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Chia-sen Jimmy Huang

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Relationships among innovativeness, attitudes, and barriers regarding the use of instructional media as perceived by teacher educators in arts education programs at Taiwan teachers' colleges

Huang, Chia-sen Jimmy, Ph.D.

Iowa State University, 1993
Relationships among innovativeness, attitudes, and barriers regarding
the use of instructional media as perceived by teacher educators
in arts education programs at Taiwan teachers colleges

by

Chia-sen Jimmy Huang

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
Department: Industrial Education and Technology
Major: Industrial Education and Technology

Approved:

Signature was redacted for privacy.

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For the Graduate College

Iowa State University
Ames, Iowa
1993
TABLE OF CONTENTS

ACKNOWLEDGEMENTS ........................................... x

CHAPTER 1. INTRODUCTION ........................................ 1
  Background for the Study ..................................... 1
    Technology and education .................................. 1
    Teaching and innovations .................................. 2
    Attitudes and instructional media ......................... 3
    Barriers to media use ...................................... 4
    Taiwan applications ....................................... 5
  Need for the Study ........................................... 6
  Statement of the Problem .................................... 6
  Purpose of the Study ........................................ 7
  Research Hypotheses and Rationale ......................... 9
  Assumptions of the Study .................................. 13
  Limitations of the Study ................................... 13
  Definition of Terms ......................................... 14

CHAPTER 2. REVIEW OF LITERATURE ............................... 17
  Introduction .................................................. 17
  Adoption and Diffusion of Innovations ..................... 18
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>RESULTS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demographic Data</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Years of teaching experience</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Number of in-service training sessions attended</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Highest educational level attained</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Relationship among three demographic variables</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Descriptive Statistics for Scales</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Distributions of scale scores</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Results of Hypotheses Testing</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>Other Findings</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>86</td>
</tr>
<tr>
<td>5</td>
<td>DISCUSSION</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Purpose and Procedures of the Study</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Findings and Conclusions</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>Demographic characteristics</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>General perspectives on the three measures</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Tests of hypotheses</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>Recommendations</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>Recommendations for Taiwan teachers colleges</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>Recommendations for future research</td>
<td>96</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 3.1: Mailing and retrieval of the questionnaires .................. 51
Table 3.2: Guide to coding .................................................. 56
Table 4.1: Distribution of years of teaching experience ................. 61
Table 4.2: Distribution of in-service training sessions attended .......... 62
Table 4.3: Distribution of highest educational level ...................... 63
Table 4.4: Distribution of in-service training sessions attended by educational levels .......................................................... 63
Table 4.5: Matrix and chi-square between educational level and in-service training ...................................................... 64
Table 4.6: F-test between educational level and years of teaching experience 64
Table 4.7: A t-test between in-service training and years of teaching experience .............................................................. 65
Table 4.8: Test for differences between innovators and noninnovators on the attitude scale ................................................. 67
Table 4.9: Test for differences between innovators and noninnovators on the barrier scale .................................................. 68
Table 4.10: Mean scores of respondent attitudes by educational level .... 69
Table 4.11: ANOVA on respondent attitudes by educational level ...... 69
Table 4.12: Mean scores of respondent perceived barriers by educational level ............ 70
Table 4.13: ANOVA on respondent perceived barriers by educational level 70
Table 4.14: Mean scores of respondent innovativeness by educational level 71
Table 4.15: ANOVA on respondent innovativeness by educational level 72
Table 4.16: Mean scores of respondent attitudes by teaching experience 73
Table 4.17: ANOVA on respondent attitudes by teaching experience 73
Table 4.18: Mean scores of respondent perceived barriers by teaching experience 74
Table 4.19: ANOVA on respondent perceived barriers by teaching experience 74
Table 4.20: Mean scores of respondent innovativeness by teaching experience 75
Table 4.21: ANOVA on respondent innovativeness by teaching experience 75
Table 4.22: Mean scores of respondent attitudes by in-service training 76
Table 4.23: t-test on respondent attitudes by in-service training 77
Table 4.24: Mean scores of respondent perceived barriers by in-service training 78
Table 4.25: t-test on respondent perceived barriers by in-service training 78
Table 4.26: Mean scores of respondent innovativeness by in-service training 79
Table 4.27: t-test on respondent innovativeness by in-service training 79
Table 4.28: Pearson correlation coefficients among the innovativeness, attitudes, and perceived barriers 80
Table 4.29: Pearson correlation coefficients among respondent innovativeness, attitudes, perceived barriers, teaching experience, educational level, and in-service training 81
Table 4.30: Stepwise multiple regression analysis of respondent innovativeness .................................................. 85
Table 4.31: Stepwise multiple regression analysis on respondent innovativeness by five independent variables ........................................ 85
Table 4.32: Summary of tests for hypotheses .................................................. 87
Table 5.1: Comparison of instruments between Hurt, Joseph, and Cook (1977) and this study .................................................. 91
Table 5.2: Distributions of attitude scores and barrier scores .................................................. 91
Table A.1: Distribution of innovativeness scores .................................................. 119
Table A.2: Distribution of attitude scores .................................................. 120
Table A.3: Distribution of barrier scores .................................................. 121
Table A.4: Reliability analysis of total survey item .................................................. 122
Table A.5: Reliability analysis of innovativeness scale .................................................. 124
Table A.6: Reliability analysis of attitude scale .................................................. 125
Table A.7: Reliability analysis of barrier scale .................................................. 126
Table D.1: Means and standard deviations for each item .................................................. 146
LIST OF FIGURES

Figure 2.1: A model of stages in the innovation-decision process .... 21
Figure 2.2: Adopter categorization on the basis of innovativeness .... 25
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CHAPTER 1. INTRODUCTION

Background for the Study

The twentieth century is a knowledge-exploding era where all knowledge is accumulating at an increasingly rapid rate. Humans are being asked to acquire and manage large amounts of knowledge in a limited time. Smith (1987) stated that students must learn how to find information, discern what is important in a body of facts, and restructure information relevant to a given situation. Considering the amount of information available today, teachers must learn how to process information selectively to obtain what they need for teaching. It appears necessary for educators and educational systems to develop a new systematic, technological approach and to apply scientific knowledge to the problem of selecting information and preparing it for delivery.

Technology and education

Since the essence of education is information and communication, teachers need to acquire sufficient knowledge and skills to operate new teaching devices as well as apply learning and teaching theory. In preparing students for the future, teachers will perform more important roles in the classroom than ever before. It is difficult
to fulfill students' needs for tomorrow's life when teachers teach in traditional ways. Heinich (1970) pointed out that the teacher and the media were considered to be partners in an instructional system, each playing a vital though different role. The routine delivery of information to students could be accomplished by technological means (Winn, 1989).

There is an evidence that the technology relevant to instruction is also being developed at a rapid pace (Gagne', 1986). The aim of each of this technology is either to improve a teacher's ability to communicate ideas to students or to reach more students. Descy (1991) and Reza (1988) indicated that instructional media can play a significantly positive role in the teaching and learning process and improve education in terms of quality and quantity. Also, technology can help satisfy diverse learning needs because of the tremendous diversity of delivery materials in many different formats (Niemi and Gooler, 1987). Thomas (1991) suggested that teachers must understand how barriers to effective learning can be identified, overcome, and facilitated by appropriate technology. It is the right time for teachers to use technology to create a more effective teaching and learning process.

**Teaching and innovations**

In the context of teaching and training, it is believed that technological applications will in the near future considerably change the way people teach and learn (Lee, 1989). Ullmer (1989) stated that designers should carefully consider not only the new technology's instrumentation, but also the teaching regimens, the images of the learner, the governing ideologies, and the instructional development mandates that it may engender.
Rogers and Shoemaker (1971) pointed out that the adoption of a new technology may be either an individual or a group decision that occurs over a period of time and varies according to characteristics of the innovation. Adopting new technologies can offer the means to increase productivity, improve product quality, and offer better service (West and Sindair, 1992). Indeed, many researchers believe that the most formidable challenge of the decade will be to train people to work in this emerging information society (Jorde, 1985; McIsaac, 1979; Molnar, 1978). To make that transition, it is necessary for teachers to meet the needs for change, set the pace for the change process, and then monitor its progress as each new idea is translated into a teaching program.

Attitudes and instructional media

In the future, instructional media is expected to serve more of a communication function and may affect the teachers' attitudes toward their jobs. Simonson (1979a) developed six guidelines regarding instructional media for producing attitude change. He stated that when attitude changes are desired, instructional media should be realistic, relevant and stimulating. Chang (1988) suggested that teachers need to have positive attitudes toward the use of instructional media in their teaching. To achieve media instruction, he encouraged teachers to learn the new technology through in-service training. Chinn (1990) also concluded that positive attitudes toward specific instructional media can be fostered by the provision of effective training.

Abrams (1986) found that there were five possible reasons for attitude differences regarding the use of instructional media: (1) level of learner control, (2) opportunity to review questions, provide feedback, and review sanctions, (3) preference over tra-
ditional instruction, (4) challenge to do the best, and (5) time available to effectively use the method.

An examination of the literature in the field of education and educational communications and technology revealed that teachers had positive, neutral, and negative attitudes toward the use of instructional media. More detail is provided in the next chapter.

Barriers to media use

Efforts to improve instruction may be hindered if teachers do not recognize and use the potential of instructional media. By recognizing the barriers that exist, solutions can be found and some assurances made that instructional media will be appropriately implemented.

Lahm (1989) indicated that it is evident that technology is not being used as it should be, and the reasons for its misuse or lack of use should be investigated. This study also reported five types of barriers to the use of instructional media: (1) equipment, (2) implementation issues, (3) teacher training, (4) teaching profession, and (5) traditional classroom operation. The Office of Technology Assessment (1990) integrated several categories of barriers and identified four barriers in existing program: (1) economic, (2) social, (3) institutional, and (4) technological barriers. Examples of these barriers include: (1) lack of funding support, (2) the difficulty for institutions to adopt new technologies, (3) lack of knowledge and skills about instructional media, (4) lack of equipment, (5) lack of administrative support, (6) lack of available time, (7) lack of interest, and (8) lack of information about instructional media. Other studies identified up to 15 barriers to the use of instructional media in various types
of classrooms. More details are provided in the next chapter.

Taiwan applications

Several studies regarding the use of instructional media in different major fields have been conducted in Taiwan. Two studies (Kwo, 1982; Chen, 1984) were conducted to determine the barriers affecting the use of instructional media. They concluded four factors influencing the use of instructional media: (1) lack of media equipment, (2) financial deficiency, (3) lack of media specialists, and (4) lack of information about instructional media. Another study (Huang, 1990) surveyed elementary science teachers regarding their use of instructional media and concluded that: (1) teachers are accustomed to a lack of and unfamiliarity with instructional media, (2) teachers are unfamiliar with operational skills of instructional media, (3) teachers perceive strong needs for the availability of media instruction, and (4) teachers' educational level and in-service training experience are two factors strongly influencing media instruction.

Kwo (1982) also found that faculty in arts education departments made the most frequent use of instructional media in teaching at Taiwan teachers colleges, when compared to the following educational departments: (1) music, (2) elementary, (3) science, (4) language and literature, and (5) social studies. Arts education contains fine arts and industrial arts in these teachers colleges.

In order to further understand the situation regarding the faculty use of instructional media at Taiwan teachers colleges, the current study explored faculty innovativeness, attitudes, and perceived barriers in arts education programs at Taiwan teachers colleges.
Need for the Study

A number of instructional technology innovations have come and gone over the years. Several forms of instructional media have been available for a long time, but their widespread application in education has not materialized in Taiwan.

A few studies regarding the use of instructional media by the teachers have been described and conducted in Taiwan. Little research had focused on the barriers which may inhibit the use of instructional media and the attitudes toward the use of instructional media by arts education faculty at Taiwan teachers colleges. In addition, the variable of innovativeness had not been used in previous studies. This study determined the degree of innovativeness regarding the use of instructional media, identified the barriers affecting the use of instructional media, and measured the attitudes toward the use of instructional media in arts education programs at Taiwan teachers colleges. This study provides empirical evidence to guide the further development of instructional media experiences within arts education programs at Taiwan teachers colleges.

Statement of the Problem

The problem addressed by this study was to determine the degree of faculty innovativeness; to identify the barriers as perceived by faculty affecting the use of instructional media; to measure faculty attitudes toward the use of instructional media; and to examine the relationships among innovativeness, attitudes, barriers, and selected demographic variables including: (1) educational level, (2) years of teaching experience, and (3) number of in-service sessions attended in arts education
programs at Taiwan teachers colleges. A final aspect of the problem is to determine whether innovativeness can be predicted by the other independent variables.

**Purpose of the Study**

The first purpose was to determine the innovativeness, attitudes, and barriers regarding faculty use of instructional media in arts education program at Taiwan teachers colleges. A second purpose was to determine if arts education faculty at different levels of: (1) education, (2) teaching experience, and (3) in-service training differ on the following dependent variables: (1) the degree of innovativeness, (2) attitudes toward the use of instructional media, and (3) perceived barriers affecting the use of instructional media. A third purpose was to determine the relationships among the following variables: (1) innovativeness, (2) attitudes, (3) perceived barriers, (4) educational level, (5) years of teaching experience, and (6) number of in-service training sessions attended regarding faculty use of instructional media in arts education programs at Taiwan teachers colleges. The fourth purpose was to determine if innovativeness could be predicted using the following variables: (1) educational level, (2) years of teaching experience, (3) number of in-service training sessions attended, (4) attitudes, and (5) perceived barriers. The specific objectives were:

1. to determine the degree of faculty innovativeness regarding the use of instructional media in arts education programs at Taiwan teachers colleges.

2. to determine faculty attitudes toward the use of instructional media in arts education programs at Taiwan teachers colleges.
3. to identify the barriers as perceived by faculty affecting the use of instructional media in arts education programs at Taiwan teachers colleges.

4. to determine if arts education faculty with various levels of: (1) in-service training and (2) education differ regarding the degree of innovativeness.

5. to determine if arts education faculty with various levels of: (1) in-service training, (2) education, and (3) innovation differ regarding attitudes toward the use of instructional media.

6. to determine if arts education faculty with various levels of: (1) in-service training, (2) education, and (3) innovation differ regarding perceived barriers affecting the use of instructional media.

7. to determine whether relationships exist among the measures of innovativeness, attitudes, and perceived barriers regarding faculty use of instructional media.

8. to determine whether relationships exist between innovativeness and the following demographic variables: (1) years of teaching experience, (2) number of in-service training sessions attended, and (3) educational level.

9. to determine whether relationships exist between attitudes toward the use of instructional media and the following demographic variables: (1) years of teaching experience, (2) number of in-service training sessions attended, and (3) educational level.

10. to determine whether relationships exist between the perceived barriers affecting the use of instructional media and the following demographic variables: (1)
years of teaching experience, (2) number of in-service training sessions attended, and (3) educational level.

11. to determine the extent to which innovativeness can be predicted using the following independent variables: (1) years of teaching experience, (2) number of in-service training sessions attended, (3) educational level, (4) attitudes, and (5) perceived barriers.

Research Hypotheses and Rationale

To address the objectives of this study, the following research hypotheses were formulated:

Hypothesis 1a: Arts education faculty at Taiwan teachers colleges who were innovators will demonstrate more favorable attitudes toward the use of instructional media than noninnovators.

Hypothesis 1b: Arts education faculty at Taiwan teachers colleges who were innovators will perceive more barriers affecting the use of instructional media than noninnovators.

Rationale: Rogers (1983) generalized that earlier adopters have more favorable attitudes toward: (1) change, (2) education, (3) science, (4) seek information about innovations, and (5) exposure to mass media communication channels than later adopters (Generalization 7-16, 7-18, 7-19, 7-29, 7-27).

Hypothesis 2a: Arts education faculty at Taiwan teachers colleges with higher educational levels will demonstrate more favorable attitudes toward the use of instructional media than those with lower educational levels.
Hypothesis 2b: Arts education faculty at Taiwan teachers colleges with higher educational levels will perceive more barriers affecting the use of instructional media than those with lower educational levels.

Hypothesis 2c: Arts education faculty at Taiwan teachers colleges with higher educational levels will demonstrate more innovative practices toward the use of instructional media than those with lower educational levels.

Rationale: El-Hmaisat (1985), Gudmundsson (1985), and Huang (1990) found that teachers with higher educational levels made use of instructional media more frequently than those with lower educational levels.

Hypothesis 3a: Arts education faculty at Taiwan teachers colleges who had more years of teaching experience will demonstrate more favorable attitudes toward the use of instructional media than those had fewer years of teaching experience.

Hypothesis 3b: Arts education faculty at Taiwan teachers colleges who had more years of teaching experience will perceive more barriers affecting the use of instructional media than those had fewer years of teaching experience.

Hypothesis 3c: Arts education faculty at Taiwan teachers colleges who had more years of teaching experience will demonstrate more innovative practices toward the use of instructional media than those had fewer years of teaching experience.

Rationale: Four research studies reported that a significant relationship existed between teaching experience and teacher perceived barriers regarding the use of instructional media (Arterbury, 1971; Ervin, 1989; Hamilton et al., 1982; Torres Quintana, 1992).

Hypothesis 4a: Arts education faculty at Taiwan teachers colleges who had in-service training will demonstrate more favorable attitudes toward the use of instruc-
Hypothesis 4b: Arts education faculty at Taiwan teachers colleges who had in-service training will perceive more barriers affecting the use of instructional media than those had no in-service training.

Hypothesis 4c: Arts education faculty at Taiwan teachers colleges who had in-service training will demonstrate more innovative practices toward the use of instructional media than those had no in-service training.

Rationale: Nineteen research studies reported that teachers' attitudes were positively influenced toward their use of instructional media upon the completion of in-service training (Attar, 1986; Burke, 1986; Chinn, 1990; Delfsare, 1987; Driscoll, 1987; Duby, 1985; Eldridge, 1990; El-Hmaisat, 1985; Garland, 1990; Huang, 1990; Kabli, 1986; Kablt, 1986; Kim, 1986; Koontz, 1992; Lasher, 1971; Lindstrom, 1987; Ristow, 1987; Torres Quintana, 1992; Woolsey, 1985). Furthermore, Eleven research studies reported that teachers who were given in-service training could perceive more barriers than those were not given in-service training (Birkenhotz et al., 1989; Hamilton et al., 1982; Hasselbring, 1991; Hershfield, 1981; Hurly and Hlynka, 1982; Laney, 1984; Leske and Persico, 1989; Schultz, 1990; Tetenbaum and Malkeen, 1984; Tickton, 1971; Torres Quintana, 1992).

Hypothesis 5: There are significant relationships among the innovativeness, attitudes, and perceived barriers regarding the use of instructional media as reported by arts education faculty at Taiwan teachers colleges.

