. Sixteen teachers (9.9%) were married but had no children at the time the questionnaire was administered.

5. Teaching experience. Forty-eight teachers (29.8%) had taught for 1-5 years. Sixty-six teachers (41.0%) had taught for 6-10 years. Thirty-nine teachers (24.2%) had taught for 11-15 years. Only eight teachers (5.0%) had taught for more than 15 years.

6. Geographical areas. Fifty (31.1%) of the respondents were working in northern Taiwan. Forty (24.8%) work in central Taiwan. Fifty-two (32.3%) work in southern Taiwan. Sixteen (9.9%) work in eastern Taiwan. Only three (1.9%) work on individual islands around Taiwan.

7. Income levels. None of the respondents was grouped into the two income ranges of less than NT$15,000 or NT$15,001-NT$20,000. Thirty-one respondents earned NT$20,001-NT$25,000 monthly. The majority of respondents (47.2%) had a salary which ranged between NT$25,001 and NT$30,000. Thirty-two respondents earned NT$30,001-NT$35,000 monthly. Twelve and ten respondents earned NT$35,001-NT$40,000 or NT$40,000 or more respectively.
Conclusions

The major conclusions and statistical findings of this study, related to each hypothesis, are presented in this section.

**Hypothesis 1** There is no relationship between job satisfaction and the demographic variables of sex, age, position, marriage status, school location, teaching experience, and income.

The null hypothesis was rejected in favor of the alternative hypothesis, which is that at least one of the demographic variables was highly correlated with job satisfaction. The F value, with 18 and 127 degrees of freedom, is 3.73, which is significant at .05 level. Also, $R^2$ is 0.3460, which shows strength of the correlation between the dependent and the independent variables. The unique contributions of income factor on the overall job satisfaction were found to be significant at 0.05 level.

**Hypothesis 1.1** There is no difference in the degree of job satisfaction between female and male industrial arts teachers.

The null hypothesis was retained. The results indicated the $t$ value, with 107.4 degree of freedom, was 0.9683, which was not significantly different at .05 level. It was concluded that the job satisfaction of male teachers was not different from that of female teachers.
Hypothesis 1.2 There is no difference in the degree of job satisfaction among industrial arts teachers in different age groups.

The null hypothesis was retained. The F value, with 2 and 143 degrees of freedom, was 0.02. It is not significant at .05 level. In other words, there is no significant difference in the degree of job satisfaction among industrial arts teachers in the different age groups.

Hypothesis 1.3 There is no difference in the degree of job satisfaction among industrial arts teachers in different positions.

The null hypothesis was rejected. The F value, with 3 and 142 degrees of freedom, was 7.21, which was significant at .05 level. In other words, at least one of the position groups was significantly different from the others in the degree of job satisfaction of industrial arts teachers. Furthermore, the results of Duncan's test showed that a difference was found between part-time administrators and the other groups.

Hypothesis 1.4 There is no difference in the degree of job satisfaction among industrial arts teachers with different marriage status.

The null hypothesis was retained. The F value, with 2 and 143 degrees of freedom, was 1.52, which was not significant at .05 level. Therefore, there was no significant
difference in the degree of job satisfaction among industrial arts teachers representing different marital status.

Hypothesis 1.5 There is no difference in the degree of job satisfaction among industrial arts teachers with different teaching experience.

The null hypothesis was retained. The F value, with 3 and 142 degrees of freedom, was 2.19, which was not significant at .05 level. In other words, there was no significant difference in the degree of job satisfaction among industrial arts teachers with different intervals of teaching experience.

Hypothesis 1.6 There is no difference in the degree of job satisfaction among industrial arts teachers teaching in different geographical areas.

The null hypothesis was retained. The F value, with 3 and 142 degrees of freedom, was 2.64, which was significant at .05 level. It meant that there was no difference in degree of job satisfaction among industrial arts teachers in different geographical areas.

Hypothesis 1.7 There is no difference in the degree of job satisfaction among industrial arts teachers teaching in different income groups.

