Quality indicators of excellence for doctoral program assessment in industrial education

John Anozie Ugonabo

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QUALITY INDICATORS OF EXCELLENCE FOR DOCTORAL PROGRAM ASSESSMENT IN INDUSTRIAL EDUCATION

Iowa State University

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Ph.D. 1981
Quality indicators of excellence for doctoral program assessment in industrial education

by

John Anozie Ugonabo

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

Major: Industrial Education

Approved:

Signature was redacted for privacy.

In Charge of Major Work

Signature was redacted for privacy.

For the Major Department

Signature was redacted for privacy.

For the Graduate College

Iowa State University
Ames, Iowa

1981
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CHAPTER I. INTRODUCTION

Quality in education is an elusive attribute, not easily subjected to measurement. No single index—be it size of endowment, number of books in the library, publication record of the faculty, level of faculty salaries, or number of Nobel Laureates on the faculty, Guggenheim fellows, members of the National Academy of Sciences, National Merit Scholars in the undergraduate college, or Woodrow Wilson Fellows in the graduate school, nor any combination of measures—is sufficient to estimate adequately the true worth of an educational institution. True, most of the universities esteemed as "distinguished" have rather more of each of the above than do institutions that are not held in such high regard by the academic community.

The assessment of quality is a difficult task at all levels of education. It is perhaps both simpler and more complex at the level of the graduate school. It is simpler in that one can more easily assess the scholarly attributes of the most distinguished members of the academic community. It is more difficult in that the higher a student goes on the ladder of formal learning, the more education becomes self-education and the more factors other than the quality of the faculty assume importance.

The diversity of our current system of higher education has properly been regarded by both the professional educator
and the layman as a great source of strength, since it permits flexibility and adaptability and encourages experimentation and competing solutions to common problems. At the level of the doctorate, great diversity in quality is known to exist among the approximately 200 institutions granting this degree today in the United States.

However, evaluation by opinion and self-perception has been far from satisfactory, particularly in the advanced training for scholarship and the professions. In stating the case for studies of quality, David Riesman (1978) argued:

...the quality of a school changes faster than its clientele recognizes; and colleges that have developed a novel or more demanding program cannot get the students to match it, while other institutions that have decayed cannot keep away students who should no longer go there. While automobiles carry their advertising, so to speak, on their body shells, which speak as loudly as print or TV commercials, colleges can change inside their shells with hardly anyone's noticing. And the result can be tragic, not only for misled students, but for imaginative faculty and administrators who may not live long enough to be rewarded by the appearance of good students attracted by those changes (p. 27).

Growth in quality education is essential. Evaluation of quality in education at both the undergraduate and graduate levels is very important, hence the need for objective indicators.

Problem of the Study

An effective index of quality assessment indicators of doctoral programs within the field of Industrial Education has not yet been devised.
The problem of this study was to generate, identify, and analyze a list of realistic quality indicators for assessment of doctoral programs in the field of Industrial Education.

Purpose of the Study

1. To extend knowledge through inquiry and to maintain a steady growth within the field of industrial education.
2. To identify and develop and analyze quality indicators to be employed in the assessment of doctoral programs in industrial education.
3. To expand on the existing body of knowledge of graduate programs in industrial education.
4. To assist industrial education to identify the activities and informational sources that can be utilized in the doctoral program assessment and review.
5. To elicit more information about assessment techniques of the doctorate in industrial education than has previously been known. The resulting information was intended to improve the data base, not replace, decisions that may be made by graduate education administrators and policymakers.
Need for the Study

Several factors made this study necessary. There was always a need for research in industrial education so as to maintain a steady and constant growth and development in this area. The need for this study was established through the review of literature in several areas of education.

Curriculum development

Higher education institutions have felt considerable external and internal pressures during the past three decades. During this period, many curriculum development projects were initiated to improve curricula for the purpose of correcting the deficiencies caused by the vast technology explosion. Through such means as the National Defense Education Act (NDEA), the federal government provided large sums of money to support public schools (McGivney and Krahé, 1973, p. 89).

According to Grobman (1971), the channelling of federal money through the National Science Foundation (NSF) sparked an era of innovation in science and mathematics curricula.

Today, the need to improve the educational programs is not restricted to the science curriculum. The collection and use of feedback during curriculum development is needed in all educational disciplines. This point was emphasized by Hastings (1966) who wrote:
If the educational establishment is to move toward the point of basing decisions about revision and decisions about adoption on educational purposes and outcomes, we need far more evaluation data of all kinds, than we have had in any instance to date... (p. 281).