Rationale: Ten research studies concluded that the relationship between innovativeness and attitudes toward innovation are positively related (Carr, 1985; Evans and Lipperman, 1968; Harrington, 1976; Harvey, 1970; Havelock, 1971; Hyer, 1972;
Hypothesis 6: There are significant relationships between each of demographic variable (educational level, years of teaching experience, and number of in-service training sessions attended) and faculty attitudes toward the use of instructional media at Taiwan teachers colleges.

Rationale: Nine research studies reported that a significant positive relationship existed between teaching experience and teachers' attitudes toward the use of instructional media (Chinn, 1990; Clerc, 1985; El-Hmaisat, 1985; Gudmundsson, 1985; Huang, 1990; Kabli, 1986; Lasher, 1971; Torres Quintana, 1992; Woolsey, 1985).

Hypothesis 7: There are significant relationships between each of demographic variable (educational level, years of teaching experience, and number of in-service training sessions attended) and faculty perceived barriers regarding the use of instructional media at Taiwan teachers colleges.

Rationale: Four research studies reported that a significant relationship existed between teaching experience and teacher perceived barriers regarding the use of instructional media (Arterbury, 1971; Ervin, 1989; Hamilton et al., 1982; Torres Quintana, 1992).

Hypothesis 8: There are significant relationships between each of demographic variable (educational level, years of teaching experience, and number of in-service training sessions attended) and faculty innovativeness toward the use of instructional media at Taiwan teachers colleges.

Rationale: Nine research studies found that educational level was associated with innovativeness regarding the use of instructional media (Aiken and Hage, 1970; Brickell, 1967; Chesler, 1966; CERLI, 1969; Lippitt et al., 1967; Penny, 1970; Rogers,
Hypothesis 9: There is a linear combination of the following five variables (educational level, teaching experience, number of in-service training sessions attended, attitudes, and perceived barriers) which is significantly related to the degree of faculty innovativeness regarding the use of instructional media at Taiwan teachers colleges.

Rationale: Mohr (1969) reported that about 63 percent of the variance in organizational innovativeness was explained by three variables: (1) the resources available to the organization, (2) the attitudes of the director of the health department, and (3) various organizational characteristics.

Assumptions of the Study

Four assumptions serve as the basis for the study:

1. The Innovativeness Scale (IS) for measuring faculty innovativeness used by Hurt, Joseph, and Cook (1977) was valid and reliable.

2. The respondents answered the survey questions accurately and honestly.

3. The collected data reflected the actual experiences of arts education faculty at Taiwan teachers college.

4. The respondents at each collection point were representative of the entire population under study.

Limitations of the Study

The following three limitations are presented:
1. Data for this study were collected from arts education faculty at Taiwan teachers colleges. Therefore, any generalization cannot be made beyond this population.

2. The study was limited to the general use of instructional media and not to specific technical skills. and

3. The data analysis utilized correlational techniques, so interpretation of results is limited to the degree of linear relationships between variables, rather than cause-and-effect relationships.

Definition of Terms

The following terms are provided to clarify and standardize the research in this study.

Instructional Technology Complex, integrated process involving people, procedures, ideas, devices, and organization for analyzing problems and devising, implementing, evaluating, and meaning solutions to those problems in situations in which learning is purposive and controlled (Reiser, 1987, p. 11).

Taiwan Teachers Colleges Teachers colleges are equivalent to the 13th through the 16th grade. There are nine teachers colleges in Taiwan now, and graduates are certified to teach in elementary schools in Taiwan.

Arts Education Faculty at Taiwan Teachers Colleges Faculty who taught at least one class of arts education at Taiwan teachers colleges during the 1992 academic year.
Instructional Media Refers to those devices and their content which promote learning situations in industrial arts teaching. Exceptions are chalk/ blackboards and textbooks. Software media used in this study include: posters, charts, pictures, models, samples, real objects, overhead transparencies, slides, videotapes, audiotapes, films, opaque projector materials, computer disk, etc. Hardware media used in this study include: magnetic boards, flannel boards, bulletin boards, film projectors, slide projectors, overhead projectors, cameras, thermal copiers, VCRs, opaque projectors, audio cassette recorders, camcorders, computers, etc.

Media Instructional materials, techniques, and equipment used by teachers to supplement or substitute for traditional means of communication (Brookens, 1970, p. 8).

Arts Education of Taiwan Teachers Colleges Arts education at teachers colleges in Taiwan is divided into two phases which are fine arts and industrial arts. Arts education deals with industry – its organization, materials, occupations, processes, and products – and with the problems resulting from the industrial and technological nature of the society (Wilber, 1948, p. 2). And it also deals with the aesthetic and creative concepts of daily life during the activities of teaching.

Innovativeness Innovativeness is the degree to which an individual or other units of adoption is relatively earlier in adopting new ideas than the other members of a system (Rogers, 1983, p. 22).
Innovators

Innovators are active information seekers about new ideas. They have a high degree of mass media exposure and their interpersonal networks extend over a wide area, usually reaching outside of their local system. Innovators are able to cope with higher levels of uncertainty about an innovation than are other adopter categories - (1) early adopters, (2) early majority, (3) late majority, and (4) laggards (Rogers, 1983, p. 22).
CHAPTER 2. REVIEW OF LITERATURE

Introduction

The main purpose of this study was to determine the innovativeness, attitudes, and barriers regarding faculty use of instructional media in arts education programs at Taiwan teachers colleges. Because some previous research had focused on exploring teacher attitudes and barriers regarding the use of instructional media, faculty innovativeness was added to the current study. The secondary purpose of the study was to investigate, using selected characteristics of faculty, the relationships among innovativeness, attitudes, and perceived barriers regarding the use of instructional media in arts education programs at Taiwan teachers colleges. These characteristics included educational level, years of teaching experience, and number of in-service training sessions attended.

The literature review consists of three sections. The first section describes the adoption and diffusion of innovations. It includes: (1) adoption and diffusion theory, (2) definition of innovativeness, (3) adopter categorization, (4) measuring innovativeness, and (5) review of related innovativeness research. Section two presents attitudes toward the use of instructional media. It includes: (1) importance of attitudes and attitude measurement in education, (2) definition of attitudes, (3) measuring attitudes in education, (4) attitude change and instructional media, and (5) review of related
attitude research. Barriers affecting the use of instructional media is presented in the third section. It includes: (1) individual resistance to media innovations, (2) institution resistance to media innovations, (3) types of barriers to the use of instructional media, (4) factors affecting the use of instructional media, and (5) review of related barrier research.

Adoption and Diffusion of Innovations

Rogers and Shoemaker (1971) stated that adoption is a decision to make full use of a new idea as the best course of action available. Later, Rogers (1983) explained that adoption is the innovation decision that describes the process through which an individual or organization passes from first knowledge of an innovation; to forming an attitude toward the innovation; to a decision to adopt or reject; to implementation of the new idea; and to the confirmation of this decision. Diffusion can be defined as the spreading of an innovation or an idea or practice perceived as new through a social system from the source of its generation to institutions or individuals who adopt it (Tangara, 1992). Rogers (1983) explained that diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. He also indicated that communication is a process in which participants create and share information with one another in order to reach a mutual understanding.

Adoption and diffusion theory

Rogers (1986) indicated that adoption and diffusion theory consists of a series of stages such as: (1) awareness, (2) making value and compatibility judgements,
(3) making an adoption or rejection decision based on the judgements, (4) implement­
mentation of the innovation, and (5) seeking sources that will confirm their decision.
In order to provide an understanding of adoption and diffusion theory, the follow­
ing three aspects will be discussed to build a theoretical foundation: (1) innovation
attributes, (2) the decision process, and (3) the diffusion process.

Innovation attributes

The process of adoption focuses on the perceived attributes of the innovation
(Hurt and Hibbard, 1989). Rogers (1983) indicated that five attributes of innovations
are: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5)
observability. He further explained that:

Relative advantage is the degree to which an innovation is perceived as
being better than the idea it supersedes. The degree of relative advantage
is often expressed in economic profitability, in status giving, or in other
ways. Compatibility is the degree to which an innovation is perceived
as consistent with the existing values, past experiences, and needs of
potential adopters. An innovation can be compatible or incompatible
(1) with sociocultural values and beliefs, (2) with previous introduced
ideas, or (3) with client needs for innovations. Complexity is the degree
to which an innovation is perceived as relatively difficult to understand
and use. Any new idea may be classified on the complexity- simplicity
continuum. Trialability is the degree to which an innovation may be
experimented with on a limited basis. New ideas that can be tried on the
installment plan will generally be adopted more rapidly than innovations
that are not divisible. Observability is the degree to which the results
of an innovation are visible to others. The results of some ideas are
easily observed and communicated to others, whereas some innovations
are difficult to describe to others. (p. 213–240)

Bowden (1988) suggested that there are specific times during an individual’s ca­
reer when they are more likely to see relative advantage to the adoption of innovation.
According to Moon (1982), an innovation may be compatible at cultural, social, social psychological, symbolic, and functional levels. Of these attributes, the perceived degree of relative advantage and compatibility of the innovation seems to be the most powerful discriminators between potential adopters and nonadopters (Bolton, 1983).

The decision process

Rogers (1983) had indicated that the innovation-decision process is the process through which an individual or organization passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. This process consists of a series of actions and choices over time through which an individual or an organization evaluates a new idea and decides whether or not to incorporate the new idea into ongoing practice. Figure 2-1 shows a model of the stages in the innovation-decision process. In the knowledge stage, the individual receives factual information. In the persuasion stage, the individual seeks out additional information and forms a favorable or unfavorable attitude toward the innovation. In the decision stage, an individual actually adopts or rejects the innovation. In the implementation stage, the innovation is incorporated into use. In the confirmation stage, the individual seeks reinforcement of an innovation-decision process when they reverse this previous decision if exposed to conflicting messages about the innovation.

The diffusion process

The four main elements of the diffusion process are the innovation, communication channels, time, and the social system (Rogers, 1983). He further explained that:
COMMUNICATION CHANNELS

PRIOR CONDITIONS
1. Previous practice
2. Felt need/problems
3. Innovativeness
4. Norms of the social systems.

I. KNOWLEDGE
II. PERSUASION
III. DECISION
IV. IMPLEMENTATION
IV. CONFIRMATION

Characteristics of the Decision-Making Unit
1. Socio-economic characteristics
2. Personality variables
3. Communication behavior

Perceived Characteristics of the Innovation
1. Relative advantage
2. Compatibility
3. Complexity
4. Trialability
5. Observability

source: Rogers (1983)

Figure 2.1: A model of stages in the innovation-decision process
An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. A communication channel is the means by which messages get from one individual to another. Time is an important element in the diffusion process. A social system is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. (p. 10)

Robertson (1971) defined diffusion in a manner more applicable to the marketing of new products by adding two further elements. He indicated that diffusion is: (1) the adoption, (2) of new products or services, (3) over time, (4) by consumers, (5) within social systems, and (6) as encouraged by marketing activities. McElory (1992) also indicated that innovation is used and modeled by an individual or adoption group that has some type of experience with the innovation. These individuals or change agents use various channels of communication to facilitate the transfer of innovation.

Opinion leaders and change agents play an integral part in the diffusion process. Rogers (1983) pointed out that opinion leaders are members of the social system in which they exert their influence, while a change agent is an individual who influences clients' innovation decisions in a direction deemed desirable by a change agency. Change agents use opinion leaders within a given social system as lieutenants in diffusion campaigns. So, opinion leaders and change agents are innovators who are more knowledgeable, open to change, highly motivated, cosmopolitan, mobile, and venturesome (Stewart, 1982).

Definition of innovativeness

Some authors have defined innovativeness as synonymous with risk-taking (Can-
cion, 1967; Donnelly and Etzel, 1973; Popielarz, 1967). Feaster (1968) conceptual-
ized innovativeness as a willingness to recognize and internalize the need for change.
Rogers and Shoemaker (1971) conceptualized innovativeness as the early adoption of innovations relative to other members of the organization or social system. Rogers (1983, p.22) redefined innovativeness as "the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system". Innovativeness indicates behavioral change, the ultimate goal of most diffusion programs, rather than cognitive or attitude change. Rogers and Shoemaker (1971) implied that innovativeness is a personality characteristic. Hurt, Joseph, and Cook (1977) conceptualized that innovativeness tends to be normally distributed and can be treated as a personality construct, which may be interpreted as a willingness to change. Kirton and Mulligan (1969), Bruner and Tajfel (1961), and Jacoby (1971) had also demonstrated strong relationships between innovativeness and other personality characteristics which are normally distributed.

**Adopter categorization**

The innovation diffusion process is typically illustrated by plotting the distribution of the number of adopters of new product or process over time and expressed as a percentage of all potential adopters of the innovations (West and Sinclair, 1992). Rogers (1983) suggested that adoption demonstrates a fairly normal distribution over time. As a result, adopters can be placed into categories based on their time of adoption, relative to other adopters, and defined in terms of variation from the mean time of adoption for all faculty use of instructional media in arts education programs at Taiwan teachers colleges.

Figure 2.2 indicates that the first 2.5 percent of the individuals are innovators, the next 13.5 percent of the individuals are termed the early adopters, the next 34 percent
of the individuals are early majority, the next 34 percent of the individuals are termed the late majority, and the final 16 percent of the individuals are laggards. Innovators are venturesome and can launch the new ideas in the social system by importing the innovation from outside of the system's boundaries and play a gatekeeping role in the flow of new ideas into a social system. Early adopters try to decrease uncertainty about a new idea by adopting it, and then conveying a subjective evaluation of the innovation to near-peers by means of interpersonal networks. The early majority are deliberate and can adopt new ideas just before the average number of a social system and interact frequently with their peers, but seldom hold leadership positions. The late majority are skeptical and can adopt new ideas just after the average member of a social system and have a skeptical and cautious air regarding approaching innovations. Laggards are the last in a social system to adopt an innovation and process almost no opinion leadership. Their decisions are often made in terms of what has been done in previous generations and these individuals interact primarily with others who also have traditional values (Rogers, 1983).

Measuring innovativeness

Innovativeness is an elusive construct defined and operationalized differently by various researchers (Goldsmith, 1986). A literature review yielded four scales for measuring innovativeness stated as follows:

(1) The Open Processing Scale (OPS)

The Open Processing Scale (OPS) was developed by Leavitt and Walton (1975, 1981, 1983) in the marketing/consumer behavior context to measure a hypothesized distinctive cognitive style presumed to underlie innovative behavior. The OPS has a
24-item, self-report measure with 12 content reversed items. It has two parallel forms and comparable forms.

(2) Innovativeness Scale (IS)

Hurt, Joseph, and Cook (1977) developed their Innovativeness Scale (IS) to measure a normally distributed, generalized personality trait, willingness to change, which contributes to the adoption or rejection of new ideas. The IS has 12 positively and 8 negatively worded items. A seven-point Likert-type response format is described.

(3) Jackson Innovation Inventory (JI)

Jackson (1976) wrote that an inventor is a creative and inventive individual, capable of originality of thought, motivated to develop novel solutions to problems, values new ideas, and likes to improvise. The JI has 20 personality items. Half of the items are negatively worded, and a true/false response format is used.

(4) Kirton Adoption-Innovation Inventory (KAI)
Kirton (1976) described two distinct styles of creativity and problem solving. He indicated that some persons tend to be adopters and solve problems within existing perceptual frames of reference by doing things better, while innovators recognize or restructure the frame-work as part of the problem leading to more abrupt and disruptive solutions. The KAI has a 32-item (11 reversed) measure which asks respondents how difficult it is to present themselves to others. A five-point Likert-type response format was used with “Very Easy” to “Very Hard” as anchor points.

Traditional techniques have primarily employed post-facto interviews to measure innovativeness. These post-facto techniques, however, suffer from several weaknesses such as: (1) time consuming and costly, (2) interviewer biases may confound responses, (3) restricted sample size, (4) innovation-bound, (5) the inability to manipulate independent variables, (6) the lack of power to randomize, and (7) the high risk of improper interpretation (Hurt, Joseph, and Cook, 1977). Because of these problems with the post-facto interview techniques, self-reports have been shown to be consistently good predictors of many types of behavior (Shrauger and Osberg, 1981), especially Likert-type scales. This approach has three advantages: (1) such scales are easy and inexpensive to administer, (2) they can measure innovativeness across a variety of innovation-contexts, and thus are not likely to be confounded by a specific innovation, and (3) Likert-type self-report scales normally have high reliability (Hurt, Joseph, and Cook, 1977).

In supporting the use of self-report measurements, Hurt, Joseph, and Cook (1977) and Jorde (1985) reported that how individuals view themselves with respect to the personality dimension of innovativeness provides an accurate predictor of innovation-acceptance behavior. Six research studies suggested that innovativeness has a positive
correlation with certain personality characteristics such as creativity, openness, flexibility, venturesomeness, risk-propensity, and internal locus of control (Carlson, 1965; Coover and Goldstein, 1980; Jorde, 1985; Gardner, 1981; Rogers, 1983; Roberston, 1971). This study selected the Innovativeness Scale developed by Hurt, Joseph, and Cook (1977) to effectively measure the innovativeness of faculty in arts education programs at Taiwan teachers colleges.

Review of related innovativeness research

Certain characteristics are positively related to innovativeness. In demographic characteristics, education leads to better usage of information and an increase in the tolerance for risk taking (Webster, 1967). Turnbull and Meenagh (1980) indicated that there were eight social interaction characteristics that were positively related to innovativeness: (1) social participation, (2) opinion leadership, (3) cosmopolitanism, (4) social mobility, (5) deviancy from social system norms, (6) contact with change agencies, (7) interpersonal communications exposure, and (8) mass media exposure. Furthermore, knowledgeability, general attitude toward change, achievement, motivation, and education aspiration were all higher among innovator types (Roberston, 1971).

Rogers and Stanfield (1968) found that fulfillment of felt needs, availability, and immediacy of benefits were positively related to innovativeness. Turnbull and Meenagh (1980) suggested that the greater the level of newness associated with the innovation, the slower the adoption rate. Summers (1971) concluded that where innovativeness was reflected in the norms of a progressive system, opinion leadership would be linked to innovativeness. The continuum of innovativeness could be par-
tioned into five adopter categories on the basis of two characteristics of a normal distribution, the mean and the standard deviation. These five categories were conceptualizations based on observations of reality and designed to make comparisons possible (Rogers, 1983).

Previous research studies showed many important differences between earlier and later adopters of innovations in: (1) socioeconomic status, (2) personality variables, and (3) communication behavior. A series of Rogers' (1983) generalizations summarized research findings about the socioeconomic characteristics of adopter categories. The relatively earlier adopters in a social system were different from later adopters in age, but they had more years of education, were more likely to be literate, had a more favorable attitude toward credit, and had more specialized operations. These characteristics indicate generally that earlier adopters had higher socioeconomic status than later adopters. Earlier adopters in a system also differed from later adopters in personality variables. Earlier adapters had greater rationality, greater intelligence, a more favorable attitude toward change, a greater ability to cope with uncertainty and risk, a more favorable attitude toward education, and a more favorable attitude toward science. Finally, the adopter categories had different communication behavior. Earlier adopters had greater exposure to mass-media channels, had greater exposure to interpersonal communication channels, engaged in more active information seeking, and had greater knowledge of innovations.