The null hypothesis was rejected. The F value, with 4 and 141 degrees of freedom, was 7.15, which was significant at .05 level. Hence, at least one of the income groups of
industrial arts teachers was significantly different from the others in the degree of job satisfaction. Moreover, the results of Duncan's test showed that a difference was found between income over NT$35,000 and less than NT$35,000.

**Hypothesis 2** The eight predictor variables do not differ in contribution to the job satisfaction of industrial arts teachers. The variables are supervision, colleagues, working conditions, recognition, salary, work itself, advancement, and teacher preparation.

The null hypothesis was rejected. The F value, is 5.44 with 158 and 1051 degrees of freedom. It is significant at .05 level. Therefore, the individual contributions of these eight predictor variables are significantly different. Moreover, according to the results of Duncan's test, the colleagues factor with the highest mean score contributed to job satisfaction for most of the industrial arts teachers. On the other hand, the working conditions factor with the lowest mean score contributed the least to job satisfaction for most of the industrial arts teachers.

In order to identify which particular work milieu factors made the differences on the position and income variables, more hypotheses were tested. Also, the alpha value was set at .00625.

**Hypothesis 3.1** There is no difference in the supervision factor among industrial arts teachers in different
The null hypothesis was rejected. The F value, with 3 and 147 degrees of freedom, was 4.87, which was significant at .00625 level. In other words, at least one of the position groups was significantly different from the others regarding the supervision factor. Furthermore, the results of Duncan's test showed the difference occurred in the group of part-time administrators.

Hypothesis 3.2  There is no difference in the colleagues factor among industrial arts teachers in different positions.

The null hypothesis was rejected. The F value, with 3 and 147 degrees of freedom, was 8.47, which was significant at .00625 level. In other words, at least one of the position groups was significantly different from the others in the colleagues factor. Furthermore, the results of Duncan's test showed the difference occurred in the group of part-time administrators.

Hypothesis 3.3  There is no difference in the working conditions factor among industrial arts teachers in different positions.

The null hypothesis was rejected. The F value, with 3 and 147 degrees of freedom, was 4.71, which was significant at .00625 level. In other words, at least one of the position groups was significantly different from the others in the
working conditions factor. Furthermore, the results of Duncan's test indicated the differences were found between part-time administrator and full-time IA teacher, between part-time administrator and part-time IA teacher, and between non-IA teacher and part-time IA teacher.

Hypothesis 3.4 There is no difference in the recognition factor among industrial arts teachers in different positions.

The null hypothesis was retained. The F value, with 3 and 148 degrees of freedom, was 2.71, which was not significant at .00625 level. In other words, there was no significant difference in the recognition factor among industrial arts teachers in different positions.

Hypothesis 3.5 There is no difference in the pay factor among industrial arts teachers in different positions.

The null hypothesis was retained. The F value, with 3 and 148 degrees of freedom, was 3.14, which was not significant at .00625 level. It can be concluded there was no significant difference in the pay factor among industrial arts teachers in different positions.

Hypothesis 3.6 There is no difference in the work itself factor among industrial arts teachers in different positions.

The null hypothesis was retained. The F value, with 3 and 147 degrees of freedom, was 0.49, which was not
significant at .00625 level. Hence, there was no significant difference in the work itself factor among industrial arts teachers in different positions.

**Hypothesis 3.7** There is no difference in the advancement factor among industrial arts teachers in different positions.

The null hypothesis was retained. The F value, with 3 and 147 degrees of freedom, was 4.14, which was not significant at .00625 level. In other words, there was no difference in the advancement factor among industrial arts teachers in different positions.

**Hypothesis 3.8** There is no difference in the teacher preparation factor among industrial arts teachers in different positions.

The null hypothesis was rejected. The F value, with 3 and 147 degrees of freedom, was 5.05, which was not significant at .00625 level. Therefore, at least one of the position groups was significantly different from the others in the teacher preparation factor. In addition, the results of Duncan’s test indicated the differences were found between part-time administrator and full-time IA teacher, between part-time administrator and non-IA teacher, and between part-time IA teacher and non-IA teacher.