The internal and external pressures upon education affected the way educators thought about the theory and practice of curriculum development, educational evaluation, and program assessment and reviews.

**Educational evaluation**

Along with the need for program development and innovation in curricula, came the need for new evaluation methods. According to the views of Worthen and Sanders (1973):

The late 1950s and early 1960s were the years which echoed with cries for curriculum reform. Several major new curriculum projects were initiated across the country (U.S.): with these innovations came the need for new evaluation procedures. Initially many curriculum developers attempted to use the familiar controlled experimental design paradigm to evaluate their products; however, this approach proved satisfactory for only some of the evaluation needs, the would-be curriculum evaluators were forced to seek elsewhere for additional methodologies (p. 4).

The educational evaluation community reacted to the need for additional methodologies and has expanded the evaluators' body of knowledge since the 1950s. Specific examples of these developments included the refinement in the use of educational objectives. Bloom et al. (1956), Mager (1962), Krathwohl et al. (1964), Gronlund (1970), and many others have stressed the practice of stating and measuring learning
objectives operationally. However, the need still existed for research concerning the use of the evaluation process to assess those objectives. This need was stressed by Stake (1970) who wrote:

Few procedures have been cited that have been used successfully for making judgement data, a part of the evaluation story.... Evaluators have an obligation to make a careful search for objectives, standards and other judgement data (p. 205).

Further support for research on evaluation in education was stated by Cronbach (1963):

Common practice falls far short of the ideal both in breadth of evaluation and in the use of results. If measurement is intended to obtain marks for administrative purposes, better evaluation would not lead to many changes. We take the larger view that evaluation is an essential part of learning and educational planning. It then follows that improved evaluation is the key to a more effective school (p. 569).

**Industrial art education**

The efforts of improving American education in the 1950s and 1960s were not limited to science and mathematics. In industrial arts education, research and development had facilitated changes in the definition of the field, the curriculum base, the educational goals and objectives of industrial arts programs. However, the problem of improving instruction in industrial arts still needed thought and research.

Streichler (1966), Householder (1969), and Cochran (1970) reported on several research and curriculum development
projects that addressed the need for improvement in industrial arts education during the 1960s. Householder (1969) reported:

Dissatisfaction with contemporary industrial arts programs coupled with a great deal of effort in improving content selection and analysis procedures has led to a large number of proposals for new educational programs for industrial arts. Some of these curriculum proposals were the results of funded curriculum projects; other proposals resulted from the efforts of individuals or small groups with little or no funding (p. 11).

The preceding citations supported the emphasis on efforts directed at the improvement of industrial education programs at all levels. A lack of research on the characteristics and quality indicators of excellence for doctoral programs in industrial education contributed to the need for this study.

Koble and Thrower (1966) stated:

A search of the research studies reveals that little has been done in the area of research in measurement or evaluation techniques... (p. 38).

Koble and Thrower (1966) further identified a need for research on industrial arts program evaluation. These authors stated:

This area of education is so nearly void of conclusive research that it is impossible to identify gaps, simply because there are not gaps but wide open panoramas (p. 38).

Householder (1969) added:

Program evaluation has been the subject of renewed interest in industrial arts education. No doubt some of
the motivation has been a direct result of past criticisms of industrial arts practices and procedures... (p. 12).

The Iowa Guide for Curriculum Improvement in Industrial Arts K-12 (1975) included this observation:

Regardless of the process used for curriculum development, no curriculum is ever perfect, nor complete, nor can it remain static. Weak points and inconsistencies will continuously arise in even the most carefully developed program... (p. 8).

Graduate studies in education and industrial education

Quite a number of studies on graduate education have emphasized the need for this study.

Giles T. Brown (1978), expressing the need for quality assessment indicators in educational programs, decried the hasty and untenable conclusions concerning graduate programs reached by many people, including graduate deans, based upon slender evidence, a brief conversation, a chance encounter with a student, or a glance at a report.

Bernard J. Downey et al. (1978), supporting the basic premise inherent in this study, expressed the view that program reviews should lead to the improvement of program quality, rather than focusing entirely on external demands for program accountability. He further expressed the view that, although discussions in the graduate community have emphasized these points for some time, there was continuing uncertainty into the early 1970s about the best way to undertake these tasks of program assessment and reviews.
Many observers would agree that a more rational approach to the assessment of quality in doctoral education would be desirable if fair and wise judgments were to be made about specific doctoral programs and if program evaluation were to become a vital force in maintaining and strengthening the quality of graduate education.