Hamilton (1990) applied Rogers theory of adoption and diffusion of innovations to characteristics of earlier adopters of an electronic network for educators. Her results confirmed many of Rogers' predictions such as: The average earlier adopter possessed a master degree, relied on diverse sources of information including frequent
contact outside of the work place, and felt positively toward technology and risk taking. She also stressed the importance of these earlier adopters, without them, others failed to adopt and the innovations could not diffuse through the population.


Six research studies support the contention that innovativeness and teaching experience were not related (Archibald, 1980; Beckerman, 1971; Carr, 1985; Galler, 1970; Willsey, 1971; Wygal, 1966).

Nine research studies found that educational level was associated with innovativeness (Aiken and Hage, 1970; Brickell, 1967; Chesler, 1966; CERLI, 1969; Lippitt et al., 1967; Penny, 1970; Rogers, 1963; 1983; Rogers and Shoemaker, 1971; Zimmerman, 1970). But, Harrington (1976) and Carr (1985) wrote that educational level and innovativeness were not related.

In the late of 1960s, a number of multiple correlation analyses were made of organizational innovativeness. Another recent trend in innovativeness-prediction research is to include independent variables that use: (1) system-level variables, (2) communication network variables, along with (3) individual-level variables to predict innovativeness. To date, diffusion research has concentrated too much: (1) on investigating the characteristics of adopter categories and (2) in studying a rather limited range of such characteristics variables (Rogers, 1983).
Attitudes Toward the Use of Instructional Media

Importance of attitudes and attitude measurement in education

Attitudes and attitude measurement regarding teachers and students are a critical component of understanding the teaching and learning process. When the educator designs a teaching activity, one should recognize the need for establishing attitudinal goals and for planning activities designed to produce effective outcomes in learners as a consequence of an instructional sequence. Student opinions toward learning activities that teachers are constructing need to be assessed. Whatever the reason, attitudinal outcomes should be important considerations. There are many intervening factors likely to influence the relationships between how teachers and students feel and how they act. Probably the development of desirable attitudes in teachers and students should be a goal in itself (Simonson, 1979a).

Attitude measurement is only one of many evaluation techniques for the developer to consider for use. The concept "attitude" is one of the more popular and controversial concepts in contemporary social psychology (Dashner, 1980). Many related disciplines also have used this concept in their approaches. Perhaps no other terms has been so extensively used by theorists and researchers in the behavioral sciences (Wicker, 1969; Schuman and Johnson, 1976). As a psychology construct, attitude is a hypothetical variable that operates within individuals as a hidden variable, attitude act to shape and give stimulus (Dashner, 1980). Many attitude measures have names that are self-explanatory. The developer can identify attitudes that can be measured, then measures can be created.
Definition of attitudes

Thomas and Znaniecki (1918) defined attitude as:

A mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual’s responses to all objects and situations with which it is related. (p. 21)

Some definitions of attitude make reference to elements such as motivational process, cognition, and perceptual orientations (DeFleur and Westie, 1963). Fleming and Levie (1978) indicated that attitudes can vary in direction, either positive or negative; in degree, the amount of positiveness or negativeness; and in intensity, the amount of commitment with which a position is held. Operationally, attitudes are latent and not directly observable in themselves, they do act to organize, or to provide direction to, actions and behaviors that are observable (Simonson, 1979a). Additionally, attitudes have been defined to have three components: affective, cognitive, and behavioral (Zimbardo and Ebbesen, 1970). The affective component consists of a person’s evaluation of, liking of, or emotional response to the object or person. The cognitive component is conceptualized as a person’s beliefs about, or factual knowledge of the object or person. The behavioral component includes the person’s overt behavior directed toward the object or person (Simonson, 1979a).

Measuring attitudes in education

Since attitudes are defined as latent, and not observable in themselves, the teacher or developer must identify some behavior that would seem to be representative of the attitude in question so that this behavior might be measured as an
index of the attitude construct. In general, attitude measure development should utilize appropriate test construction techniques. Simonson (1979d) and Henerson et al. (1990) suggested that attitude measures should be valid, reliable, replicable, and can be simple to administer, explain, and understand.

There are four techniques for collecting attitude information: (1) self-reports, (2) reports of others, (3) sociometric procedures, and (4) records. Each of these can be used to measure attitude-related behaviors. Most commonly, attitude measurement is accomplished by using one of the following tools: (1) questionnaires, (2) rating scales, (3) interviews, (4) written reports, (5) observations, and (6) sociometrics (Henerson et al., 1990).

Generally, there are six steps used in the creation of an attitude measure: (1) identify the construct to be measured, (2) find an existing measure of the construct, (3) construct an attitude measure, (4) conduct a pilot study, (5) revise tests for actual use, and (6) summarize, analyze, and display results (Diab, 1967; Henerson et al., 1990). In the process of attitude measurement, the designer should attempt to locate an instrument that will measure the relevant construct. The use of standardized measures will simplify the job of attitude evaluation for the teacher or developer. If no existing measure of the relevant attitude is available, the teacher or designer will need to construct his or her own test.

Four major scales are commonly used: (1) Thurstone's method of equal appearing intervals, (2) Likert's method of summated ratings, (3) Guttman’s scalogram, and (4) Osgood’s semantic differential (Zimbardo, Ebbesen, and Maslach, 1977). Especially, Likert-type method is used frequently. Likert-type method has three advantages: (1) such scales are easy and inexpensive to administer, (2) normally has
high reliability, and (3) the apparent correlation can be found between agreement scale scores for attitudes and related behaviors (Hurt et al., 1977; Henerson et al., 1990).

When a test is constructed locally, it is critical that reliability and validity information be collected for the measure. Assessment of validity and reliability help to determine the amount of faith people should place in a measurement instrument (Mehrens and Lehmann, 1973; Henerson et al., 1990). Validity indicates how worthwhile a measure is likely to be, in a given situation, for telling you what you need to know. Reliability indicates how consistently a measure is likely to be, in a given situation, for telling you whether a measure is reliable. Basically, there are four categories of validity: (1) content validity, (2) concurrent validity, (3) construct validity, and (4) predictive validity. This study used content validity to design the survey. There are several methods of determining reliability that can be easily used by the attitude test developer. The test-retest method and split-half method are frequently used. Since there is no single, established method for determining validity and reliability, the developer should use carefully in constructing, administering, and interpreting measures and their results.

Attitude change and instructional media

An individual's attitude can be changed through communication (Kiesler, Collins, and Miller, 1969; Weissman, 1986). Rosenberg and Abelson (1967) introduced the Affective-Cognitive Consistency Theory in order to explain the processes by which attitude change occurs. They indicated that the more information disseminated by a media presentation, the more likely it would be to change the attitude of the viewer.
In the 1950s and 1960s, the primary purpose of these messages using media was to persuade those who saw them of the importance of an idea. Agerter (1985) reported that attitude change occurred because of interactions among the message, the media delivery system, and the characteristics of the learners. There is evidence to show that instruction with media is often received more favorably than instruction without media. The use of media seems to produce positive attitudes in many learning situations (Simonson, 1984).

Some of the earliest research reported on media and the influence it had on attitudes was published in 1931 by Thurstone (Aegerter, 1985). Over two hundred sources were reviewed by Simonson (1977; 1979b; Simonson, Thies, and Burch, 1979c). Generally, the results of those studies were not uniform enough to produce a definitive conclusion regarding the relationship between mediated instruction and attitudes. Results were often contradictory. However, there were a considerable number of studies in the literature where researchers were able to produce positive attitude results, similar to Thurstone's (Simonson, 1979d).

Research dealing with the media-attitude relationship has often attempted to determine if there is an identifiable relationship between what a learner likes or dislikes about the concept that is presented and how much is learned (Simonson, 1982). A positive link between the learner attitude toward content information and achievement has been identified by five research studies (Fenneman, 1973; Greenwald, 1965, 1966; Levy, 1973; Perry and Kopperman, 1973; Simonson, 1977). A preference for mediated instruction by learners has been found in experiments conducted by two research studies (Dambrot, 1972; Redemsky, 1959).

Attitudinal outcomes should be a concern to the teacher or developer of teaching
materials. Simonson (1979d; 1982; 1984) offered six guidelines listed below that are likely to contribute to a healthy, positive learning environment. The six guidelines are: (1) Learners react favorably to mediated instruction that is realistic, relevant to them, and technically stimulating, (2) Learners are persuaded and react favorably when mediated instruction includes the presentation of new information about the topic, (3) Learners are positively affected when persuasive messages are presented in as credible a manner as possible, (4) Learners who are involved in the planning, production, or delivery of mediated instruction are likely to react favorably to the instructional activity and to the message delivered, (5) Learners who participate in postinstruction discussions and critiques are likely to develop favorable attitudes toward delivery method and content, and (6) Learners who experience a purposeful emotional involvement or arousal during instruction are likely to change their attitudes in the direction advocated in mediated message.

Review of related attitude research

An examination of the literature in the field of education and educational communications and technology revealed that teachers had positive, neutral, and negative attitudes toward the use of instructional media. Considerations that affected these attitudes were:

1. The presence of a full-time media specialist would create a positive attitude toward the use of instructional media (Miller, 1969; Rohner, 1981).

2. There was a positive relationship between teacher attitude toward the use of instructional media and the support received from the administration (Gray, 1971; Kelly, 1959; Nakafuji, 1985; Smith, 1984; Torres Quintana, 1992).
3. The higher interest of teachers would create a positive attitude toward the use of instructional media (Agerter, 1985; Dodge, et al., 1974; Meinster, 1990).


5. The attitude of the teacher was not the major factor in determining the use of instructional media in teaching (Seidman, 1986).

6. The attitude of the teacher toward the use of instructional media was not affected by a lapse of time (Aquino, 1974; Attar, 1986).

7. The availability of instructional media for the teacher to use would create a positive attitude (Abajian, 1986; Attar, 1986; Bankirer, 1987; Kabli, 1986; Kablt, 1986).

8. The support of external funding sources would create a positive attitude toward teacher use of instructional media (Bankirer, 1987; Smith, 1984).

9. Educational effectiveness and efficiency could be improved and demonstrate a positive attitude regarding teacher use of instructional media in classroom (Abrams, 1986; Bankirer, 1987; Doetkott, 1987; Hendrick, 1985). and

10. The utilization of media techniques, such as computer and instructional television would create a positive attitude toward the use of them (Ajibero, 1985;

Also, the literature revealed that there were three variables: (1) teaching experience, (2) educational level, and (3) in-service training that may influence teacher use of instructional media. Nine research studies (Chinn, 1990; Clerc, 1985; El-Hmaisat, 1985; Gudmundsson, 1985; Huang, 1990; Kabli, 1986; Lasher, 1971; Torres Quintana, 1992; Woolsey, 1985) reported that a significant positive relationship existed between teaching experience and attitudes toward the use of instructional media by both preservice and full-time teachers. Five research studies (Burke, 1986; Kablt, 1986; Kim, 1986; Mason, 1986; Suriyawongse, 1988) reported that no significant relationship existed between teaching experience and attitudes toward the use of instructional media by both preservice and full-time teachers.

El-Hmaisat (1985), Gudmundsson (1985), and Huang (1990) found that teachers with higher educational levels made use of instructional media more frequently than those with lower educational levels. While, Fite (1987) and Sariyawongse (1988), concluded that there was no significant relationship between educational level and teacher attitudes toward the use of instructional media.

Nineteen research studies (Attar, 1986; Burke, 1986; Chinn, 1990; Delfrate, 1987; Driscoll, 1987; Duby, 1985; Eldridge, 1990; El-Hmaisat, 1985; Garland, 1990; Huang, 1990; Kabli, 1986; Kablt, 1986; Kim, 1986; Koontz, 1992; Lasher, 1971; Lindstrom, 1987; Ristow, 1987; Torres Quintana, 1992; Woolsey, 1985) reported that preservice teachers and full-time teachers were positively influenced their attitudes toward the use of instructional media upon the completion of in-service training. However, two research studies (Aquino, 1968; Meinster, 1990) reported that teacher
in-service training in instructional media produced negative results. Meanwhile, three research studies (Lasher, 1971; Jones, 1982; Kreamer, 1978) concluded that there was no significant relationship between in-service training and teacher use of instructional media.

Barriers Affecting the Use of Instructional Media

The barriers to media use have been studied by several researchers. Schieman and Fiordo (1990) concluded that adoption of instructional media would meet with resistance and even opposition in higher education. Resistance to media innovations may stem from an individual or an institution characteristic. This study also indicated that resistance includes decisiveness, objection, confusion, opposition, ignorance, and fear.

Individual resistance to media innovations

Resistance stems from Lewin’s (1951) field theory. Research on compliance-resistance was conducted by McLaughlin, Cody, and Robey (1980; cited in Schieman and Fiordo, 1990). They emphasized that students and colleagues who do not comply with our request to change will let us know, and we must then convert their resistance into compliance.

Purdy (1975) surveyed faculty at one community college and concluded that many educators are inherently resistant to learning how to use modern technology. Rose (1982) concluded that educators may lack an understanding of the nature of technology. They may not know how to use the technology and/or perceive it as difficult and complex. Furthermore, they may lack the information to enable them to
make sound educational decisions. Rose (1982) also indicated that educators rely on their personalities to direct the learning situation. The fewer the intervening objects between the teacher and the student, the better.

Champion (1975) offered eight potential sources of individual resistance to change. They were: (1) Change can be a threat to job security and creates anxiety for many employees, (2) Change may alter informal group relationships on the job, (3) Learning to do a new job required by the innovation may be regarded by educators with hostility, (4) General ignorance about the nature and extent of impending change will likely create resistance, (5) Change may signify a loss of status and prestige, (6) Some people just do not like to change, regardless of the benefits, (7) Hostility may exist towards any agent of change if he is viewed as an outsider, and (8) If there is a clear distinction between staff and faculty within the institution, there may be faculty resistance.

**Institution resistance to media innovations**

Jwaideh and Marker (1973; cited in Schieman and Fiordo, 1990) stated that a major obstacle to the adoption of instructional media in higher education is the inertia of the education system itself. The educational bureaucracy neutralizes new ideas and applications with apparent ease through budget cuts, budget shifts, changing priorities or pressure from individuals and groups. Rose (1982) identified institutional barriers that include the overselling of alternative instructional media by administrators and communications specialists, the failure of administrators to support and reward the use of instructional media, the absence of detailed planning for the use of instructional media, and the lack of the evaluation of the effects of the use of instruc-
Duttweiler (1983) concluded that the traditional governing structure of education creates greater resistance to innovation than does faculty resistance. He favored the elimination of various legal barriers regarding the present governing structure of schools: student/professional staff ratio; attendance requirement; the defining of classes, courses, and graduation units in terms of the amount of time that is spent instead of the amount of learning that occurs. These same standards, rules and regulations, however, may also prove to be barriers to the optimum use of instructional media.

**Types of barriers to the use of instructional media**

The Office of Technology Assessment (1990) identified four barriers in existing programs: (1) economic, (2) institutional, (3) social, and (4) technological barriers. The New York State Education Department (1985) indicated that technologies should not be imposed without sensitivity to institutional and societal barriers. Economic barriers mean funding support and budget distribution. Institutional barriers would occur when educational institutions might have to adopt curricula, schedules, and classroom organization in order to employ these technologies effectively. Social barriers include: (1) inadequate staff development, (2) lack of adequate equipment, and (3) skepticism about traditional long-term effects. Technological barriers refer to the operational skills regarding the use of instructional media.

Generally, the barriers to the use of instructional media can be organized into five categories: (1) equipment, (2) implementation issues, (3) teacher training, (4) teaching profession, and (5) traditional classroom operation (Lahm, 1989).

Equipment barriers include: (1) Inadequate funding for hardware and software,
(2) Too much work required to manipulate the equipment, (3) New and complex skills required to use the newer equipment, (4) Available hardware is often obsolete, (5) Equipment is unavailable when needed, (6) Software inadequate to meet the needs of students, and (7) Equipment does not work as expected.

Implementation barriers include: (1) Schools lack both short- and long-term planning for instructional media integration, (2) There is no financial support for teacher time and effort, (3) There is a lack of human resources to assist in the use of instructional media and in teaching with media, (4) Administrators do not offer assistance to teachers, (5) The individual teacher may never use of new instructional media, and (6) Token implementation or occasional use is insufficient for successful adoption of new instructional media.

Teacher training barriers include: (1) There is a limited supply of knowledgeable teacher trainers, (2) There may not be room for the use of instructional media in the school curricula, (3) Faculty are using media as productivity tools, but fail to use it in instruction, (4) There are various models for the delivery of knowledge in teacher training programs, but the most effective model is not known yet, and (5) There is a difference between acquisition and performance. Even if the skills are acquired in training, there is no guarantee that they will be used.

Teaching profession barriers include: (1) Teachers historically tend to value student first of the school operation, (2) Instructional media is often viewed as incongruent with that object, (3) Instructional media is viewed as an end, not as a means to an end, (4) Instructional media is seen by some as strictly scientific, limiting the art of teaching, (5) Teachers are trained in content, not problem-solving skills, (6) Teachers see no reason to adopt the instructional media, and (7) Teachers value in-
terpersonal relationships with their students, but computers are often seen to replace the teacher-student relationship with a student-machine relationship.

Classroom environment barriers include: (1) Teachers may not have the time or desire to get involved in learning about instructional media, (2) Certain routines and behavior patterns emerge that deal with the requirement of using the question/answer format, (3) Textbooks, chalkboards, and workbooks are the accepted materials to deliver instruction, (4) Teaching takes place in fairly stable, predictable setting, but instructional media threatens that stability, (5) There are established classroom rules and procedures for both students and teachers, (6) It requires too much work to change teaching strategies, and (7) It requires too much work to identify appropriate software.

Factors affecting the use of instructional media

Barker (1986) suggested that seven important attributes need to be considered when instructional media was selected as a means of implementing a training or learning task. They were: (1) bandwidth for information transfer, (2) interactivity, (3) versatility, (4) effectiveness, (5) intelligence, (6) availability, and (7) cost.

Romiszowski (1988) pointed out that six major factors affecting the use of instructional media: (1) learner characteristics, (2) instructional characteristics, (3) instructional strategy, (4) media characteristics, (5) teacher attitude or skill, and (6) organizational constraints. Learner characteristics include the learner age, socio-economic status, educational background, cultural biases, life experiences, attitude toward topic, and prerequisite knowledge of topic, etc. Instructional characteristics are those that are related to the content that will be presented such as the course,
course objectives, and difficulty level of content. Instructional strategy relates to the method of presentation such as lecture, conference, demonstration, performance, individualized instruction, study assignments, tutoring, and instructor differences. Media characteristics are those properties of the medium.