**Hypothesis 4.1** There is no difference in the supervision factor among industrial arts teachers in different
income groups.

The null hypothesis was retained. The F value, with 4 and 146 degrees of freedom, was 1.92, which was not significant at .00625 level. Hence, there was no significant difference in the supervision factor among industrial arts teachers in different income groups.

Hypothesis 4.2 There is no difference in the colleagues factor among industrial arts teachers in different income groups.

The null hypothesis was retained. The F value, with 4 and 146 degrees of freedom, was 1.50, which was not significant at .00625 level. Therefore, there was no significant difference in the colleagues factor among industrial arts teachers in different income groups.

Hypothesis 4.3 There is no difference in the working conditions factor among industrial arts teachers in different income groups.

The null hypothesis was rejected. The F value, with 4 and 146 degrees of freedom, was 9.01, which was significant at .00625 level. Hence, at least one of the income groups of industrial arts teachers was significantly different from the others in the working conditions factor. Moreover, the results of the Duncan's test showed a difference was found between income level over NT$35,000 and less than NT$35,000.
Hypothesis 4.4  There is no difference in the recognition factor among industrial arts teachers in different income groups.

The null hypothesis was retained. The F value, with 4 and 147 degrees of freedom, was 0.97, which was not significant at .00625 level. In other words, there was no significant difference in the recognition factor among industrial arts teachers in different income groups.

Hypothesis 4.5  There is no difference in the pay factor among industrial arts teachers in different income groups.

The null hypothesis was rejected. The F value, with 4 and 147 degrees of freedom, was 10.41, which was significant at .00625 level. Hence, at least one of the income groups of industrial arts teachers was significantly different from the others in the pay factor. Moreover, the results of the Duncan's test presented a difference which was found between income level over NT$35,000 and less than NT$35,000.

Hypothesis 4.6  There is no difference in the work itself factor among industrial arts teachers in different income groups.

The null hypothesis was retained. The F value, with 4 and 146 degrees of freedom, was 4.58, which was not significant at .00625 level.
Hypothesis 4.7 There is no difference in the advancement factor among industrial arts teachers in different income groups.

The null hypothesis was rejected. The F value, with 4 and 146 degrees of freedom, was 4.58, which was significant at .00625 level. Hence, at least one of the income groups of industrial arts teachers was significantly different from the others in the degree of job satisfaction. Hence, at least one of the income groups of industrial arts teachers was significantly different from the others in the working conditions factor. Moreover, the results of the Duncan's test showed a difference which was found between income level NT$35,001-NT$40,000 and less than NT$35,000, and between over NT$40,0001 and NT$30,001-NT$35,000.

Hypothesis 4.8 There is no difference in the teacher preparation factor among industrial arts teachers in different income groups.

The null hypothesis was retained. The F value, with 4 and 146 degrees of freedom, was 2.53, which was not significant at .00625 level. Hence, there was no significant difference in the teacher preparation factor among industrial arts teachers in different income groups.
Development of the Flow Diagram

Hypothesis 1 through hypothesis 1.7 found demographic variables highly correlated with job satisfaction of industrial arts teachers. Especially, position and income level variables significantly contributed to teacher job satisfaction. Further testing provided more information about these three variables. The position variables made a significant contribution to supervision, colleagues, working conditions, and teacher preparation factors. The income variable significantly contributed to working conditions, pay, and advancement factors. Based on these findings, the flow diagram for predicting job satisfaction of industrial arts teachers in secondary schools in Taiwan was developed and is presented in Figure 14.

Author Discussion

Based on the findings of this study, the position and income variables made a significant contribution to overall job satisfaction. This finding supported the results of the study done by Li (1990). The population of Li's study was master's graduates from the Department of Industrial Education in both National Taiwan Normal University and National Chang-Hwa Normal University.