A recommendation that emerged from the previous studies was that graduate program evaluation efforts should consider adopting some sort of procedure for obtaining a number of different assessment indicators. Such a procedure should provide information about more quality related programs in a form that would permit comparisons with measures of the same characteristics in similar programs in other universities. As a result of widespread concern about the shortcomings of peer ratings as the primary index of quality in doctoral education, the Council of Graduate Schools in the U.S. has been sponsoring agencies and individuals to study ways of assessing quality in doctoral education. The Council stated:

Such studies should be geared towards examining the feasibility of gathering reliable and useful information about a broad variety of doctoral program characteristics (Council for Graduate Studies, 1978, p. 31).

Further the Council for Graduate Studies (1978), in releasing a pioneering report, stated:

Our purpose in making such summary widely available is to stimulate activity and interest in meaningful program assessment.... Studies are going forward directed towards further development and implementation of improved procedures for program assessments (p. 35).
One of the shortcomings of previous efforts to assess the quality of graduate education programs has been the failure to recognize that the criteria usually employed to measure quality are primarily relevant to programs emphasizing the preparation of researchers and less appropriate to programs emphasizing the preparation of teachers and other practitioners. Hence, the need for this study emphasized the preparation of researchers, teachers and other practitioners.

The doctorate in industrial education has been the center of focus and emphasis in recent times, hence it was pertinent to study the quality indicators of doctoral programs in this area of education.

Buffer (1979) stated, "The doctorate with an emphasis in industrial education is rapidly becoming a requirement for industrial arts teacher educators."

In the Tenth Yearbook of the American Council on Industrial Arts Teacher Education (ACIATE) entitled "Graduate Study in Industrial Arts," Karnes and Lux (1961, p. 111-112) suggested that the doctorate was necessary for those who planned to conduct research and whose major responsibilities were in connection with the professional aspects of industrial arts education.

Stressing the need for this study, James J. Buffer, Jr. (1979) wrote:

...the collection and analysis of information identified a number of issues and concerns related to quality
graduate programs. For example, the multitude of graduate degree designates, differences in entrance and exit criteria, increase in degree productivity especially among less established institutes, changes in degree attainment required for employment of new graduate degree programs suggest that the profession does not have full agreement regarding the nature of quality graduate education (p. 291-320).

Buffer (1979), also stressing the need for quality doctoral studies, stated that the availability of quality programs had become more crucial as professions became more demanding, mirroring the increasing complexity of sociocultural conditions.

Approximately 49 institutions now award the doctorate with a specialization in industrial education and 170 offer the master's degree (Dennis, 1977). Growth has been phenomenal. The future thrust must be in the area of evaluation to help program offerings, the professional preparation of educational personnel and the integrity of the graduate major in the field of industrial arts education.

The Questions of This Study

The following questions formed the basis for this study:

1. Is there a consensus on what constitute quality indicators in the assessment of doctoral programs in industrial education?

2. What consistency exists among the three principal groups regarding quality indicators and specific characteristics subsumed under these indicators?
Assumptions of the Study

The study was undertaken with the following assumptions:

1. Industrial education doctoral candidates would be honest and accurate in their answers to the questionnaire.

2. The information sought in this study could not be obtained from any other better source.

3. The sample selected was large enough to represent the population.

4. The method of analysis of data and the presentation of the findings were appropriate to the study.

5. Educational excellence was represented only partially and imperfectly by any single rating or index of program quality.

Limitations of the Study

1. The study was limited to 20 selected institutions.

2. It was limited to doctoral students of the selected universities, their recent alumni and their faculty.

3. The study was limited to the quality indicators of excellence in industrial education doctoral programs.
Procedure of the Study

1. A review of literature relative to graduate education was undertaken.

2. The proposal for the topic of graduate (doctoral) research was identified and initial discussion was sought with members of the graduate advisory committee and other consultants.

3. The definite topic was selected as, The doctorate in industrial education: Quality indicators of excellence for doctoral program assessment in the field of industrial education.

4. The research proposal was submitted and accepted by the graduate advisory committee.

5. A literature search was conducted through the use of the ERIC Retrieval System and the identified literature was reviewed.

6. The population to be used was determined through a random sample of the institutions that offer doctoral programs in industrial education.

7. The questionnaire was developed to identify the quality indicators of excellence.

8. The questionnaire was pretested.

9. Changes in the questionnaire were made based upon the findings of the pilot study.
10. The instrument was mailed to the selected survey sample along with a covering letter.