Review of related barrier research

An examination of the literature in the field of education and educational communications technology revealed that teachers perceived fifteen barriers affecting the use of instructional media. Considerations that affected these perceived barriers were:


2. The lack of available equipment such as hardware, software, and related materials was a significant barrier regarding the use of instructional media (Birkenhotz and Stewart; Confederation Coll. of Applied Arts and Technology, 1989; Forman, 1982; Gordon, 1989; Hasselbring, 1991; Homan, 1977; Hu, 1988; Hurly and Hlynka, 1982; Kanny, 1990; Kwo, 1982; New York State Education Dept., 1985; Rose, 1982; Ross, 1988; Sayed, 1989; Schultz, 1990; Tennessee Education Association, 1991; Tetenbaum and Mulkeen, 1984).
3. The lack of knowledge was a significant barrier to the use of instructional media (Birkenhotz and Stewart, 1991; Duttweiler, 1983; Ervin, 1989; Forman, 1982; Gordon, 1989; Hurly and Hlynka, 1982; Rosenfeld, 1986; Ross, 1988; Swanson, 1991; Torres Quintana, 1992).

4. The lack of media experts was a significant barrier to the use of instructional media (Chen, 1984; Kwo, 1982; New York State Education Dept., 1985; Rose, 1982; Tickton, 1971).

5. The lack of space such as appropriate storage place or an audio-visual classroom was a major barrier regarding the use of instructional media (Chen, 1984; Williams, 1990).

6. The lack of security of an existing system was a barrier regarding the use of instructional media (Sayed, 1989).


8. The lack of operational skills about instructional media was a major barrier (Duttweiler, 1983; Rose, 1982; Ross, 1988).

10. The lack of simple maintenance techniques regarding the use of instructional media was a significant barrier (Chen, 1984; Hershfield, 1981).

11. The scarcity of administrative support and assistance in the schools regarding the use of instructional media was a significant barrier (Duttweiler, 1983; Hurly and Hlynka, 1982; Rose, 1982; Schultz, 1990; Torres Quintana, 1992).

12. The ambivalence of research findings on the effectiveness regarding the use of instructional media was a major barrier (New York State Education Department, 1985; Rose, 1982; Ross, 1988).

13. The lack of interest in the use of instructional media showed that instructional media would have yet to be exploited by teachers (Birkenhotz and Stewart, 1991; Fahy, 1991; Forman, 1982; Gordon, 1988; Torres Quintana, 1992).

14. Instructional media could promote interaction between teacher and student, but they would never take place of actual human contact and relationship-building (Heathman and Kleiner, 1991; Hershfield, 1981). and

15. The lack of incentive regarding adopting new instructional media was a major barrier (Hershfield, 1981; New York State Education Dept., 1985; Rose, 1982; Rosenfeld, 1986; Tetenbaum and Mulkeen, 1984).

Also, the literature revealed that there were three variables: (1) educational level, (2) teaching experience, and (3) in-service training that may influence teacher perceived barriers regarding the use of instructional media. These are identified in the previous attitude section. Four research studies (Arterbury, 1971; Ervin, 1989; Hamilton et al., 1982; Torres Quintana, 1992) reported that a significant relationship
existed between teaching experience and teacher perceived barriers regarding the use of instructional media.

Ervin (1989) founded that a significant relationship existed between educational level and teacher perceived barriers regarding the use of instructional media.

Eleven research studies (Birkenhotz et al., 1989; Hamilton et al., 1982; Hasselbring, 1991; Hershfield, 1981; Hurly and Hlynka, 1982; Laney, 1984; Leske and Persico, 1989; Schultz, 1990; Tetenbaum and Malkeen, 1984; Tickton, 1971; Torres Quintana, 1992) reported that teachers who were given in-service training would perceive more barriers than those were not given in-service training.

Summary

This chapter contains three sections: (1) adoption and diffusion of innovations; (2) attitudes toward the use of instructional media; and (3) perceived barriers affecting the use of instructional media. Literature related to this study regarding the three variables (attitudes, perceived barriers, and innovativeness) and the three demographic variables (educational level, years of teaching experience, and number of in-service training sessions attended) were discussed.

From this literature review, innovation attributes and the innovation-decision process could serve as a theoretical foundation for adoption and diffusion theory. Rogers (1983) identified five attributes of innovations: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability when compared to both adopters and nonadopters. The innovation-decision process is the process through which an individual moves from first knowledge of an innovation; to forming an attitude toward the innovation; to a decision to adopt or reject; to implemen-
tation of the new idea; and to confirmation of this decision. This process consists of five stages: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. Rogers (1983) suggested that adoption demonstrated a fairly normal distribution over time. Adopters could be placed into five categories based on their time of adoption: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. The four elements of the diffusion process were an innovation, communication channels, time, and the social system. Opinion leaders and change agents played an integral part in the diffusion process. Opinion leaders were members of the social system in which they exert influence, while a change agent was an individual who influences client's innovation decisions in a direction deemed desirable by a change agency.

Four innovativeness scales have been used in varied research studies. They are the: (1) Open Processing Scale (OPS) developed by Levitt and Walton (1975), (2) Innovativeness Scale (IS) developed by Hurt, Joseph, and Cook (1977), (3) Jackson Innovation Inventory (JI) developed by Jackson (1976), and (4) Kirton Adoption-Innovation Inventory (KAI) developed by Kirton (1976).

Certain characteristics were positively related to innovativeness such as: (1) educational level, (2) social interaction characteristics, (3) knowledgeability, (4) attitude toward the change, (5) achievement, (6) motivation, (7) fulfillment of felt needs, (8) availability, and (9) immediacy of benefits. Previous research studies reported many important differences between earlier adopters and later adopters of innovations in: (1) socioeconomic status, (2) personality variables, and (3) communication behavior. As previously reported, ten research studies concluded that there was a positive relationship between innovativeness and attitudes toward innovations and nine research
studies found that educational level was correlated with innovativeness regarding the use of instructional media.

In order to facilitate a more complete understanding of teaching and learning, the researcher should collect as much relevant data as possible. Attitudes and attitude measurement regarding teachers and students are a critical component of that understanding. The concept of attitude is one of the more popular and controversial concepts in contemporary social psychology. Operationally, attitudes are latent and not directly observable in themselves, they do act to organize, or to provide direction, actions and behaviors that are observable. A positive link between the learner attitude toward content information and achievement has been identified by many research studies. An examination of the literature in the field of education and educational communications and technology revealed that teachers had positive, neutral, and negative attitudes toward the use of instructional media. Nine research studies reported that a significant positive relationship existed between teaching experience and teacher attitudes toward the use of instructional media. Also, nineteen research studies found that in-service training had positively influenced teachers' attitudes toward the use of instructional media.

An examination of the literature in the field of education and educational communications and technology revealed that teachers perceived fifteen barriers affecting the use of instructional media. Four research studies reported that a significant relationship existed between teaching experience and teacher perceived barriers regarding the use of instructional media. Ervin (1989) found that a significant relationship existed between educational level and teacher perceived barriers regarding the use of instructional media. Also, eleven research studies reported that teachers given in-
service training could perceive more barriers that those were not given in-service training.

Based on this literature, it appears that a promising avenue of research is that of comparing innovativeness, attitudes, and perceived barriers regarding the use of instructional media. In addition, three promising demographic variables include educational level, years of teaching experience, and number of in-service training sessions attended.
CHAPTER 3. METHODOLOGY

Introduction

The purpose of this chapter is to describe the methodology used to investigate the relationship among innovativeness, attitudes, and barriers regarding faculty use of instructional media in arts education programs at Taiwan teachers colleges. A description of the population and sample is presented first. Instrument development, the method of data collection, data coding and input, and data analysis are then presented separately.

Population and Sample

The population was identified as the faculty who taught at least one arts education class at all teachers colleges in Taiwan during the 1992 academic year. This is a census of arts education faculty at Taiwan teachers colleges. The total number of faculty at the nine colleges was 109. The sample for this study consisted of 85 faculty out of a total population of 109 faculty for a 77.98 percent response rate.

The return rates for each Taiwan teachers college is reported in Table 3.1. The colleges with the lowest return rate included National Tainan and National Chiayi. Further investigation suggests that these institutions have older faculty with fewer advanced degrees. The best return rate was from the researcher's own college in
Table 3.1: Mailing and retrieval of the questionnaires

<table>
<thead>
<tr>
<th>School</th>
<th>Sent No.</th>
<th>Returned No.</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Taipei Teachers College</td>
<td>9</td>
<td>8</td>
<td>88.89 %</td>
</tr>
<tr>
<td>Taipei Municipal Teachers College</td>
<td>12</td>
<td>9</td>
<td>75.00 %</td>
</tr>
<tr>
<td>National Hsinchu Teachers College</td>
<td>26</td>
<td>19</td>
<td>73.08 %</td>
</tr>
<tr>
<td>National Taichung Teachers College</td>
<td>20</td>
<td>20</td>
<td>100.00 %</td>
</tr>
<tr>
<td>National Chiayi Teachers College</td>
<td>8</td>
<td>5</td>
<td>62.50 %</td>
</tr>
<tr>
<td>National Tainan Teachers College</td>
<td>9</td>
<td>4</td>
<td>44.44 %</td>
</tr>
<tr>
<td>National Pingtung Teachers College</td>
<td>13</td>
<td>11</td>
<td>84.62 %</td>
</tr>
<tr>
<td>National Taitung Teachers College</td>
<td>6</td>
<td>4</td>
<td>66.67 %</td>
</tr>
<tr>
<td>National Hualien Teachers College</td>
<td>6</td>
<td>5</td>
<td>83.33 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>109</strong></td>
<td><strong>85</strong></td>
<td><strong>77.98 %</strong></td>
</tr>
</tbody>
</table>

Rate = (Returned No./Sent No.) x 100 %

National Taichung.

**Instrument Development**

To obtain sufficient valid data for analysis and the testing of hypotheses, a questionnaire was developed as the major instrument for this study. The steps utilized to complete this task are addressed below and in subsequent sections.

**Initial instrument development**

This step included assembling a draft of survey items, mainly from publications and individual experiences, that addressed innovativeness, attitudes, and perceived barriers regarding the use of instructional media. As a result of this initial step, a list...
of draft survey items was established to serve as a fundamental scheme for further classification. During this stage, research regarding the use of instructional media were analyzed. This research included textbooks, Dissertation Abstracts International, and journals regarding the use of instructional media. Also four innovativeness scales such as The Open Processing Scale, Innovativeness Scale, Jackson Innovation Inventory, and Kirton Adoption-Innovation Inventory and related research studies regarding innovativeness were reviewed. Two Tables of Specifications (see Appendix C) were devised, while preparing items regarding faculty use of instructional media in arts education programs at Taiwan teachers colleges.

The above findings were categorized and formulated to provide a systematic, logical framework for this instrument. The innovativeness Scale developed by Hurt, Joseph, and Cook (1977) was included to cover this aspect. Five categories were used to guide the development of attitude items: (1) availability and administrative support, (2) information transfer and in-service training, (3) effectiveness, (4) application, and (5) interest. Four categories were used to guide the development of barrier items: (1) cost barriers, (2) availability barriers, (3) knowledge and operational barriers, and (4) other barriers.

The completed questionnaire was comprised of four parts: the title page, a cover letter to the faculty from the investigator, section of demographic data, and the major part—questions related to this study (see Appendix D). Three items of demographic data were selected: (1) their years of teaching experience, (2) their amount of in-service training (within the past two years and more than two years ago), and (3) their educational level. In addition to the previous data, other questions asked faculty to report: (1) their personal perceptions regarding innovativeness, (2) their attitudes
toward the use of instructional media, and (3) their perceived barriers affecting the use of instructional media. A seven-point Likert-type scale was used to determine the level of agreement of respondents about the statements listed in section II (Personal Perceptions Inventory) and section III (Teaching and Instruction Scale) as follows:

1 = Strongly Disagree (SD),
2 = Disagree (D),
3 = Moderately Disagree (MD),
4 = Undecided (U),
5 = Agree (A),
6 = Moderately Agree (MA), and
7 = Strongly Agree (SA).

For section IV (Barriers to Technology Utilization Inventory), a seven-point Likert-type scale was used to determine the level of influence of respondents about the statements listed from 1 = No Influence to 7 = Very Influential.

The scale for the measurement of innovativeness was the Innovativeness Scale developed by Hurt, Joseph, and Cook (1977) in section II (Personal Perceptions Inventory) of this survey. The Innovativeness Scale has 12 positively and 8 negatively worded items. A seven-point Likert-type response format is described. The original 20-item instrument of Innovativeness Scale (shown in Appendix B) was used by the student, teacher, and combined samples. Its internal reliability is .89 and its correlation with the 20-item Innovativeness scale is .92. The construct validity is based on the correlated distribution of responses of their study with the distribution of innovator types identified by Rogers and Shoemaker (1971) on the basis of actual adaption. Secondly, innovativeness is characterized as being unidimensional. Evidence has been
reported supporting the predictive validity of the Innovativeness Scale (Hurt, Joseph, and Cook, 1977). Witteman (1976) concluded that there was a significant linear correlation of .50 between the responses to the Innovativeness Scale and the measure of opinion leadership (n=936). Reliability for the 20-item form of the instrument was estimated using KR-20 for making all possible split-half comparisons. This analysis resulted in an estimated reliability coefficient of KR-20=.94 (Hurt, Joseph, and Cook, 1977).

Validation and pilot test

Once the survey items were developed, the researcher's program of study committee, faculty, and individuals knowledgeable about instructional media at Iowa State University served as a panel of experts and their comments were incorporated to improve content validity of this instrument. These items were also pilot tested on ten Chinese Ph.D. graduate students in the Department of Industrial Education and Technology at Iowa State University and minor modifications were made on the original items as a result of evaluations from this testing. One change suggested by the graduate students who pilot tested the instrument included clarifying the instructions for the items by modifying the Chinese statements.

Reliability of the survey instrument

The reliability of a survey instrument can be defined as "the level of internal consistency or stability of the measuring device over time" (Borg and Gall, 1989, p. 257). They also indicated that reliability is expressed as a coefficient that varies from 0.00 to 1.00. Cronbach's coefficient alpha is the statistical reliability coefficient that
is often used.

The survey instrument used in the study was tested for reliability under three categories: (1) Section II, Personal Perceptions Inventory, (2) Section III, Teaching and Instruction Scale, and (3) Section IV, Barriers to Technology Utilization Inventory.

Nunnally (1982) reported that an alpha value greater than 0.65 can be considered to be an acceptable level for research purposes. For this study, the results of the entire reliability and each section reliability are reported in Table A.4, Table A.5, Table A.6, and Table A.7, Appendix A. These coefficient alpha values were, over 0.80, considered to be reliable for entire sections and each section of survey instrument. The reliability scores of Entire Section and Section II, III, and IV were 0.8669, 0.8082, 0.8512, and 0.9263 respectively.

Data Collection

The names and addresses of faculty for the 1992 academic year in departments of arts education were obtained from records at each of the Taiwan teachers colleges. Every reasonable attempt was made to locate each faculty member. In order to gather data for this study, necessary permission was obtained from the University Committee on the Use of Human Subjects Research at Iowa State University. Dillman's (1978) procedures for conducting mail surveys were used to collect data for this study. Faculty were mailed the survey instrument and a cover letter requesting their voluntary participation and explaining the purpose of the survey. After two weeks, a second copy of the survey and a follow up letter were mailed to individuals who did not respond to the first mailing. Individual phone call were made to colleges
in an attempt to improve the response rate.

Data Coding and Input

The returned questionnaires were reviewed for missing data by the researcher and were appropriately keypunched into the mainframe computer at Iowa State University's Computation Center. Information from each questionnaire was coded using the following Table 3.2.

Table 3.2: Guide to coding

<table>
<thead>
<tr>
<th>Item</th>
<th>Line No.</th>
<th>Code Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>School ID</td>
<td>1</td>
<td>1-9</td>
</tr>
<tr>
<td>Subject ID</td>
<td>2-3</td>
<td>1-26</td>
</tr>
<tr>
<td>Years of Teaching Experience</td>
<td>5-6</td>
<td>1-35</td>
</tr>
<tr>
<td>Amount of In-service Training (within the past two years)</td>
<td>7</td>
<td>0-9</td>
</tr>
<tr>
<td>Amount of In-service Training (more than two years ago)</td>
<td>8</td>
<td>0-9</td>
</tr>
<tr>
<td>Educational level</td>
<td>9</td>
<td>1-4</td>
</tr>
<tr>
<td>Personal Perceptions Inventory</td>
<td>11-30</td>
<td>1-7</td>
</tr>
<tr>
<td>Teaching and Instruction Scale</td>
<td>32-54</td>
<td>1-7</td>
</tr>
<tr>
<td>Barriers to Technology Utilization Inventory</td>
<td>56-71</td>
<td>1-7</td>
</tr>
</tbody>
</table>
Data Analysis

The data analysis involved an examination of the demographic data and the testing of hypotheses. Descriptive statistics were calculated on all variables for the total sample to obtain demographic data to study the distribution of variables. The Statistical Package for Social Science (SPSS-X) was employed at this step. Frequencies and percentages were used to report demographic data and the scale of results in general; while the Pearson product-moment correlation coefficients were utilized to further analyze the subjects in terms of distributions. Descriptive statistics, such as mean and standard deviation, as well as the means were drawn to generally report how faculty perceived the use of instructional media in terms of the three aspects: Innovativeness Inventory, Attitude Scale, and Barrier Inventory. Furthermore, statistical analysis procedures, such as t-test, one-way ANOVA, a post-hoc analysis of the Duncan's multiple range test, Pearson product-moment correlation coefficients, as well as stepwise multiple regression procedure were employed to further analyze and test the hypotheses. The following three sections describe the respective techniques used for each hypothesis.

(1) Hypothesis 1a, 1b, 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, and 4c were tested by computing a t-test and one-way analysis of variance (ANOVA) to test for differences between the following independent group means: (1) in-service training, (2) educational level and (3) innovation level on their attitudes, perceived barriers, and innovativeness regarding the use of instructional media.

(2) Hypothesis 5, 6, 7, and 8 were tested by computing a Pearson product-moment correlation to examine relationships among the following demographic variables: (1) educational level, (2) years of teaching experience, (3) number of in-service
training sessions attended, and the following dependent variables: (1) attitudes, (2) perceived barriers, and (3) innovativeness regarding the use of instructional media.

(3) Hypothesis 9 was tested by computing a stepwise multiple regression to predict the degree of the innovativeness using the following independent variables: (1) educational level, (2) years of teaching experience, (3) number of in-service training sessions attended, (4) attitudes, and (5) perceived barriers regarding the use of instructional media.
CHAPTER 4. RESULTS

This study was undertaken to help improve the utilization of instructional media in arts education programs at Taiwan teachers colleges. This chapter includes: (1) demographic data, (2) descriptive statistics for scales, (3) results of hypotheses testing, (4) other findings, and (5) a summary.