For the particular educational settings in Taiwan, this finding can be expected. In secondary schools, once an
Figure 14. A flow diagram for predicting job satisfaction of industrial arts teachers in secondary schools in Taiwan, R.O.C.
industrial arts teacher becomes a part-time administrator, his/her teaching load will reduce from 23-24 hours to 4-8 hours per week to work on the administrative assignments. In addition, administrators have more involvement in the decision-making processes. According to Waxman, Carner, and Berkenstock's (1984) suggestion, more involvement in the decision-making process reduces job turnover rate. Furthermore, comparing two individuals with the same educational level and teaching experience, an administrator usually has a higher salary than a teacher. In conclusion, reducing teaching load, involving decision-making processes, and increasing salary will produce higher teacher job satisfaction.

In Hypothesis 1.7, the results of the Duncan's test indicated there was a significant difference between teachers earning more than NT$35,000 and less than NT$35,000 per month. This amount indicates a appropriate salary that will be satisfied by most industrial arts teachers.

Among the eight work-related factors, colleagues, recognition, and supervision were the top three factors satisfied by most industrial arts teachers. The major concern of these three factors was the relationship among people with whom industrial arts teachers work. The results indicated that teachers are satisfied with their colleagues friendship, leadership of immediate supervisors, and recognition they
received from others.

On the other hand, advancement and working conditions were dissatisfied by most industrial arts teachers. The opportunities for advancement and the changes of working conditions are always decided by administrators and education policy-makers. Teachers always feel powerless to change anything related to these two factors in their working environments.

The results of this study tend to support the need-hierarchy theory proposed by Maslow (1970). Teacher’s salary and secure job provide the first two levels of human needs—physiological needs and safety needs. From the evidence of satisfaction of colleagues and supervision factors, it can be concluded most teachers’ satisfaction of belongingness and love needs was achieved. When the lower-level needs have been satisfied, needs, such as esteem and self-actualization needs, are not satisfied easily for everyone. Therefore, it was found in this study that the dissatisfaction of the advancement factor caused by the need for self-actualization cannot be achieved.

The significance of the flow diagram can be stated in two ways. First, industrial arts teachers in different position groups and income groups usually have a different degree of satisfaction toward their jobs. According to this study, those industrial arts teachers who were also part-time
administrators and/or had monthly salary over $NT35,000 dollars had the highest job satisfaction. Second, teachers in different position groups had different perceptions toward supervision, colleagues, working conditions, and teacher preparation factors. In another point of view, when a teacher is not satisfied, for example, the working conditions in his/her school, one way to change the teacher's perception may be to change his/her position. At the same time, the same principle can be applied to teachers in different income groups. For instance, if a teacher is not satisfied with his/her salary, the simplest way to satisfy him/her is to raise the salary (but this is not always allowed).

**Recommendations**

It is recommended that the findings of this study be:

1. Utilized by educators and administrators to evaluate the industrial arts teachers' level of job satisfaction.

2. Used in teacher preparation institutions for improving programs. For instance, the skills of working with supervisors and colleagues should be taught in teacher preparation programs. Also, since the working conditions factor was dissatisfied by most industrial arts teachers, future teachers should learn how to deal with this kind of situation in
their preparation programs.

3. Used for administrative decision-making to improve environment for better teacher job satisfaction. For instance, what is an attractive salary for qualified industrial arts teachers? what is an appropriate teaching load and class size for industrial arts teachers?

Based on the findings and conclusions of this study, the following recommendations for further research are presented.

1. Provide a complete picture of industrial arts teachers’ job satisfaction. A future study should be conducted with the population of all industrial arts teachers in Taiwan or a sample of graduates from all universities preparing industrial arts teachers. The subjects of industrial arts teachers in this study included only teachers who graduated from the National Kaohsuing Normal University.

2. Compare the degree of job satisfaction among industrial arts teachers who graduated from the National Kaohsuing Normal University, the National Taiwan Normal University, and other schools.