11. Three weeks after the initial mailing, a follow-up letter was mailed to those who had not responded.

12. Data were collected and transferred to Iowa State University computer forms to be analyzed.

13. The data were analyzed to reflect the mean, standard deviation and frequencies among other information.

Definition of Terms

**Industrial education**: This is a term that includes all educational activities and that are concerned with modern industry and crafts, their raw materials, products, machines, personnel and problems. It therefore includes both industrial arts and vocational industrial education (Friese and Williams, 1966, p. 7).

**Industrial art education**: Industrial arts, as a curriculum area, are those phases of general education which deal with technology, its evolution, utilization and significance, its organization, materials, occupations, processes and products and the problems and benefits resulting from technological and industrial nature of society (Maley, 1973, p. 3).

**Quality indicators**: These are statements, phrases and/
or words that act as signs and thereby serve to point out the presence of quality in a program. A quality indicator constitutes an index of quality in a program.

**Industrial education administrators:** This refers to those who administer industrial education faculties or departments that offer doctoral programs. It refers to the heads of departments or chairpersons of departments.

**Faculty:** Faculty is used here to refer to all the professors, associate professors, etc. who advise and direct doctoral students. The coordinator of graduate studies is a good example.

**Consensus:** Consensus is here defined as having no significant differences among the schools and the three groups in the rating of the quality indicator variables.

**Significant institutional differences:** These are quality indicator variables which, as the result of the 16 schools' ratings, have significant mean differences at .01 and .05 levels.

**Significant group differences:** These are the quality indicator variables which, as the result of the faculty, students, and alumni ratings, secured significant mean differences at .01 and .05 levels.

**Significant interaction effects:** These are the quality indicator variables that have significant school/group interaction effects at .01 level.
CHAPTER II. REVIEW OF LITERATURE

Today, there is a growing awareness of the crucial role of public education in both the developed and the developing countries. Along with this awareness, there has been a growing concern in the public about the individuals or groups who influence the programs and the operational policies of the schools. Probably no single group influences more the direction which public education takes than the professional educators—especially those who have their doctorate degrees and serve in administrative positions in education. Usually these are professors in colleges of education who predominantly administer the teacher training programs, who perform the research in the areas of teaching and learning, and who teach administration of educational programs at all levels.

Therefore, the success of a nation's educational system in no small measure is in the control of such professionally trained people. Although this group of educational leaders thus far has not been the focus of extensive research, any group playing such a crucial role should be subject to very close scrutiny. Means should be sought to attract to the field only the capable individuals and the utmost care should be taken to see that their educational programs are of a kind that will adequately prepare themselves for their important responsibilities and obligations.
While a few investigations have been carried out with regard to doctoral programs and degree recipients in general education, however, in the field of industrial education relevant research of the doctoral programs is sparse. The review of such literature in this study will be treated under these three headings:

1. Issues and trends in higher education,
2. Previous studies in higher and graduate education,
3. Previous graduate studies in industrial education.

Issues and Trends in Higher Education

The diversity of our current system of higher education has properly been regarded by both the professional educator and the layman as a great source of strength, since it permits flexibility and adaptability and encourages experimentation and competition in finding solutions to common problems. At the level of the doctorate, great diversity in quality is also known to exist among the institutions granting the degree today in the United States.

Evaluation by opinion or self-perception, however, is far from being satisfactory, particularly in the assessment of advanced training for scholarship and research. David Riesman (1978) stated:

The quality of a school changes faster than its clientele recognizes; the colleges that have developed a novel or more demanding program cannot get the students to match it, while other institutions that have decayed
cannot keep away students who should no longer go there. While automobiles carry their advertising, so to speak, on their body shells which speak as loudly as print or TV commercials, colleges can change inside their shells with hardly anyone noticing. The result can be tragic, not only for misled students but for imaginative faculty and administrators who may not live long enough to be rewarded by the appearance of good students attracted by those changes (p. 221).

Evaluation of quality at all levels of education is essential in order to maintain constant and healthy growth.

The American educational institutions have felt considerable external and internal pressures during the past few decades. Many factors have placed new demands upon the enterprise of public education, resulting in a re-examination of the goals, instructional contents, and methods of instruction in American education. According to Doll (1974):

The 1950's became a time of ferment; McCarthyism was rampant, a redefinition of morality was beginning to occur, the family as an institution was declining and complaints about alleged mathematical and scientific illiteracy in the general population were growing. The schools were open for the criticism of their programs which followed the blast off of Sputnik I in October, 1957. Shortcuts to learning were being sought as a means of meeting criticism.... Part of that which came to be called "curriculum reform" was a variant of classical efforts at reform, emphasizing indirect ways of changing programs through adding facilities and materials and altering organizational plans (p. 11).