Demographic Data

This section describes the demographic characteristics of the respondents. They are described according to the following independent variables: (1) years of teaching experience, (2) number of in-service training sessions attended, and (3) highest educational level attained. Frequency distributions, chi-square, t-test, and F-test are used to present this information.

Years of teaching experience

Table 4.1 shows that faculty teaching experience was distributed from 1 to 40 years. The largest group of respondents (15.3 percent) had one year of teaching experience. Approximately 50 percent of the respondents had less than ten years of teaching experience while more than one-fifth of the respondents (21 percent) had between 20 and 25 years. The average teaching experience was 11.6 years for all
respondents in arts education programs at Taiwan teachers colleges. One respondent failed to complete this item on the instrument.

Number of in-service training sessions attended

Respondents were asked to indicate how many instructional media of in-service training programs that they had attended within the past two years and how many more than two years ago. Responses were grouped into five different categories for "within the past two years" and six different categories for "more than two years ago."

Table 4.2 indicates that 82.4 percent of the respondents had not attended in-service training programs regarding the use of instructional media within the past two years. The remaining 17.6 percent of the respondents had attended from one to nine in-service training sessions within the past two years. Also, 64.7 percent of the respondents had not attended in-service training sessions prior to May, 1991. The remaining 35.3 percent of the respondents had attended from one to nine in-service training sessions more than two years ago.

Highest educational level attained

Table 4.3 indicates that the number of respondents were not equally divided based on their educational level. The largest portion of the respondents held a master's degree (60 percent). The next largest group (24.7 percent) held a bachelor's degree or below. The smallest group (15.3 percent) contained respondents that earned a doctoral degree.

Table 4.4 shows that respondents with doctoral degrees had attended in-service
Table 4.1: Distribution of years of teaching experience

<table>
<thead>
<tr>
<th>Year</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cum Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>15.3</td>
<td>15.5</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2.4</td>
<td>17.9</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>10.6</td>
<td>28.6</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>3.5</td>
<td>32.1</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>4.7</td>
<td>36.9</td>
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<td>6</td>
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<td>4.7</td>
<td>41.7</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>2.4</td>
<td>44.0</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>4.7</td>
<td>48.8</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
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<td>50.0</td>
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<tr>
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<td>94.0</td>
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<tr>
<td>30</td>
<td>2</td>
<td>2.4</td>
<td>96.4</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>1.2</td>
<td>97.6</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td>1.2</td>
<td>98.8</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>1.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean = 11.6
SD = 9.50
Range = 39
Table 4.2: Distribution of in-service training sessions attended

<table>
<thead>
<tr>
<th>Times (within the past two years)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>69</td>
<td>81.2</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>9.4</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>5.9</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Times (more than two years ago)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>54</td>
<td>64.3</td>
</tr>
<tr>
<td>1</td>
<td>19</td>
<td>22.6</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>9.5</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

training programs more frequently than the other two categories. In addition, respondents with a master's degree attended in-service training programs more frequently than those with bachelor's degrees or below.

Relationship among three demographic variables

Table 4.5 shows the matrix and chi-square between educational level and in-service training. In addition, there was a significant relationship (at .05 level) between educational level and in-service training. The results showed that two categories of in-service training of respondents drawn from different educational levels were significantly different. Only the four groups (doctoral degree with attendance,
Table 4.3: Distribution of highest educational level

<table>
<thead>
<tr>
<th>Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral degree</td>
<td>13</td>
<td>15.3</td>
</tr>
<tr>
<td>Master's degree</td>
<td>51</td>
<td>60.0</td>
</tr>
<tr>
<td>Bachelor's degree or below</td>
<td>21</td>
<td>24.7</td>
</tr>
</tbody>
</table>

Table 4.4: Distribution of in-service training sessions attended by educational levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Respondents</th>
<th>Percentage of attending sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral degree</td>
<td>13</td>
<td>69.2 %</td>
</tr>
<tr>
<td>Master's degree</td>
<td>51</td>
<td>43.1 %</td>
</tr>
<tr>
<td>Bachelor's degree or below</td>
<td>21</td>
<td>23.8 %</td>
</tr>
</tbody>
</table>

doctoral degree without attendance, bachelor’s or below degree with attendance, and bachelor’s or below degree without attendance) had the greater differences between observed value and expected value as shown in Table 4.5. Those differences can be helpful for increasing the chi-square value and can attain significant level.

Table 4.6 shows that there was a significant relationship (at .01 level) between educational level and years of teaching experience. The Duncan’s procedure showed that the average number of years of teaching experience of respondents drawn from three levels of education were significantly different. The results showed that respondents with master’s degrees (Mean= 8.56) had fewer years of teaching experience when compared to those with doctoral degrees (Mean= 11.5) and bachelor’s or below degrees (Mean= 18.9).

Table 4.7 shows that there was no significant relationship (at .05 level) between
Table 4.5: Matrix and chi-square between educational level and in-service training

<table>
<thead>
<tr>
<th>Educational Level by In-service Training</th>
<th>Attendance (fo, fe)</th>
<th>No Attendance (fo, fe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral degree</td>
<td>(9, 5.5)</td>
<td>(4, 7.5)</td>
</tr>
<tr>
<td>Master's degree</td>
<td>(22, 21.6)</td>
<td>(29, 29.4)</td>
</tr>
<tr>
<td>Bachelor's degree or Below</td>
<td>(5, 8.9)</td>
<td>(16, 12.1)</td>
</tr>
<tr>
<td>Total</td>
<td>(36, 36)</td>
<td>(36, 36)</td>
</tr>
</tbody>
</table>

$\chi^2 = 6.817, p = .03$

Table 4.6: F-test between educational level and years of teaching experience

<table>
<thead>
<tr>
<th>Educational Levels</th>
<th>N</th>
<th>Mean *</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral Degree</td>
<td>13</td>
<td>11.5</td>
<td>11.7</td>
</tr>
<tr>
<td>Master's Degree</td>
<td>50</td>
<td>8.56</td>
<td>7.01</td>
</tr>
<tr>
<td>Bachelor's Degree or Below</td>
<td>20</td>
<td>18.9</td>
<td>10.1</td>
</tr>
</tbody>
</table>

$* F (2, 80) = 10.207, p = .0001$

in-service training and teaching experience. The results showed that the average number of years of teaching experience of respondents drawn from two types of in-service training were not significantly different.

**Descriptive Statistics for Scales**

Innovativeness, attitudes, and barrier scale scores are reported in this section. Means and standard deviations of the main and subgroups are also reported.
Table 4.7: A t-test between in-service training and years of teaching experience

<table>
<thead>
<tr>
<th>In-service Training</th>
<th>N</th>
<th>Mean *</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>36</td>
<td>13.1</td>
<td>9.4</td>
</tr>
<tr>
<td>No Attendance</td>
<td>48</td>
<td>10.5</td>
<td>9.6</td>
</tr>
</tbody>
</table>

* t (82) = -1.23, p = .22

Distributions of scale scores

A cumulative Likert-type scale was used to calculate the innovativeness scores. The maximum range for innovativeness scores was from 20 to 140. The higher the innovativeness score, the more innovative practices regarding the use of instructional media would be demonstrated by the respondent. Respondents' innovativeness scores ranged from 79 to 135. The mean score was 104.5, the standard deviation was 11.0, and the median was 105. Scores were evenly distributed across the range. A complete frequency distribution can be found in Table A.1, Appendix A.

Based on the model provided by Rogers (1983), the researcher selected the top 16 percent of the respondents as the innovators and the bottom 16 percent of the respondents as the noninnovators. So, this study identified the innovators as participants with innovativeness scores from 115 to 135, and noninnovators as participants with innovativeness scores from 75 to 93. Both innovators and noninnovators were used when testing the differences on attitudes and perceived barriers regarding the use of instructional media. Participants who had scores from 94 to 114 were not used in hypothesis testing.

A cumulative Likert-type scale was used to calculate the attitude scores. The
maximum range for attitude scores was from 23 to 161. The higher the attitude score, the more favorable attitudes toward the use of instructional media by the respondent. Respondents' attitude scores ranged from 92 to 151. The mean score was 124.9, the median score was 124, and the standard deviation was 12.9. Scores were evenly distributed across the range. A complete frequency distribution can be found in Table A.2, Appendix A.

A cumulative Likert-type scale was used to calculate the barrier scores. The maximum range for barrier scores was from 16 to 112. The higher the barrier score, the more perceived barriers regarding the use of instructional media by the respondent. Respondents' barrier scores ranged from 31 to 112. The mean score was 76.4, the median score was 77, and the standard deviation was 19.4. Scores were evenly distributed across the range. A complete frequency distribution can be found in Table A.3, Appendix A.

Results of Hypotheses Testing

The results of tests for all hypotheses are reported in this section.

Hypothesis 1a: There is no significant difference pertaining to attitudes toward the use of instructional media, as demonstrated by arts education faculty who were innovators and noninnovators.

The t-test for independent group means was used to test this hypothesis. The corresponding statistical hypothesis is:

\[ H_0: \mu_1 = \mu_2 \] and

\[ H_a: \mu_1 > \mu_2 \]

where: \( \mu_1 \) was the population mean on innovators
and \( \mu_2 \) was the population mean on noninnovators.

From the data provided in Table 4.8, the null hypothesis \( 1a \) can be rejected. Therefore, it was concluded that arts education faculty who were innovators demonstrated more favorable attitudes toward the use of instructional media than noninnovators.

Table 4.8: Test for differences between innovators and noninnovators on the attitude scale

<table>
<thead>
<tr>
<th>Type</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>innovators</td>
<td>14</td>
<td>136.3</td>
<td>11.0</td>
<td>3.97</td>
<td>.001 **</td>
</tr>
<tr>
<td>noninnovators</td>
<td>14</td>
<td>117.6</td>
<td>13.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** significant .01 level

Hypothesis \( 1b \): There is no significant difference pertaining to the barriers regarding the use of instructional media, as perceived by arts education faculty who were innovators and noninnovators.

The t-test was also utilized in testing this hypothesis. The corresponding statistical hypothesis is:

\[ H_0: \mu_1 = \mu_2 \] and
\[ H_a: \mu_1 > \mu_2 \]

where: \( \mu_1 \) was the population mean on innovators
and \( \mu_2 \) was the population mean on noninnovators.

The results in Table 4.9 fail to provide evidence to reject the null hypothesis \( 1b \). Therefore, it was concluded that arts education faculty who were innovators did not perceive more barriers regarding the use of instructional media than noninnovators.
Table 4.9: Test for differences between innovators and noninnovators on the barrier scale

<table>
<thead>
<tr>
<th>Type</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>innovators</td>
<td>11</td>
<td>68.5</td>
<td>25.1</td>
<td>-.58</td>
<td>.57</td>
</tr>
<tr>
<td>noninnovators</td>
<td>14</td>
<td>74.3</td>
<td>24.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 2a: There is no significant difference in attitudes toward the use of instructional media, as demonstrated by arts education faculty who had higher educational levels as compared to those with lower educational levels.

The corresponding statistical hypothesis is:

Ho: $\mu_1 = \mu_2 = \mu_3$ and

Ha: at least two $\mu$'s are different

where: $\mu_1$ was the population mean on doctoral degree holders,

$\mu_2$ was the population mean on master's degree holders, and

$\mu_3$ was the population mean on bachelor's degree or below holders.

The data for this hypothesis are shown in Table 4.10. The ANOVA for independent group means was used for testing the hypothesis. Results from Table 4.11 shows that faculty attitudes toward the use of instructional media at three educational levels were not significantly different, $F(2,80) = .20$, $p = .82$. Therefore, the null hypothesis 2a cannot be rejected. It was concluded that arts education faculty possessing higher educational levels did not demonstrate more favorable attitudes toward the use of instructional media than those with lower educational levels.
Table 4.10: Mean scores of respondent attitudes by educational level

<table>
<thead>
<tr>
<th>Educational Levels</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral degree</td>
<td>13</td>
<td>122.8</td>
<td>11.6</td>
</tr>
<tr>
<td>Master's degree</td>
<td>50</td>
<td>125.4</td>
<td>13.7</td>
</tr>
<tr>
<td>Bachelor's degree or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>below</td>
<td>20</td>
<td>124.9</td>
<td>12.1</td>
</tr>
</tbody>
</table>

Table 4.11: ANOVA on respondent attitudes by educational level

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>67.3</td>
<td>33.7</td>
<td>.20</td>
<td>.82</td>
</tr>
<tr>
<td>Within groups</td>
<td>80</td>
<td>13617.5</td>
<td>170.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>13684.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 2b: There is no significant difference in barriers regarding the use of instructional media, as perceived by arts education faculty who had higher educational levels as compared to those with lower educational levels.

The corresponding statistical hypothesis is:

Ho: $\mu_1 = \mu_2 = \mu_3$ and

Ha: at least two $\mu$'s are different

where: $\mu_1$ was the population mean on doctoral degree holders,
$\mu_2$ was the population mean on master's degree holders, and
$\mu_3$ was the population mean on bachelor's degree or below holders.
The data for this hypothesis are shown in Table 4.12. The ANOVA for independent group means was used for testing the hypothesis. The results from Table 4.13 show that faculty at three educational levels of perceived barriers regarding the use of instructional media were not significantly different, $F(2,75) = .12, p = .90$. Therefore, the hypothesis 2b cannot be rejected. It was concluded that arts education faculty with higher educational levels did not perceive more barriers regarding the use of instructional media than those with lower educational levels.

Table 4.12: Mean scores of respondent perceived barriers by educational level

<table>
<thead>
<tr>
<th>Educational Levels</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral degree</td>
<td>10</td>
<td>73.6</td>
<td>22.4</td>
</tr>
<tr>
<td>Master's degree</td>
<td>47</td>
<td>76.7</td>
<td>19.6</td>
</tr>
<tr>
<td>Bachelor's degree or below</td>
<td>21</td>
<td>76.9</td>
<td>18.2</td>
</tr>
</tbody>
</table>

Table 4.13: ANOVA on respondent perceived barriers by educational level

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>88.6</td>
<td>44.3</td>
<td>.12</td>
<td>.90</td>
</tr>
<tr>
<td>Within groups</td>
<td>75</td>
<td>2891.6</td>
<td>385.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>77</td>
<td>29000.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 2c: There is no significant difference in the innovative practices regarding the use of instructional media, as demonstrated by arts education faculty who had higher educational levels as compared to those with lower educational levels.

The corresponding statistical hypothesis is:

Ho: $\mu_1 = \mu_2 = \mu_3$ and

Ha: at least two $\mu$'s are different

where: $\mu_1$ was the population mean on doctoral degree holders,

$\mu_2$ was the population mean on master’s degree holders, and

$\mu_3$ was the population mean on bachelor's degree or below holders.

The data for this hypothesis are shown in Table 4.14. The ANOVA for independent group means was used for testing the hypothesis. Results from Table 4.15 shows that faculty innovativeness regarding the use of instructional media at three educational levels were not significantly different, $F(2,72) = 1.40$, $p = .25$. Therefore, the null hypothesis 2c cannot be rejected. It was concluded that arts education faculty with higher educational levels did not demonstrate more innovative practices than those with lower educational levels.

Table 4.14: Mean scores of respondent innovativeness by educational level

<table>
<thead>
<tr>
<th>Educational Levels</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral degree</td>
<td>9</td>
<td>110.1</td>
<td>13.3</td>
</tr>
<tr>
<td>Master's degree</td>
<td>48</td>
<td>103.9</td>
<td>10.8</td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>18</td>
<td>103.1</td>
<td>10.0</td>
</tr>
</tbody>
</table>
Table 4.15: ANOVA on respondent innovativeness by educational level

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>337.1</td>
<td>168.5</td>
<td>1.40</td>
<td>.25</td>
</tr>
<tr>
<td>Within groups</td>
<td>72</td>
<td>8665.5</td>
<td>120.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>9002.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 3a: There is no significant difference in attitudes toward the use of instructional media, as demonstrated by arts education faculty who had more teaching experience as compared to those with less teaching experience.

The corresponding statistical hypothesis is:

Ho: \( \mu_1 = \mu_2 = \mu_3 = 0 \) and

Ha: at least two \( \mu \)'s are different

where: \( \mu_1 \) was the population mean on low years of teaching experience,

\( \mu_2 \) was the population mean on middle years of teaching experience, and

\( \mu_3 \) was the population mean on high years of teaching experience.

The data for this hypothesis are shown in Table 4.16. The ANOVA for independent group means was used for testing the hypothesis. Results from Table 4.17 shows that respondent attitudes toward the use of instructional media at three levels of teaching experience were not significantly different, \( F(2,78) = .21, p = .81 \). Therefore, the null hypothesis 3a cannot be rejected. It was concluded that arts education faculty who had more teaching experience did not demonstrate more favorable attitudes toward the use of instructional media than those with less teaching experience.

Hypothesis 3b: There is no significant difference in barriers regarding the use of instructional media, as perceived by arts education faculty who had more teaching
Table 4.16: Mean scores of respondent attitudes by teaching experience

<table>
<thead>
<tr>
<th>Teaching Experience</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low years</td>
<td>27</td>
<td>125.2</td>
<td>12.1</td>
</tr>
<tr>
<td>Middle years</td>
<td>26</td>
<td>123.5</td>
<td>13.8</td>
</tr>
<tr>
<td>High years</td>
<td>28</td>
<td>125.8</td>
<td>13.5</td>
</tr>
</tbody>
</table>

Table 4.17: ANOVA on respondent attitudes by teaching experience

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>74.1</td>
<td>37.1</td>
<td>.21</td>
<td>.81</td>
</tr>
<tr>
<td>Within groups</td>
<td>78</td>
<td>13512.6</td>
<td>173.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>13586.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The data for this hypothesis are shown in Table 4.18. The ANOVA for independent group means was used for testing the hypothesis. Results from Table 4.19 shows that faculty perceived barriers regarding the use of instructional media at three levels of teaching experience were not significantly different, $F(2,73) = 1.10$, $p = .34$. Therefore, the null hypothesis 3b cannot be rejected. It was concluded that arts edu-
Table 4.18: Mean scores of respondent perceived barriers by teaching experience

<table>
<thead>
<tr>
<th>Teaching Experience</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low years</td>
<td>23</td>
<td>77.3</td>
<td>21.1</td>
</tr>
<tr>
<td>Middle years</td>
<td>26</td>
<td>72.1</td>
<td>20.6</td>
</tr>
<tr>
<td>High years</td>
<td>27</td>
<td>80.0</td>
<td>17.2</td>
</tr>
</tbody>
</table>

cation faculty who had more teaching experience did not demonstrate more barriers regarding the use of instructional media than those with less teaching experience.