3. Compare the degree of job satisfaction among industrial arts teachers to other teachers in the fields other than industrial arts.

4. Examine the reasons why teachers who were working in eastern Taiwan had the highest job satisfaction. In this
study, teachers who serve in the schools located in eastern Taiwan region had the highest job satisfaction among teachers working in the five different regions.

5. Investigate the relationship between teacher job satisfaction and principal leadership, rather than just immediate supervisors. Supervision was an important factor which influenced industrial arts teachers' job satisfaction in this study.

6. Study the relationship between job satisfaction and absenteeism and turnover. According to Lawler (1973), two of the negative consequences of dissatisfaction were absenteeism and turnover.
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ACKNOWLEDGEMENTS

The efforts, advice, and encouragement of many individuals enabled me to meet the challenge of completing this study. Constraints on time and space will not allow me to identify everyone who has contributed, however, a few individuals are too exceptional to be omitted.

To Dr. William D. Wolansky, my major professor, I am exceedingly appreciative of the guidance and assistance he has given me throughout my program. Without his assistance and encouragement, this dissertation would not have been completed.

Great appreciation is also extended to all other members of my graduate advisory committee: Dr. Larry L. Bradshaw, Dr. Anton J. Netusil, Dr. Robert F. Strahan, and Dr. Johnny S. K. Wong, for their academic assistance and unique contributions to my dissertation. Also, appreciation is expressed to Dr. John N. Reliy for serving on the committee at the final examination. His advice was also very valuable to the completion of this study.

Finally, to my parents, brothers, and friends who also helped me, my deepest gratitude for their encouragement and support. Thank you all very much.
APPENDIX A: ENGLISH VERSION OF THE QUESTIONNAIRE
TEACHER JOB SATISFACTION QUESTIONNAIRE

Part I: General Information

Direction: Please place an (X) in the appropriate space for each of the following questions:

1. Gender?
   ( ) Male
   ( ) Female

2. Age?
   ( ) 30 and under
   ( ) 31-40
   ( ) 41-50
   ( ) 51-60
   ( ) Over 60

3. Position?
   ( ) Full-time IA teacher
   ( ) Full-time administrator
   ( ) Non-IA teacher
   ( ) Part-time teacher
   ( ) Non-IA teacher

4. Marital status?
   ( ) Single
   ( ) Single parent (divorced)
   ( ) Married (with children)
   ( ) Married (without child)
   ( ) Single parent (widowed)

5. Years of teaching experience
   ( ) 1-5 years
   ( ) 6-10 years
   ( ) Over 15 years
   ( ) 11-15 years

6. Geographic location of your school
   ( ) Northern Taiwan
   ( ) Southern Taiwan
   ( ) Central Taiwan
   ( ) Eastern Taiwan
   ( ) Individual islands

7. Approximate total monthly salary?
   ( ) Less than NT$15,000
   ( ) NT$15,001 - NT$20,000
   ( ) NT$20,001 - NT$25,000
   ( ) NT$25,001 - NT$30,000
   ( ) NT$30,001 - NT$35,000
   ( ) NT$35,001 - NT$40,000
   ( ) NT$40,001 and over

Part II: Job Satisfaction

Direction: Please read each statement carefully, and circle your AGREEMENT to each statement according to your own situation. If you do not find the exact answer which fits your case, choose the one which comes the closest to it.

AGREEMENT
   (SA) strongly agree
   (A) agree
   (N) neutral
   (D) disagree
   (SD) strongly disagree

1. My immediate supervisor gives me assistance when I need help.
AGREEMENT
(SA) strongly agree
(A) agree
(N) neutral
(D) disagree
(SD) strongly disagree

2. I like the people with whom I work.  SA A N D SD

3. Working conditions in my school are good.  SA A N D SD

4. I receive full recognition for my successful teaching.  SA A N D SD

5. I am well paid in proportion to my working load.  SA A N D SD

6. Teaching encourages me to be creative.  SA A N D SD

7. I have chances to participate in professional conferences, seminars, workshops, and other related activities.  SA A N D SD

8. My immediate supervisor explains what is expected of me.  SA A N D SD

9. I do not get cooperation from the people I work with.  SA A N D SD

10. Working conditions in my school are comfortable.  SA A N D SD

11. No one tells me that I am a good teacher.  SA A N D SD

12. Insufficient income keeps me from living the way I want to live.  SA A N D SD

13. Teaching is very interesting work.  SA A N D SD

14. I feel the university prepared me adequately.  SA A N D SD

15. My immediate supervisor is not willing to listen to suggestions.  SA A N D SD

16. My colleagues stimulate me to do better work.  SA A N D SD

17. The class sizes I teach are too large.  SA A N D SD

18. I receive too little recognition.  SA A N D SD

19. I have too many non-teaching responsibilities.  SA A N D SD

20. Teaching provides an opportunity for promotion.  SA A N D SD

21. I had a realistic picture of my job before I graduated from the university.  SA A N D SD

22. My immediate supervisor treats everyone equitably.  SA A N D SD
AGREEMENT
(SA) strongly agree
(A) agree
(N) neutral
(D) disagree
(SD) strongly disagree

23. I have made lasting friendships among my colleagues.  
SA A N D SD

24. The laboratory budget is adequate.  
SA A N D SD

25. Teacher income is adequate for normal expenses.  
SA A N D SD

26. Teaching provides an opportunity to use a variety of skills.  
SA A N D SD

27. Teaching provides limited opportunities for advancement.  
SA A N D SD

28. The university prepared me to function within the school system.  
SA A N D SD

29. My immediate supervisor makes me feel uncomfortable.  
SA A N D SD

30. My interests are similar to those of my colleagues.  
SA A N D SD

31. Materials/supplies which I need for teaching are available.  
SA A N D SD

32. Teaching provides me with financial security.  
SA A N D SD

33. I do not have freedom to make my own decisions.  
SA A N D SD

34. I have chances to continue to learn.  
SA A N D SD

35. The extra-curriculum in the university helped me to work in the school.  
SA A N D SD

36. When I teach a good lesson, My immediate supervisor notices.  
SA A N D SD

37. My colleagues provide me with suggestions or feedback about my teaching.  
SA A N D SD

38. The procedures for obtaining materials and services are well defined and efficient.  
SA A N D SD
APPENDIX B: ITEM CLASSIFICATION
Supervision

1. My immediate supervisor gives me assistance when I need help.
8. My immediate supervisor explains what is expected of me.
15. My immediate supervisor is not willing to listen to suggestions.
22. My immediate supervisor treats everyone equitably.
29. My immediate supervisor makes me feel uncomfortable.
36. When I teach a good lesson, My immediate supervisor notices.

Colleagues

2. I like the people with whom I work.
9. I do not get cooperation from the people I work with.
16. My colleagues stimulate me to do better work.
23. I have made lasting friendships among my colleagues.
30. My interests are similar to those of my colleagues.
37. My colleagues provide me with suggestions or feedback about my teaching.

Working Conditions

3. Working conditions in my school are good.
10. Working conditions in my school are comfortable.
17. The class sizes I teach are too large.
24. The laboratory budget is adequate.
31. Materials/supplies which I need for teaching are available.
38. The procedures for obtaining materials and services are well defined and efficient.

Recognition
4. I receive full recognition for my successful teaching.
11. No one tells me that I am a good teacher.
18. I receive too little recognition.

Pay
5. I am well paid in proportion to my working load.
12. Insufficient income keeps me from living the way I want to live.
25. Teacher income is adequate for normal expenses.
32. Teaching provides me with financial security.

Work itself
6. Teaching encourages me to be creative.
13. Teaching is very interesting work.
19. Too many non-teaching responsibilities affect the quality of my teaching.
26. Teaching provides an opportunity to use a variety of skills.
33. I do not have freedom to make decisions about my own
teaching.