Table 4.19: ANOVA on respondent perceived barriers by teaching experience

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>842.0</td>
<td>421.0</td>
<td>1.10</td>
<td>.34</td>
</tr>
<tr>
<td>Within groups</td>
<td>73</td>
<td>28103.0</td>
<td>385.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>75</td>
<td>28944.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 3c: There is no significant difference in innovative practices regarding the use of instructional media, as demonstrated by arts education faculty who had more teaching experience as compared to those with less teaching experience.

The corresponding statistical hypothesis is:

Ho: \( \mu_1 = \mu_2 = \mu_3 = 0 \) and

Ha: at least two \( \mu \)'s are different

where: \( \mu_1 \) was the population mean on low years of teaching experience,

\( \mu_2 \) was the population mean on middle years of teaching experience, and
$\mu_3$ was the population mean on high years of teaching experience.

The data for this hypothesis are shown in Table 4.20. The ANOVA for independent group means was used for testing the hypothesis. Results from Table 4.21 shows that faculty innovativeness regarding the use of instructional media at three levels of teaching experience were not significantly different, $F(2,70) = .63$, $p = .53$. Therefore, the null hypothesis 3c cannot be rejected. It was concluded that arts education faculty who had more teaching experience did not demonstrate more innovative practices regarding the use of instructional media than those with less teaching experience.

Table 4.20: Mean scores of respondent innovativeness by teaching experience

<table>
<thead>
<tr>
<th>Teaching Experience</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low years</td>
<td>22</td>
<td>102.0</td>
<td>10.6</td>
</tr>
<tr>
<td>Middle years</td>
<td>27</td>
<td>105.5</td>
<td>11.7</td>
</tr>
<tr>
<td>High years</td>
<td>24</td>
<td>104.8</td>
<td>10.7</td>
</tr>
</tbody>
</table>

Table 4.21: ANOVA on respondent innovativeness by teaching experience

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>156.0</td>
<td>78.0</td>
<td>.63</td>
<td>.53</td>
</tr>
<tr>
<td>Within groups</td>
<td>70</td>
<td>8601.0</td>
<td>122.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>8757.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 4a: There is no significant difference in attitudes toward the use of instructional media, as demonstrated by arts education faculty who had in-service training as compared to those had no in-service training.

The corresponding statistical hypothesis is:

Ho: $\mu_1 = \mu_2$ and
Ha: $\mu_1 > \mu_2$

where: $\mu_1$ was the population mean for those had in-service training, $\mu_2$ was the population mean for those had no in-service training.

The t-test was used in testing this hypothesis. Table 4.22 indicates that mean score of attitude was greater for respondents who had in-service training ($M=128.6$) than those had no in-service training ($M=122.3$). Data reported from Table 4.23 shows that faculty attitudes toward the use of instructional media demonstrated significantly different, $t(83) = -2.3$, $p = .03$. Therefore, the null hypothesis 4a can be rejected. It was concluded that arts education faculty who had in-service training demonstrated more favorable attitudes toward the use of instructional media than those had no in-service training.

Table 4.22: Mean scores of respondent attitudes by in-service training

<table>
<thead>
<tr>
<th>In-service Training</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>34</td>
<td>128.6</td>
<td>11.4</td>
</tr>
<tr>
<td>No attendance</td>
<td>49</td>
<td>122.3</td>
<td>13.4</td>
</tr>
</tbody>
</table>
Table 4.23: t-test on respondent attitudes by in-service training

<table>
<thead>
<tr>
<th>Type</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>34</td>
<td>128.6</td>
<td>11.4</td>
<td>-2.3</td>
<td>.03 *</td>
</tr>
<tr>
<td>No attendance</td>
<td>49</td>
<td>122.3</td>
<td>13.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* significant .05 level

Hypothesis 4b: There is no significant difference in barriers regarding the use of instructional media, as perceived by arts education faculty who had in-service training as compared to those had no in-service training.

The corresponding statistical hypothesis is:

\[ H_0: \mu_1 = \mu_2 \]  
\[ H_a: \mu_1 > \mu_2 \]

where: \( \mu_1 \) was the population mean for those had in-service training, \( \mu_2 \) was the population mean for those had no in-service training.

The t-test was used in testing this hypothesis. Table 4.24 indicates that mean score of barrier was greater for respondents who had no in-service training (M = 78.1) than those had in-service training (M = 74.1). Data reported from Table 4.25 shows that faculty perceived barriers regarding the use of instructional media were not significantly different, t(78) = .90, p = .31. Therefore, the null hypothesis 4b cannot be rejected. It was concluded that arts education faculty who had in-service training did not demonstrate more barriers regarding the use of instructional media than those had no in-service training.

Hypothesis 4c: There is no significant difference in innovative practices regarding the use of instructional media, as demonstrated by arts education faculty who had
Table 4.24: Mean scores of respondent perceived barriers by in-service training

<table>
<thead>
<tr>
<th>In-service Training</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>33</td>
<td>74.1</td>
<td>17.8</td>
</tr>
<tr>
<td>No attendance</td>
<td>45</td>
<td>78.1</td>
<td>20.5</td>
</tr>
</tbody>
</table>

Table 4.25: t-test on respondent perceived barriers by in-service training

<table>
<thead>
<tr>
<th>Type</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>33</td>
<td>74.1</td>
<td>17.8</td>
<td>.90</td>
<td>.31</td>
</tr>
<tr>
<td>No attendance</td>
<td>45</td>
<td>78.1</td>
<td>20.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

in-service training as compared to those had no in-service training.

The corresponding statistical hypothesis is:

Ho: $\mu_1 = \mu_2$ and
Ha: $\mu_1 > \mu_2$

where: $\mu_1$ was the population mean for those had in-service training,
$\mu_2$ was the population mean for those had no in-service training.

The t-test was used in testing this hypothesis. Table 4.26 indicates that mean score of innovativeness was greater for respondents who had no in-service training ($M= 105.4$) than those had in-service training ($M= 103.20$). Data reported from Table 4.27 shows that faculty innovativeness regarding the use of instructional media were not significantly different, $t(75)= -.64$, $p= .52$. Therefore, the null hypothesis $H_0$ cannot be rejected. It was concluded that arts education faculty who had in-service training did not demonstrate more innovative practices regarding the use of
instructional media than those had no in-service training.

Hypothesis 5: There is no significant correlation among the innovativeness, attitudes, and perceived barriers regarding the use of instructional media as reported by arts education faculty at Taiwan teachers colleges.

Table 4.26: Mean scores of respondent innovativeness by in-service training

<table>
<thead>
<tr>
<th>In-service Training</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>43</td>
<td>103.2</td>
<td>12.1</td>
</tr>
<tr>
<td>No attendance</td>
<td>32</td>
<td>105.4</td>
<td>9.5</td>
</tr>
</tbody>
</table>

Table 4.27: t-test on respondent innovativeness by in-service training

<table>
<thead>
<tr>
<th>Type</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>32</td>
<td>105.5</td>
<td>9.5</td>
<td>-.64</td>
<td>.52</td>
</tr>
<tr>
<td>No attendance</td>
<td>43</td>
<td>103.7</td>
<td>12.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The corresponding statistical hypothesis for this test is listed as follows:

Ho: $\rho_{12} = \rho_{13} = \rho_{23}$ and

Ha: at least $\rho_{12}$, $\rho_{13}$, or $\rho_{23} \neq 0$

where: $\rho_{12}$ was the population correlation coefficient on innovativeness and attitudes, $\rho_{13}$ was the population correlation coefficient on innovativeness and perceived barriers, and $\rho_{23}$ was the population correlation coefficient on attitudes and perceived barriers.

The Pearson correlation method was used in testing the hypothesis. Results reported in Table 4.28 shows that the correlation coefficients between innovativeness
and barriers; and between attitudes and perceived barriers were fairly low. Only the group between innovativeness and attitudes was significant. Therefore, the null hypothesis 5 can be rejected. It was concluded that there was a significant relationship between faculty innovativeness and faculty attitudes regarding the use of instructional media as reported by arts education faculty at Taiwan teachers colleges. Also, it was concluded that there were no significant correlations between faculty innovativeness and faculty perceived barriers; and between faculty attitudes and faculty perceived barriers regarding the use of instructional media at Taiwan teachers colleges.

Table 4.28: Pearson correlation coefficients among the innovativeness, attitudes, and perceived barriers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Perceived Barriers</th>
<th>Attitudes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovativeness</td>
<td>-.04</td>
<td>.49 **</td>
</tr>
<tr>
<td>Attitudes</td>
<td>-.11</td>
<td>1.00</td>
</tr>
</tbody>
</table>

** significant .01 level

Hypothesis 6: There is no significant correlation between each of the following demographic variables: (1) educational level, (2) years of teaching experience, and (3) number of in-service training sessions attended and faculty attitudes toward the use of instructional media.

The corresponding statistical hypothesis for this test is listed as follows:

Ho: $\rho_{12} = \rho_{13} = \rho_{23}$ and

Ha: at least $\rho_{12}, \rho_{13},$ or $\rho_{23} \neq 0$

where: $\rho_{12}$ was the population correlation coefficient on faculty attitudes and edu-
elho was the population correlation coefficient on faculty attitudes and teaching experience, and

$\rho_{13}$ was the population correlation coefficient on faculty attitudes and in-service training.

The Pearson correlation method was used in testing the hypothesis. Results reported from Table 4.29 show that the correlation coefficients among faculty attitudes, educational level, teaching experience, and number of in-service training sessions attended were fairly low and were not significant at a .05 level. Therefore, the null hypothesis 6 cannot be rejected. It was concluded that there were no significant relationships among faculty attitudes, educational levels, teaching experience, and number of in-service training sessions attended regarding the use of instructional media as reported by arts education faculty at Taiwan teachers colleges.

Table 4.29: Pearson correlation coefficients among respondent innovativeness, attitudes, perceived barriers, teaching experience, educational level, and in-service training

<table>
<thead>
<tr>
<th>Variable</th>
<th>Innovativeness</th>
<th>Attitudes</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Levels</td>
<td>-.13</td>
<td>.03</td>
<td>.09</td>
</tr>
<tr>
<td>Teaching Experience</td>
<td>.09</td>
<td>0.10</td>
<td>-.03</td>
</tr>
<tr>
<td>In-service Training</td>
<td>.16</td>
<td>.26</td>
<td>-.12</td>
</tr>
</tbody>
</table>

Hypothesis 7: There is no significant correlation between each of the following demographic variables: (1) educational level, (2) years of teaching experience, and (3) number of in-service training sessions attended and faculty perceived barriers regarding the use of instructional media.
The corresponding statistical hypothesis for this test is listed as follows:

Ho: \( \rho_{12} = \rho_{13} = \rho_{23} \) and

Ha: at least \( \rho_{12}, \rho_{13}, \) or \( \rho_{23} \neq 0 \)

where: \( \rho_{12} \) was the population correlation coefficient on faculty perceived barriers and educational levels,

\( \rho_{13} \) was the population correlation coefficient on faculty perceived barriers and teaching experience, and

\( \rho_{23} \) was the population correlation coefficient on faculty perceived barriers and in-service training.

The Pearson correlation method was also used in testing the hypothesis. Results reported from Table 4.29 show that the correlation coefficients among faculty perceived barriers, educational level, teaching experience, and number of in-service training sessions attended were fairly low and were not significant at a .05 level. Therefore, the null hypothesis cannot be rejected. It was concluded that there were no significant relationships among faculty perceived barriers, educational level, teaching experience, and number of in-service training sessions attended regarding the use of instructional media as reported by arts education faculty at Taiwan teachers colleges.

Hypothesis 8: There is no significant correlation between each of the following demographic variables: (1) educational level, (2) years of teaching experience, and (3) number of in-service training sessions attended and faculty innovativeness regarding the use of instructional media.

The corresponding statistical hypothesis for this test is listed as follows:

Ho: \( \rho_{12} = \rho_{13} = \rho_{23} \) and
Ha: at least $\rho_{12}, \rho_{13},$ or $\rho_{23} \neq 0$

where: $\rho_{12}$ was the population correlation coefficient on faculty innovativeness and educational levels,

$\rho_{13}$ was the population correlation coefficient on faculty innovativeness and teaching experience, and

$\rho_{23}$ was the population correlation coefficient on faculty innovativeness and in-service training.

The Pearson correlation method was also used in testing the hypothesis. The results reported from Table 4.29 show that the correlation coefficients among faculty innovativeness, educational level, teaching experience, and number of in-service training sessions attended were fairly low and were not significant at a .05 level. Therefore, the null hypothesis 8 cannot be rejected. It was concluded that there were no significant relationships among faculty innovativeness, educational level, teaching experience, and number of in-service training sessions attended regarding the use of instructional media as reported by arts education faculty at Taiwan teachers colleges.

Hypothesis 9: There is no linear combination of the following five independent variables (educational level, years of teaching experience, number of in-service training sessions attended, attitudes, and perceived barriers) which is significantly related to the degree of innovativeness regarding faculty use of instructional media.

This hypothesis was tested using a stepwise multiple regression procedure to analyze and explain the variation in level of innovativeness regarding the use of instructional media that was due to the effects of five independent variables measuring faculty traits: (1) educational level, (2) years of teaching experience, (3) number of in-service training sessions attended, (4) attitudes, and (5) perceived barriers. With
innovativeness as the dependent variable, attitude was entered first using the stepwise procedure. Next, perceived barriers was entered according to the stepwise criteria. Finally, the demographic characteristics entered the model last. A result of these original regressions can be found in Table 4.31.

Only one of the predictor variables was significant in the final regression equation, namely, attitude. This result is consistent with results of the Pearson correlation analysis in Table 4.28. Innovativeness was highly correlated pairwise with attitude ($r = .49$), and the stepwise procedure corroborated that attitude was the strongest variable predicting innovativeness.

Demographic characteristics did not correlate with innovativeness (see Table 4.29). These low correlation coefficients (ranges from .09 to .16) of demographic characteristics (educational level, years of teaching experience, and number of in-service training sessions attended) with innovativeness are reaffirmed by the weak power of these variables in predicting innovativeness in the multiple regression analysis.

Table 4.30 indicates that attitude alone was a significant predictor of the level of innovative practices for faculty use of instructional media, $F(1,65) = 20.5$, $p < .001$. Therefore, null hypothesis 9 can be rejected. It was concluded that there is a significant effect of attitude on innovativeness regarding faculty use of instructional media. Also, attitude explained 24 percent of the variation ($R^2 = .24$) in innovativeness. This provides reasonably strong evidence that attitudinal differences play a major role in faculty use of instructional media.
Furthermore, when the four other independent variables are added to the model, their combined contribution to explaining variation in instructional media use was minimal as shown by the very modest increase in $R^2$ from .24 to .27. A partial F-test of the additional contribution by the four other predictors was not significant, $F(4, 61)= .625$, $p > .05$.

Table 4.30: Stepwise multiple regression analysis of respondent innovativeness

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>Beta</th>
<th>t</th>
<th>Sign. t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>.40</td>
<td>.49</td>
<td>4.53</td>
<td>.0001***</td>
</tr>
<tr>
<td>(Constant)</td>
<td>53.1</td>
<td>4.72</td>
<td></td>
<td>.0001</td>
</tr>
</tbody>
</table>

Multiple R = .49, R square = .24
*** $F(1,65) = 20.5$, $p = .0001$

Table 4.31: Stepwise multiple regression analysis on respondent innovativeness by five independent variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>Beta</th>
<th>t</th>
<th>Sign. t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>.40</td>
<td>.49</td>
<td>4.27</td>
<td>.001 **</td>
</tr>
<tr>
<td>Barrier</td>
<td>.02</td>
<td>.03</td>
<td>2.27</td>
<td>.07</td>
</tr>
<tr>
<td>TE</td>
<td>.14</td>
<td>.11</td>
<td>.91</td>
<td>.37</td>
</tr>
<tr>
<td>IT</td>
<td>.00</td>
<td>2.29E-04</td>
<td>.00</td>
<td>.99</td>
</tr>
<tr>
<td>EL</td>
<td>-3.35</td>
<td>-1.80</td>
<td>-1.51</td>
<td>.14</td>
</tr>
<tr>
<td>(Constant)</td>
<td>57.8</td>
<td>4.33</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

** $p= .001$, Multiple R = .52, R square = .27

TE = Teaching Experience
IT = In-service Training
EL = Educational Level
Other Findings

The fourth section of the instrument—Barriers Affecting the Use of Instructional Media listed four types of barriers: (1) cost barriers, (2) availability barriers, (3) knowledge and operational barriers, and (4) other barriers. On response to "(4) other barriers", respondents reported several which can be found in Appendix E. The most frequent barriers cited were lack of media specialists and the unwillingness to the use of instructional media.

Summary

The results of the statistical analysis used to test the hypotheses of this study are listed in previous sections. Both the t-test and F-test analyses were used in Hypotheses 1, 2, 3, and 4 to test for differences among different levels of innovation, education, teaching experience, and in-service training. Pearson correlation coefficients were used in Hypotheses 5, 6, 7, and 8 to test the relationships among attitudes, perceived barriers, innovativeness, and three demographic variables (educational level, years of teaching experience, and number of in-service training sessions attended). A stepwise multiple regression was used in Hypothesis 9 to predict the degree of innovativeness from five independent variables.

Table 4.32 identifies the results of each hypothesis test. Hypotheses 1a and 4a were rejected. Therefore, faculty who were innovators demonstrated more favorable attitudes toward the use of instructional media than noninnovators. Also, faculty who had in-service training demonstrated more favorable attitudes toward the use of instructional media than those had no in-service training.
Table 4.32: Summary of tests for hypotheses

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>1a</th>
<th>1b</th>
<th>2a</th>
<th>2b</th>
<th>2c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>R</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>3a</th>
<th>3b</th>
<th>3c</th>
<th>4a</th>
<th>4b</th>
<th>4c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>R</td>
<td>NR</td>
<td>NR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>PR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>PR</td>
</tr>
</tbody>
</table>

R = Rejected.
NR = Not Rejected.
PR = Partially Rejected.

Hypotheses 5 and 9 were partially rejected. Attitude toward media and innovativeness were positively related. Therefore, faculty who had higher innovative scores demonstrated more favorable attitudes toward the use of instructional media than those had less innovative scores. Also, the data indicates that attitude alone was a significant predictor of the willingness to consider faculty use of instructional media.
CHAPTER 5. DISCUSSION

This chapter presents a summary and conclusion of the major findings of the current study. In addition, recommendations and directions for Taiwan teachers colleges and future research are presented.

Purpose and Procedures of the Study

The first purpose of the study was to determine: (1) the degree of innovativeness, (2) attitudes toward the use of instructional media, and (3) perceived barriers regarding the use of instructional media in arts education programs at Taiwan teachers colleges. A second purpose was to determine if arts education faculty with different levels of: (1) education, (2) teaching experience, and (3) number of in-service training sessions attended differ on the three dependent variables (attitudes, perceived barriers, and innovativeness). A third purpose was to determine the relationship among the following variables: (1) innovativeness, (2) attitudes, (3) perceived barriers, (4) educational level, (5) years of teaching experience, and (6) number of in-service training sessions attended. The fourth purpose was to determine if innovativeness could be predicted using the following variables: (1) years of teaching experience, (2) educational level, (3) number of in-service training sessions attended, (4) attitudes, and (5) perceived barriers.
Data were collected via a mail survey from 109 faculty who taught arts education programs at Taiwan teachers colleges during the 1992 academic year. Certain demographic characteristics, including educational level, years of teaching experience, and number of in-service training sessions attended were obtained from each respondent. Three variables (attitudes, perceived barriers, and innovativeness) were also measured.