Advancement
7. I have chances to participate in professional conferences, seminars, workshops, and other related activities.
20. I have enough opportunities for promotion.
27. As a industrial arts teacher, I have limited opportunities for advancement.
34. I have chances to continue to learn.

Teacher preparation
14. I feel the university prepared me adequately.
21. I had a realistic picture of my job before I graduated from the university.
28. The university prepared me to function within school system.
35. The extra-curriculum in the university helped me to work in the school.
APPENDIX C: APPROVAL OF HUMAN SUBJECTS REVIEW COMMITTEE
Checklist for Attachments and Time Schedule

The following are attached (please check):

12. [✓] Letter or written statement to subjects indicating clearly:
   a) 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 and the place
   d) if applicable, location of the research activity
   e) how you will ensure confidentiality
   f) in a longitudinal study, note when and how you will contact subjects later
   g) participation is voluntary; nonparticipation will not affect evaluations of the subject

13. [✓] 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

   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:

   Dec. 31, 1990

   Month / Day / Year

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

   [Signature]

19. Decision of the University Human Subjects Review Committee:

   [✓] Project Approved | [ ] Project Not Approved | [ ] No Action Required

   [Signature of Committee Chairperson] Date

   [Signature of Committee Chairperson]
APPENDIX D: CHINESE VERSION OF THE QUESTIONNAIRE
中等學校工藝教師工作滿意程度調查問卷

第一部分：基本資料
說明：請選一適當答案，並於括號內打勾。

1. 性別：（ ）男 （ ）女
2. 年齡：（ ）30 歲以下 （ ）31-40 歲 （ ）41-50 歲
（ ）51-60 歲 （ ）60 歲以上
3. 擔任職務：（ ）全職工藝教師。
（ ）除工藝課，並兼任其它科目之教師。擔任科目：
（ ）教師兼任非工藝課程之科目。擔任科目：
（ ）全職行政人員（已無需教課）。
（ ）教師兼任行政及教學工作。擔任科目：

4. 婚姻狀況：（ ）未婚
（ ）單身（包括已離婚或分居） （ ）單身（配偶已死）
（ ）已婚（有子女） （ ）已婚（無子女）
5. 任教年資：（ ）1-5年 （ ）6-10年
（ ）11-15年 （ ）15年以上
6. 工作地點：（ ）北部 （ ）中部
（ ）南部 （ ）東部
（ ）離島
7. 待遇：（ ）NT$15,000 以下 （ ）NT$15,001-NT$20,000
（ ）NT$20,001-NT$25,000 （ ）NT$25,001-NT$30,000
（ ）NT$30,001-NT$35,000 （ ）NT$35,001-NT$40,000
（ ）NT$40,001 以上

第二部分：工作滿意程度
說明：請根據目前的狀況，圈選適當的答案，來回答您是否同意下列各述句。

如果您無法找到最適切的答案，請選一最接近的。本問卷中，所謂“直屬上司”意指行政業務直屬主管。

SA = 非常同意
A = 同意
N = 有時同意有時不同意
D = 不同意
SD = 非常不同意

1. 當我需要幫忙時，我的直屬上司願意給予協助。 SA A N D SD
2. 我喜歡和我一起工作的同事。 SA A N D SD
3. 學校的工作環境非常好。 SA A N D SD
4. 當我在教學上有所表現時，學校會表揚我。 SA A N D SD
5. 我的收入和工作分量成正比。 SA A N D SD
6. 教學工作讓我能發揮創造力。 SA A N D SD
7. 我有機會參加教師專業會議，研討會，短期訓練班
及其它相關活動。 SA A N D SD
8. 我的直屬上司明白地解釋對我所期望的目標。 SA A N D SD
SA = 非常同意
A = 同意
N = 有時同意有時不同意
D = 不同意
SD = 非常不同意