Findings and Conclusions

The intention of this section is to draw an overall picture related to faculty perspectives toward the use of instructional media in arts education programs at Taiwan teachers colleges. Possible resolutions of the research hypotheses probed by this study are provided. Finally, previous research studies related to the current study were presented to support conclusions.

Demographic characteristics

The faculty members tended to be relatively inexperienced with half of them having less than 10 years of experience. The average teaching experience was 11.6 years for all respondents. Approximately, 82.4 percent of the respondents had no in-service training regarding the use of instructional media within the past two years. Also, 64.7 percent of the respondents had no in-service training regarding the use of instructional media prior to May, 1991. The largest portion of the respondents held a master's degree (60 percent). Respondents with doctoral degrees had attended in-service training more frequently than the other two categories.

There were significant differences among those with different levels of educa-
tion in two types of in-service training. There were significant differences in years of teaching experience among those with different levels of education between educational level and teaching experience. Respondents with master's degrees had fewer years of teaching experience when compared to doctoral degree holders and bachelor's or below degree holders. In addition, there was no significant relationship between in-service training and years of teaching experience.

General perspectives on the three measures

A cumulative Likert-type scale was used to calculate the innovativeness scores, attitude scores, and barrier scores. According to Hurt, Joseph, and Cook's (1977) Innovativeness Scale, the mean of the combined sample was 102 with a standard deviation of 14. The innovativeness scores ranged from 22 to 139. Its internal reliability was .89. Table 5.1 shows that this study the mean (104.5), standard deviation (11), and reliability (.81) were close to those found in Hurt, Joseph, and Cook's (1977) study. This range of the innovativeness scores was less (79 to 135). Hurt, Joseph, and Cook's (1977) instrument was used with teachers, students, and combined samples, but this study used the same instrument with only a faculty sample. The lowest innovativeness score are very different, but the highest innovativeness score are nearly the same. Also, based on the model provided by Rogers (1983), the researcher selected the top of 16 percent of the respondents as the innovators and the bottom of 16 percent of respondents as the noninnovators. Respondents who were not selected were not used in hypotheses testing.
The attitude and barrier measures used in the study were reliable instruments that yielded variable scores (see Table 5.2). Respondents' attitude scores ranged from 92 to 151. The mean score was 124.9 with standard deviation of 12.9. The internal reliability was .85. Respondents' barrier scores ranged from 31 to 112. The mean score was 76.4 with standard deviation of 19.4. The internal reliability was .93.

Table 5.1: Comparison of instruments between Hurt, Joseph, and Cook (1977) and this study

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Mean</th>
<th>S.D</th>
<th>Range</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurt's study</td>
<td>102</td>
<td>14</td>
<td>22-139</td>
<td>.89</td>
</tr>
<tr>
<td>This study</td>
<td>104.5</td>
<td>11</td>
<td>79-135</td>
<td>.81</td>
</tr>
</tbody>
</table>

Table 5.2: Distributions of attitude scores and barrier scores

<table>
<thead>
<tr>
<th>Score</th>
<th>Mean</th>
<th>S.D.</th>
<th>Range</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>124.9</td>
<td>12.9</td>
<td>92-151</td>
<td>.85</td>
</tr>
<tr>
<td>Barrier</td>
<td>76.4</td>
<td>19.4</td>
<td>31-112</td>
<td>.93</td>
</tr>
</tbody>
</table>

Tests of hypotheses

In this study, nine hypotheses were tested. The results of related hypotheses are presented and discussed.

The first hypothesis of this study investigated differences in faculty attitudes and perceived barriers between innovators and noninnovators in arts education programs regarding the use of instructional media. The results indicated that there were
significant differences in faculty attitudes which agreed with Rogers' (1983) generalizations. He generalized that early adopters have more favorable attitudes toward change, education, science, seeking information, and exposing to mass media communication channels than later adopters. Also, the results indicated that there was no significant difference in faculty perceived barriers.

The second, third, and fourth hypotheses of this study investigated differences in faculty attitudes, perceived barriers, and innovativeness among the levels of education, teaching experience in years, and number of in-service training sessions attended. The results indicated that there was no significant difference in faculty attitudes, perceived barriers, and innovativeness among the three levels of education. These results were in agreement with Fite (1987) and Sariyawongse's (1988) findings. The two research studies indicated that there was no significant relationship between educational level and teachers' attitudes toward the use of instructional media.

Regarding the three levels of teaching experience, the results indicated that there was no significant difference in faculty attitudes, perceived barriers, and innovativeness among the three levels of teaching experience. Regarding in-service training, the analyses indicated that there were significant differences in faculty attitudes between respondents with in-service training and those with no in-service training. Respondents had in-service training demonstrated more favorable attitudes than those had no in-service training. These results were in agreement with 19 previous research studies (Attar, 1986; Burke, 1986; Chinn, 1990; Delfrate, 1987; Driscoll, 1987; Duby, 1985; Eldridge, 1990; El-Hmaisat, 1985; Garland, 1990; Huang, 1990; Kabli, 1986; Kablt, 1986; Kim, 1986; Koontz, 1992; Lasher, 1971; Lindstrom, 1987; Ristow, 1987; Torres Quintana, 1992; Woolsey, 1985). These research studies reported that teach-
ers' attitudes were positively influenced toward the use of instructional media upon
the completion of in-service training. In addition, there was no significant difference
between faculty who received in-service training and those who did not when facul­
ty perceived barriers were measured. This results were in contrast to 11 previous
research studies (Birkenhotz et al., 1989; Hamilton et al., 1982; Haselbring, 1991; Her­
shfield, 1981; Hurly and Hlynka, 1982; Laney, 1984; Leske and Persico, 1989; Schultz,
1990; Tetenbaum and Malkeen, 1984; Tickton, 1971; Torres Quintana, 1992). These
research studies reported that teachers given in-service training could perceive more
barriers than those who were not given in-service training regarding the use of in­
structional media. Finally, there was no significant difference between faculty who
received in-service training and those who did not when faculty innovativeness was
measured.

The fifth hypothesis of this study tested the relationships among faculty innova­
tiveness, attitudes, and perceived barriers regarding the use of instructional media.
The results indicated a significant positive correlation between faculty attitudes and
faculty innovativeness. The findings of a positive relationship was in agreement with
ten previous research studies (Carr, 1985; Evans and Lipperman, 1968; Harrington,
1976; Harvey, 1970; Havelock, 1971; Hyer, 1972; Nickse, 1972; Rogers, 1983; Shaw
and Wright, 1967; Stahl, 1972). These research studies reported that the greater
the innovativeness, the more favorable the attitude toward innovation. There was no
significant correlation between faculty attitudes and faculty perceived barriers. Also,
there was no significant correlation between faculty perceived barriers and faculty
innovativeness.

The sixth, seventh, and eighth hypotheses of this study tested the relationship
between each of the demographic variables (educational level, years of teaching experience, and number of in-service training sessions attended) and each of dependent variables (attitudes, perceived barriers, and innovativeness) regarding the use of instructional media. The results indicated that there was no significant correlation between the demographic variables and the dependent variables. The finding of no relationship between teaching experience and teacher attitudes was in contrast to nine previous research studies (Chinn, 1990; Clerc, 1985; El-Hmaisat, 1985; Gudmundsson, 1985; Huang, 1990; Kabli, 1986; Lasher, 1971; Torres Quintana, 1992; Woolsey, 1985) which reported a significant positive relationship between teaching experience and teacher attitudes toward the use of instructional media. On the other hand, the finding was in agreement with five previous research studies (Burke, 1986; Kablt, 1986; Kim, 1986; Mason, 1986; Suriyawongse, 1988) which reported no significant relationship between teaching experience and teacher attitudes toward the use of instructional media.

The results indicated that there was no significant correlation between the three demographic variables and faculty perceived barriers. The finding of no difference between teaching experience and teacher perceived barriers was in contrast to four previous research studies (Arterbury, 1971; Ervin, 1989; Hamilton, et al., 1982; Torres Quintana, 1992). These research studies reported that a significant relationship existed between teaching experience and teacher perceived barriers regarding the use of instructional media. This may be due to cultural difference between countries.

The results indicated that there was no significant correlation between the three demographic variables and faculty innovativeness. The finding of no relationship between educational level and teacher innovativeness was in contrast to nine previous
research studies (Aiken and Hage, 1970; Brickell, 1967; Chesler, 1966; CERLI, 1969; Lippitt et al., 1967; Penny, 1970; Rogers, 1963; 1983; Rogers and Shomaker, 1971; Zimmerman, 1970). These research studies reported that educational level was associated with innovativeness regarding the use of instructional media. On the other hand, the finding of was in agreement with six previous research studies (Archibald, 1980; Beckerman, 1971; Carr, 1985; Galler, 1970; Willsey, 1971; Wygal, 1966). These studies reported that the innovativeness and educational level were not related regarding the use of instructional media.

The last hypothesis of this study attempted to find the best model for predicting faculty innovativeness using the five independent variables (educational level, teaching experience, number of in-service training sessions attended, attitudes, and perceived barriers). The results indicated that attitude alone was a significant predictor of the willingness to consider faculty use of instructional media. The combined contribution of the other four independent variables was minimal and was not significant. The findings were in agreement with Mohr's (1969) research study. He reported that about 63 percent of the variance regarding organizational innovativeness was explained by the director attitudes of the health department. Although the attitude variable of this study only explained 24 percent of the variance in faculty innovativeness, it may be inferred that attitudinal differences play a major role in faculty use of instructional media.

**Recommendations**

This correlational study was an exploratory effort to investigate the relationship among faculty attitudes, perceived barriers, innovativeness, and the three demo-
graphic variables regarding the use of instructional media in arts education programs at Taiwan teachers colleges. This section contains recommendations to provide guidance for Taiwan teachers colleges and for future research.

Recommendations for Taiwan teachers colleges.

Based on the findings of this study, faculty who had in-service training demonstrated more favorable attitudes toward the use of instructional media than those had no in-service training. It is recommended that the educational authorities hold seminars to introduce the strategies for using instructional media by faculty at teachers colleges. It is also recommended that the administrators of teachers colleges need to encourage faculty to attend in-service training sessions regarding the use of instructional media.

Although the results of this study indicated that faculty perceived barriers regarding the use of instructional media were not related to faculty attitudes, faculty innovativeness, and the three demographic variables, respondents pointed out that lack of media specialists and an unwillingness to the use of instructional media were two other perceived barriers besides the four surveyed barriers (cost, availability, knowledge, and operation). It is recommended that educational authorities provide enough budget for teachers colleges to purchase appropriate media equipment and to hire media specialists to assist faculty in the use of instructional media.

Recommendations for future research

Two general recommendations for future research regarding the use of instructional media are offered. The first general area is that of categorizing the types of
instructional media since new innovations are being developed at an increasing rate. And the second general area is that of investigating the impact of cultural differences on instructional media usage.

There are also two specific recommendations for future research regarding the use of instructional media.

1. Replication of the current study with a different population such as faculty from different types of departments, is needed to document the applicability of the questionnaire. Different perspectives may be found with different populations.

2. In order to clarify relationships between faculty innovativeness and demographic variables, the following three categories of variables identified by Rogers (1983) should guide future research.

   (a) socioeconomic characteristics— age, literacy, higher social status, more specialized operations, etc.

   (b) personality variables— intelligence, rationality, empathy, achievement motivation, etc.

   (c) communication behavior— social participation, cosmopolitanism, change agent contact, mass media exposure, opinion leadership, knowledge of innovations, etc.
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APPENDIX A. ADDITIONAL STATISTICAL TABLES
Table A.1: Distribution of innovativeness scores

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RELIABILITY COEFFICIENTS 59 ITEMS

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Reliability Coefficients: 20 Items

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Standardized Item Alpha = 0.8402
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RELIABILITY COEFFICIENTS 23 ITEMS
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Table A.7: Reliability analysis of barrier scale

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RELIABILITY COEFFICIENTS 16 ITEMS

ALPHA = .9263
STANDARDIZED ITEM ALPHA = .9259
APPENDIX B. HURT, JOSEPH, AND COOK (1977)

INNOVATIVENESS SCALE
Hurt, Joseph, and Cook (1977) Innovativeness Scale

Factor loading on the 20 item scale for the student, teacher, and combined data.

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<td>I enjoy trying out new ideas.</td>
<td>.57            .56            DNL</td>
</tr>
<tr>
<td>I seek out new ways to do things.</td>
<td>.60            .68            DNL</td>
</tr>
<tr>
<td>* I am generally cautious about accepting new ideas.</td>
<td>.67            .67            .65</td>
</tr>
<tr>
<td>I frequently improvise methods for solving a problem when an answer is not apparent.</td>
<td>.58            .52            .58</td>
</tr>
<tr>
<td>* I am suspicious of new inventions and new ways of thinking.</td>
<td>.63            .60            .65</td>
</tr>
<tr>
<td>* I rarely trust new ideas until I can see whether the vast majority of people around me accept them.</td>
<td>.66            .68            .61</td>
</tr>
<tr>
<td>I feel that I am an influential member of my peer group.</td>
<td>.62            .65            .65</td>
</tr>
<tr>
<td>I consider myself to be creative and original in my thinking and behavior.</td>
<td>.62            .63            .56</td>
</tr>
<tr>
<td>* I am aware that I am usually one of the last people in my group to accept something new.</td>
<td>.63            .62            .63</td>
</tr>
<tr>
<td>I am inventive kind of person.</td>
<td>.62            .69            .53</td>
</tr>
<tr>
<td>I enjoy taking part in the</td>
<td></td>
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</table>
leadership responsibilities of the groups I belong to. .54 .54 .61

* I am reluctant about adopting new ways of doing things until I see them working for people around me. .72 .76 .66

I find it stimulating to be original in my thinking and behavior. .64 .68 DNL

* I tend to feel that the old way of living and doing things is the best way. .64 .60 .64

I am challenged by ambiguities and unsolved problems. .64 .69 .58

* I must see other people using new innovations before I will consider them. .70 .69 .68

I am receptive to new ideas. .55 .56 DNL

I am challenged by unanswered questions. .62 .61 DNL

* I often find myself skeptical of new ideas. .71 .63 .72

DNL refers to the fact that the item did not load because it failed to meet specified criteria.

* Items with reversed scoring.
APPENDIX C. OUTLINE OF THE INSTRUMENT DEVELOPMENT
I. Barriers Affecting the Use of Instructional Media

1. Dimensions

(1) Sayed (1989) Model:
1. cost of software
2. cost of hardware
3. development cost of materials
4. availability of materials
5. training to operate and use
6. information about media
7. time available for preparation
8. the security of existing system

(2) Torres Quintana (1992) Model:
1. Lack of time
2. lack of funds
3. conflict with other job responsibilities
4. lack of training
5. lack of experience
6. no interest in the equipment
7. lack of administrative support
8. unaware of the technology

(3) Barker (1986) Model:
1. information transfer
2. interactivity
3. versatility
4. effectiveness
5. intelligence
6. availability
7. cost

(4) Ideal Model:
1. interactivity
2. versatility
3. intelligence
4. availability
5. cost
2. Summary of Specifications for Barriers Affecting the Use of Instructional Media

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<td>3/8</td>
<td>3/7</td>
<td>3) intelligence</td>
<td>5/22</td>
<td>59, 60, 61, 62, 63</td>
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</tr>
<tr>
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<td>2/8</td>
<td>1/7</td>
<td>4) availability</td>
<td>5/22</td>
<td>54, 55, 56, 57, 58</td>
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<td>3/8</td>
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<td>5) cost</td>
<td>4/22</td>
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II. Attitudes Toward the Use of Instructional Media

1. Dimensions

(1) Rohner (1981) Model:
1. application
2. information transfer
3. relationship between teacher and pupil
4. experts use
5. time use
6. self-esteem
7. availability
8. in-service training
9. stress use

(2) Agerter (1985) Model:
1. interest
2. information transfer
3. stress use

(3) Sayed (1989) Model:
1. efficiency

(4) Torres Quintana (1992) Model:
1. availability
2. information transfer
3. administrative support
4. in-service training
5. stress use

(5) Ideal Model:
1. availability
2. information transfer
3. administrative support
4. efficiency
5. in-service-training
6. time use
7. application
8. interest
2. Summary of Specifications for Attitudes Toward the Use of Instructional Media

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<th>Ratio</th>
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<td>2/3</td>
<td>0</td>
<td>1/5</td>
<td>interest</td>
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<td>47, 48, 49</td>
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APPENDIX D. COVER LETTER, SURVEY INSTRUMENT, ITEM MEANS, AND ITEM STANDARD DEVIATIONS
Dear arts education faculty,

This is a questionnaire regarding the faculty use of instructional media in arts education programs at Taiwan teachers colleges. The purpose of this study is to obtain a better understanding regarding the degree of innovativeness, attitudes toward the use of instructional media, and perceived barriers affecting the use of instructional media in your arts education programs. The survey will only take about twenty minutes to complete. Any individual information that you provide will be kept strictly confidential.

For your convenience, postage for returning this survey is provided. I ask you for your cooperation in returning the survey to me within two weeks. Thanks again for your help.

Sincerely,

Chia-Sen J. Huang
Doctoral Student
Industrial Education and Technology

John C. Dugger
Chair and Associate Professor of
Industrial Education and Technology
Part I: Demographics

Directions: Please write your response on the line provided or place an 'x' in the '( )' before an appropriate answer for each of the following questions.

1. How long have you been teaching at the teachers college level?

__________ years

2. How many times have you attended in-service programs regarding instructional media?

__________ times (within the past two years)

__________ times (more than two years ago)

3. What is your highest earned degree? (Check only one)

( ) doctorate
( ) master
( ) bachelor
( ) other ________________

Part II. Personal Perceptions Inventory

Directions: For each of the following, Please circle the number between 1 and 7 that most closely reflects your level of agreement.

1= Strongly Disagree (SD),
2= Disagree (D),
3= Moderately Disagree (MD),
4= Undecided (U),
5= Moderately Agree (MA),
6= Agree (A), and
7= Strongly Agree (SA).
4. My peers often ask me for advice or information.  
5. I enjoy trying out new ideas.  
6. I seek out new ways to do things.  
7. I am generally cautious about accepting new ideas.  
8. I frequently improvise methods for solving a problem when an answer is not apparent.  
9. I am suspicious of new inventions and new ways of thinking.  
10. I rarely trust new ideas until I can see whether the vast majority of people around me accept them.  
11. I feel that I am an influential member of my peer group.  
12. I consider myself to be creative and original in my thinking and behavior.  
13. I am usually one of the last people in my group to accept something new.  
14. I am an inventive kind of person.  
15. I enjoy taking part in the leadership responsibilities of the groups I belong to.  
16. I am reluctant about adopting new ways of doing things until I see them working for people around me.  
17. I find it stimulating to be original in my thinking and behavior.  
18. I tend to feel that the old way of living and doing things is the best way.  
19. I am challenged by ambiguities and unsolved problems.  
20. I must see other people using new innovations before I will consider them.
Part III. Teaching and Instruction Scale

Directions: For each of the following, please circle the number between 1 and 7 that most closely reflects your level of agreement.

1 = Strongly Disagree (SD),
2 = Disagree (D),
3 = Moderately Disagree (MD),
4 = Undecided (U),
5 = Moderately Agree (MA),
6 = Agree (A), and
7 = Strongly Agree (SA).

(A) Availability and Administrative Support

24. I would like to see more instructional media available for use in arts education.

25. Currently, available instructional media are sufficient for my needs.

26. School administrators provide adequate time for faculty to learn the use of new instructional media.

27. School administrators provide necessary resources for faculty to adopt new instructional media.

(B) Information Transfer and In-service Training

28. I am satisfied with my current knowledge of
instructional media.

29. Recently, I have read many articles concerning instructional media.

30. I do not desire to attend a workshop or conference regarding the use of instructional media.

(C) Effectiveness

31. Instructional media can increase students' interest and motivation.

32. Instructional media can make instruction more understandable.

33. Instructional media can make teaching more effective.

34. Instructional media can give instruction a more scientific basis.

35. Instructional media can make learning more immediate.

36. Instructional media can increase interactive relationships between teachers and pupils.

37. Using appropriate instructional media enables me to provide more information to more students in less time.

(D) Application

38. If instructional media were in my classroom, I would like to use them frequently.

39. I can think of some great ways to use instructional media for teaching in arts education.

40. Instructional media can be used for instruction in many subject areas.
41. By using instructional media, I will become a more effective teacher.

42. When there is a media specialist, individual teachers do not need to be as knowledgeable about instructional media.

(E) Interest

43. I am interested in learning about the knowledge and skills regarding instructional media.

44. More attention should be devoted to the use of current instructional media such as

45. If different types of instructional media were in my classroom, I would use them only for things with which I am familiar.

46. I can find the time to experiment with instructional media in the classroom.
Part IV. Barriers to Technology Utilization Inventory

Directions: Please rate the degree to which each of the following barriers (if present) would impact your decision to use instructional media.

1  2  3  4  5  6  7
|---------|---------|---------|---------|---------|
NI  MI  VI
(No Influence) (Moderately Influential) (Very Influential)

(A) Cost Barriers

47. Cost of purchasing hardware devices. 1 2 3 4 5 6 7
48. Cost of purchasing authoring software devices. 1 2 3 4 5 6 7
49. Cost of developing/acquiring courseware. 1 2 3 4 5 6 7
50. Cost of maintaining and developing facilities. 1 2 3 4 5 6 7

(B) Availability Barriers

51. Lack of user-friendly software devices. 1 2 3 4 5 6 7
52. Lack of security of an existing system. 1 2 3 4 5 6 7
53. Lack of availability of a media specialist. 1 2 3 4 5 6 7
54. Lack of availability of an audio-visual auditorium. 1 2 3 4 5 6 7
55. Lack of time available for preparation and use. 1 2 3 4 5 6 7
56. Lack of appropriate storage place for the instructional media. 1 2 3 4 5 6 7
57. Lack of compatibility of different hardware systems. 1 2 3 4 5 6 7

(C) Knowledge and Operational Barriers
58. Lack of in-service training regarding the use of instructional media.

59. My own inability to design and produce instructional media for teaching.

60. Lack of information about instructional media.

61. My own lack of experience utilizing instructional media.

62. My own inability to use simple maintenance techniques.

(D) Other Barriers (specify)

THANK YOU
Table D.1: Means and standard deviations for each item

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<th>St. De.</th>
<th>Item</th>
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</tbody>
</table>
APPENDIX E. OTHER FINDINGS FROM SURVEY INSTRUMENT
Other Findings from Survey Instrument

1. The compatibility between the management and the use of instructional media.

2. To make the most effective use of instructional media under available equipment.

3. Lack of the ability of foreign language.

4. The limitation of taking pictures regarding the arts exhibitions at Taiwan museums and fine arts center.

5. The copyright of books and the related instructional media.

6. Lack of media specialists to assist faculty to produce and make use of instructional media.

7. The unwillingness of the use of instructional media in their teaching.

8. To look forward to sharing the available instructional media that were made by the other faculty or commercial company, and

9. Field trip can make more effective teaching in arts education programs.
APPENDIX F. HUMAN SUBJECT REVIEW
Information for Review of Research Involving Human Subjects
Iowa State University
(Please type and use the attached instructions for completing this form)

Title of Project: "Relationship Among Innovativeness, Attitudes, and Factors Affecting the Use of Instructional Factors Affecting the Use of Instructional Technology"

1. Title of Project: "Attitudes, Factors Affecting the Use of Instructional Technology"

2. I agree to provide the proper surveillance of this project to ensure that the rights and welfare of the human subjects are protected. I will report any adverse reactions to the committee. Additions to or changes in research procedures after the project has been approved will be submitted to the committee for review. I agree to request renewal of approval for any project continuing more than one year.

Hung, Chia-Sen Jimmy
Typed Name of Principal Investigator

Apr. 30, 93
Date

Signature of Principal Investigator

Industrial Education & Technology
Department

B5 I Ed & T II
Campus Address

4-8529
Campus Telephone

3. Signatures of other investigators

Date
Relationship to Principal Investigator

Major Advisor

Co-Major Professor

4. Principal Investigator(s) (check all that apply)

□ Faculty □ Staff □ Graduate Student □ Undergraduate Student

5. Project (check all that apply)

□ Research □ Thesis or dissertation □ Class project □ Independent Study (498, 696, Honors Project)

6. Number of subjects (complete all that apply)

# Adults, non-students
# ISU student
# minors under 14
# minors 14 - 17

7. Brief description of proposed research involving human subjects: (See instructions, Item 7. Use an additional page if needed.)

Please see attached sheets.

8. Informed Consent:

□ Signed informed consent will be obtained. (Attach a copy of your form.)

□ Modified informed consent will be obtained. (See instructions, item 8.)

□ Not applicable to this project.

9. (Please do not send research, thesis, or dissertation proposals.)
9. Confidentiality of Data: Describe below the methods to be used to ensure the confidentiality of data obtained. (See instructions, item 9.)

(1). The code number on the questionnaire will be used for the purpose of follow up only on unreturned questionnaires.
(2). All data will be kept confidential and stored for further analysis.
(3). All data will be reported in form of group results.

10. What risks or discomfort will be part of the study? Will subjects in the research be placed at risk or incur discomfort? Describe any risks to the subjects and precautions that will be taken to minimize them. (The concept of risk goes beyond physical risk and includes risks to subjects' dignity and self-respect as well as psychological or emotional risk. See instructions, item 10.)

There is no risk to arts education faculty at Taiwan teachers colleges who will be asked to participate because responses will be kept confidential.

11. CHECK ALL of the following that apply to your research:

☐ A. Medical clearance necessary before subjects can participate
☐ B. Samples (Blood, tissue, etc.) from subjects
☐ C. Administration of substances (foods, drugs, etc.) to subjects
☐ D. Physical exercise or conditioning for subjects
☐ E. Deception of subjects
☐ F. Subjects under 14 years of age and/or ☐ Subjects 14 - 17 years of age
☐ G. Subjects in institutions (nursing homes, prisons, etc.)
☐ H. Research must be approved by another institution or agency (Attach letters of approval)

If you checked any of the items in 11, please complete the following in the space below (include any attachments):

Items A - D Describe the procedures and note the safety precautions being taken.

Item E Describe how subjects will be deceived; justify the deception; indicate the debriefing procedure, including the timing and information to be presented to subjects.

Item F For subjects under the age of 14, indicate how informed consent from parents or legally authorized representatives as well as from subjects will be obtained.

Items G & H Specify the agency or institution that must approve the project. If subjects in any outside agency or institution are involved, approval must be obtained prior to beginning the research, and the letter of approval should be filed.
Checklist for Attachments and Time Schedule

The following are attached (please check):

12. [x] 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
    ___________________________
    May 25, 1993
    ___________________________
    Last Contact
    ___________________________
    June 30, 1993

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual
    tapes will be erased:
    ___________________________
    July 31, 1993

18. Signature of Departmental Executive Officer

    ___________________________

    Date

    ___________________________

    Department or Administrative Unit

    ___________________________

    Industrial Education & Technology

19. Decision of the University Human Subjects Review Committee:

    [x] Project Approved
    [ ] Project Not Approved
    [ ] No Action Required

    ___________________________

    Patricia M. Keith

    Name of Committee Chairperson

    ___________________________

    Signature of Committee Chairperson
APPENDIX G. COVER LETTER AND SURVEY INSTRUMENT — CHINESE VERSION
敬愛的教授：

您好！在忙碌的學期末，麻煩您幫忙填寫這份問卷，在此先向您致謝。

本人目前在美國愛荷華州立大學 (Iowa State University, Ames, Iowa) 工業教育與科技系 (Industrial Education & Technology) 進修。這份問卷主要是在瞭解九所師院美勞系 (科) 教授對使用教學媒介的態度，限制因素，及對革新觀念的接受程度 (Innovativeness) 等項之意見，進而探討它們間之關係。這份問卷是本人論文研究的主要工具之一，敬請您能花二十分鐘的時間，根據您的觀點，確實地回答問卷上的每個問題。各項答案無所謂對或錯，調查結果僅作為團體意見分析之依據，您個人的選答將保持機密，並在論文完成之後全部銷毀，請您放心作答。

由衷感謝您的支持與協助，並敬請惠予一週內填妥問卷，利用備妥的回郵信封寄給本人，再次謝謝您的協助。

敬祝
教安、萬事如意

研究者
黃嘉勝 敬上
82年5月11日
填答說明

本問卷共有62個敘述句，分成四部份，第一部份是關於您的個人基本資料；第二部份是關於革新觀念的接受程度之調查；第三部份是關於您對使用教學媒體的態度之調查；第四部份是關於您對使用教學媒體的各項限制因素之調查。敬請全部填寫，以利進行本研究。

第二部份及第三部份中，每個敘述句有七個選項，分別由數字1至7來表示，如："1" 表示 "非常不同意"；
"2" 表示 "不同意"；
"3" 表示 "有點不同意"；
"4" 表示 "不能決定"；
"5" 表示 "有點同意"；
"6" 表示 "同意"；
"7" 表示 "非常同意"。

第四部份中，每個敘述句有七個選項，分別由數字 "1" 表示 "沒有影響" 至 "7" 表示 "很有影響" 來決定其影響的程度如下：

1  2  3  4  5  6  7
|--------|--------|--------|--------|--------|--------|--------|
沒有影響  中度影響  很有影響

請根據您在美勞系(科)教學的實際經驗，在每部份的敘述句中圈選出最能代表您的意見之數字。

壹．個人基本資料

請在______內填寫所需資料或在□□中打'✓'。

1. 您在貴師院的年資：_______年。

2. 您曾參加過有關視聽教學媒體類為專題之在職訓練（含研習或研討會）
   _________次（過去近二年內）。
   _________次（二年以前）。

3. 您的最高學歷：
   □博士  □碩士  □學士  □其他__________________________

P2
貳．革新觀念的接受程度 (Innovativeness)

這一部分是有關您對革新觀念的接受程度之調查。請從以下
4至23題的敘述句中，圈選出最能代表您的意見之數字。

<table>
<thead>
<tr>
<th>非常不同意</th>
<th>不同意</th>
<th>有点不同意</th>
<th>同意</th>
<th>有点同意</th>
<th>非常同意</th>
</tr>
</thead>
</table>

4. 我的同事們經常要我向她/他們建言
或提供有關革新觀念的訊息。 1 2 3 4 5 6 7

5. 我喜歡嚐試各種革新的觀念。 1 2 3 4 5 6 7

6. 我會追求新的方法來處理事情。 1 2 3 4 5 6 7

7. 我總是在相當謹慎地認知後，才會接受
革新的觀念。 1 2 3 4 5 6 7

8. 我常可即席想出一些方法來解決難題。 1 2 3 4 5 6 7

9. 我會對各項革新的觀念提出質疑。 1 2 3 4 5 6 7

10. 當我確定我周遭的人接受革新的觀念後，我才會接受它。 1 2 3 4 5 6 7

11. 在我的同事中，我覺得我是一個有影響力的人。 1 2 3 4 5 6 7

12. 我認為自己在思考及行為上具有獨創
性的能力。 1 2 3 4 5 6 7

13. 在我的同事中，我經常是最後一個接受
革新觀念的人。 1 2 3 4 5 6 7

14. 我是一位有創新能力的人。 1 2 3 4 5 6 7

15. 我喜歡在團體活動中擔任
領導性的工作。 1 2 3 4 5 6 7

P3
16. 在我周遭的人未使用革新观念之前，我不會利用它来处理事情。

17. 我覺得革新观念在我的思考及行為上，可激發我的創造力。

18. 我覺得在生活處事上，利用傳統的觀念是最好的方法。

19. 我會向難以解決的問題挑戰。

20. 我必須看到別人使用革新的觀念後，我才會考慮接受它。

21. 我很容易接受革新的觀念。

22. 未能被答覆的問題常會激勵我想出解決的方法。

23. 我總是懷疑革新的觀念的可行性。

### 參・使用教學媒體的態度

這一部份是有關您對媒體教學的態度之調查。請從以下24 至46 題的敘述句中，圈選出最能代表您的意見之數字。

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>非常</td>
<td>不</td>
<td>有</td>
<td>同</td>
<td>不</td>
<td>有</td>
<td>同</td>
</tr>
<tr>
<td>不</td>
<td>同</td>
<td>無</td>
<td>决</td>
<td>同</td>
<td>無</td>
<td>同</td>
</tr>
</tbody>
</table>

### 可行性及行政支援方面：

24. 我喜歡見到更多的教學媒體在美勞系（科）教學中被使用。

1 2 3 4 5 6 7
<table>
<thead>
<tr>
<th>非常不同意</th>
<th>不同意</th>
<th>有点不同意</th>
<th>不同意</th>
<th>有点同意</th>
<th>同意</th>
<th>非常同意</th>
</tr>
</thead>
<tbody>
<tr>
<td>25. 目前現有的教學媒體已足夠我的教學需要。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>26. 學校行政上的支援，使我有機會去學習使用新的教學媒體。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>27. 學校行政部門會提供教學所需的設備及材料讓我試用新的教學媒體。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

● 媒體知識及在職訓練方面:

| 28. 我滿意我現有的教學媒體方面之知識。 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 29. 我已經讀過許多有關教學媒體方面的文章。 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 30. 我不喜歡參加有關教學媒體方面的研習會或學術研討會。 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

● 有效性方面:

| 31. 教學媒體能增加學生的興趣及引起學習動機。 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 32. 教學媒體能使學生更瞭解教學內容。 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 33. 教學媒體能使教學更有效化。 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 34. 教學媒體能提供較有科學依據的教學方法與內容。 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 35. 教學媒體能加速學生的學習效果。 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 36. 教學媒體能增進教師與學生間的溝通效果。 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
37. 若使用適當的教學媒體，我能在最少的時間教導學生更多的知識。

38. 假如有教學媒體在我的教室中，我會經常使用它們。

39. 我能想出很多方法來應用教學媒體在我的教學中。

40. 教學媒體可應用在許多學科方面的教學。

41. 若使用教學媒體教學，我會是一位更有效率的老師。

42. 學校中若有教學媒體專家，老師就不需深入瞭解有關的教學媒體知識了。

43. 我對學習有關教學媒體方面的知識及使用技巧有興趣。

44. 目前使用教學媒體應偏重在傳統的媒體如：印刷類媒體，展示類媒體，幻燈類媒體，電視、錄影類媒體，而不應偏重在新科技類媒體如：電腦類媒體，衛星通訊類媒體等。

45. 假如學校備有各種教學媒體，我只會選擇我熟悉的媒體來使用。

46. 在教學過程中，我會找出時間來實驗新的教學媒體。

P6,
■ 肆．影響使用教學媒體的限制因素 ■

這一部份是關於您使用教學媒體的各項限制因素之調查。請在以下
47 至 62 題的敘述句中，圈選出最合乎您的意見之數字，另外您若認為還
有其它限制的因素，請在 ________ 處註明並圈選影響其程度的數字。

●經費之限制因素：

47. 採購教學媒體硬體設備的經費。  
   沒有影響 中度影響 很有影響  
   1  2  3  4  5  6  7

48. 採購有版權的教學媒體軟體設備經費。  
   1  2  3  4  5  6  7

49. 編列發展教學需求的教學媒體設備經費。  
   1  2  3  4  5  6  7

50. 編列維修教學需求的教學媒體設備經費。  
   1  2  3  4  5  6  7

●可用性之限制因素：

51. 缺乏簡易操作的教學媒體設備。  
   1  2  3  4  5  6  7

52. 缺乏安全及保管教學媒體設備的系統。  
   1  2  3  4  5  6  7

53. 缺乏教學媒體專家的協助。  
   1  2  3  4  5  6  7

54. 缺乏專用的視聽教室或沒有教學媒體設備的教室可供使用。  
   1  2  3  4  5  6  7

55. 缺乏足夠的時間來準備及使用教學媒體。  
   1  2  3  4  5  6  7

56. 缺乏適當的教學媒體儲存設備及保藏
    地點。  
   1  2  3  4  5  6  7

57. 缺乏可匹配及運用之教學媒體設備。  
   1  2  3  4  5  6  7

P7
### 知識及操作技巧方面之限制因素:

<table>
<thead>
<tr>
<th></th>
<th>沒影響</th>
<th>中度影響</th>
<th>很有影響</th>
</tr>
</thead>
<tbody>
<tr>
<td>58.</td>
<td>缺乏有關使用教學媒體之在職訓練。</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>59.</td>
<td>缺乏設計及製作有關媒體教學的能力。</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>60.</td>
<td>缺乏有關教學媒體方面的知識。</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>61.</td>
<td>缺乏使用教學媒體的經驗。</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>62.</td>
<td>缺乏簡易維修教學媒體設備的能力。</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

### 其它之限制因素 (請註明):

<table>
<thead>
<tr>
<th></th>
<th>1 2 3 4 5 6 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>2</td>
<td>1 2 3 4 5 6 7</td>
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<td>3</td>
<td>1 2 3 4 5 6 7</td>
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<td>4</td>
<td>1 2 3 4 5 6 7</td>
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<td>5</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>6</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>7</td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

■ 謝謝您的填答 ■