9. 我無法獲得同事們的合作。
SA A N D SD
10. 學校工作環境非常舒適。
SA A N D SD
11. 沒有人告訴我：”我是個好老師。”
SA A N D SD
12. 有限的收入，使我無法過著我想要的生活方式。
SA A N D SD
13. 教書是非常有趣的工作。
SA A N D SD
14. 我覺得大學教育讓我有足夠的準備成為一位老師。
SA A N D SD
15. 我的直屬上司不願聽他人的建議。
SA A N D SD
16. 我的同事常激勵我凡事做得更好。
SA A N D SD
17. 我所教的班級人數太多。
SA A N D SD
18. 我所接受到的表揚太少。
SA A N D SD
19. 我負擔了太多非教學性質的工作，而影響了教學品質。
SA A N D SD
20. 我有足夠的進階機會。
SA A N D SD
21. 在我尚未進入學校工作之前，已對未來的工作有了概略的了解。
SA A N D SD
22. 我的直屬上司公平地對待每一個人。
SA A N D SD
23. 我在同事間保持良好的友誼。
SA A N D SD
24. 學校工廠實習的經費是足夠的。
SA A N D SD
25. 教師的收入是足夠一般生活開支。
SA A N D SD
26. 我有足夠的機會運用不同的教學技巧。
SA A N D SD
27. 身為工藝教師並沒有足夠的陞遷機會。
SA A N D SD
28. 大學教育使我有足夠的能力來到學校工作。
SA A N D SD
29. 我的直屬上司使我覺得難以相處。
SA A N D SD
30. 我的興趣和同事們很相近。
SA A N D SD
31. 我教學所需的材料及設備是足夠的。
SA A N D SD
32. 教學工作提供我經濟上的安全感。
SA A N D SD
33. 我總是盡職盡命行事，沒有足夠的自主權。
SA A N D SD
34. 我有足夠的進修機會。
SA A N D SD
35. 大學時代的課外活動有助於我日後的學校工作。
SA A N D SD
36. 當我在教學上有顯著的進展時，我的直屬上司總是知道。
SA A N D SD
37. 同事們常提供我許多教學相關的建議。
SA A N D SD
38. 獲得教學所需材料和行政支援的程序是方便而有效的。
SA A N D SD
September 3, 1990

Dear industrial arts teacher:

I am a graduate student in the Department of Industrial Education and Technology at Iowa State University. As a part of the degree requirements, I am conducting a study to investigate the degree of job satisfaction of industrial arts teachers in Taiwan. The purpose of my study is to identify and analyze the factors that correlate with the degree of job satisfaction among industrial arts teachers who graduated from National Kaohsuing Normal University.

Your assistance is requested for this study and your participation is vital to its success. However, your participation is entirely voluntary and your completion of the questionnaire will constitute your consent to participate. The responses you make are GUARANTEED CONFIDENTIAL. They will not be used to identify or evaluate any individual. The code number on the questionnaire will be used for purpose of follow up only on unreturned questionnaires. After the original data have been collected, and before data analysis, the list of participants will be destroyed to preserve the anonymity of respondents.

This questionnaire will only take you about ten minutes to complete it. For your convenience, postage for returning this booklet is prepaid. We appreciate your prompt cooperation and professional contribution.

Sincerely,

Jui-Chen Yu  
Doctoral Student  
Industrial Education and Technology

Dr. William D. Wolanksy  
Professor of Industrial Education and technology, and Coordinator of International Education Program, College of Education
APPENDIX F: FOLLOW-UP LETTER
September 15, 1990

Dear industrial arts teacher:

I realize that industrial arts teachers have very busy schedules, especially at this point of the semester. Perhaps that is why I have not received your completed questionnaire for the study of degree of job satisfaction among industrial arts teachers, which was mailed to you at the beginning of this month. I am enclosing another copy of questionnaire for your response in case your questionnaire was not received.

Although your participation is totally voluntary, this study cannot be successfully concluded without your support and cooperation. If you have recently returned your questionnaire, please accept this note as a thank you for your contribution. If your have not done so, would you take a little of your time to complete and return it as early as possible.

Sincerely,

Jui-Chen Yu
Doctoral student
Industrial Education and Technology