Recently, many curriculum development projects were initiated to improve curricula for the purpose of correcting the deficiencies caused by a vast technological explosion. Through such means as the National Defense Education Act (NDEA), the
federal government provided large sums of money to support public schools (McGivney and Krahl, 1973, p. 89).

Grobman (1971) stated that the channeling of federal money through the National Science Foundation (NSF) sparked an era of innovation in scientific and mathematical curricula. Grobman reported one specific innovation in educational development as follows:

There was an interest in a new tactic for producing student materials in science that would permit faster updating of curricula—a developmental approach. Basically, this approach involves the production of new curricula, using experimental tryouts of preliminary materials and collecting feedback from such tryouts to be used for improvement of curricula prior to its release for general distribution (p. 436).

Today, the need to improve educational programs during the formative period is not restricted to scientific curricula. The collection and use of feedback during the curricular development process is needed in all educational disciplines. This point was emphasized by Hastings (1966) when he wrote:

If the educational establishment is to move towards the point of basing decisions about revision and decisions about adoption on educational purposes and outcomes, we need far more evaluation data of all kinds than we have had in any instance to date... (p. 28).

Along with the need for program development and innovation in curricula, came the need for new evaluation methods. According to Worthen and Sanders (1973):

The late 1950s and early 1960s, the post Sputnik years echoed with cries for curricular reforms. Several
major new projects were initiated across the country; with these innovations came the need for new evaluation procedures. Initially, many curriculum developers attempted to use the familiar controlled experimental design paradigms to evaluate their research; however, this approach proved satisfactory for only some of the evaluation needs, and would-be curriculum developers were forced to seek elsewhere for additional methodologies (p. 4).

Although individuals like Bloom et al. (1956), Mager (1962), Krathwohl (1964), and Grolund (1971) did respond, the need still existed for research concerning the use of the evaluation process to assess the educational objectives. Stake (1970) pointed out these needs when he stated:

Few procedures have been cited that have been used successfully for making judgment data a part of the evaluation story. Excuses are many.... But none of the excuses are adequate. It does not matter that evaluators seldom find strong correlates between background conditions including aims, needs, and standards.... Evaluators have an obligation to make a careful search for objectives, standards and other judgmental data (p. 205).

The matter of the present oversupply of doctoral graduates in some fields is a trend and concern of great consequence. Answers to some pertinent questions must be forthcoming. Should there be an artificial limit established to inhibit enrollment in certain programs simply because there are not enough jobs available? Or should the students be allowed to use their initiative and scholarly ambitions to enroll in a given program knowing that the job market is tight? The Council of Graduate Schools' position in this instance is that there is need to continually develop the
best information possible regarding the existing state of the job market so that students can be aware of the conditions before they enroll in a program. Another very important issue which is receiving national attention involves the matter of increasing opportunities for graduate studies for members of minority groups, women and handicapped persons. This is a difficult problem to deal with considering all the factors involved. The Council of Graduate Schools is working with groups to find ways and means of effectively increasing these opportunities.

Previous Studies in Graduate Education

At this time, there is no formula or equation which will afford an accurate assessment of an institution's capacity to provide graduate training in education, but two of the most important qualitative dimensions which will necessitate attention are:

1. The mission of the professional education college,
2. The performance characteristics of the departmental staff and the institution.

In terms of the former, the capacity of the institution to provide effective graduate training will most certainly be a function of its objectives. More specific to the qualitative aspects of performance characteristics, it would be necessary to consider several additional factors. Faculty character-
istics in terms of number, rank, and status for advising graduate students must be closely examined. It is also essential that the record of the faculty with respect to its professional contributions be evaluated as an indicator of institutional capacity to provide the desired training programs. Furthermore, it would be very beneficial to more closely examine the individual institution's plan of action for the future.

The Council of Graduate Schools, in its concern for graduate study, has pursued a very active role with various accrediting bodies. Recently, the Council on Postsecondary Education has been examining the nontraditional programs which were offered out of state. Such programs were subject to much controversy in terms of the manner and the mode in which they were being offered by some institutions. The Council subsequently made these recommendations: "Wherever an off-campus program is offered, leading to a degree, that program and that site should be examined by the appropriate regional accrediting body for that location."

The Council thus was very much concerned about the development and the continuing quality of programs in graduate education.

Robertson and Sistler (1971) studied the doctorate in education in 124 institutions for the Phi Delta Kappa Commission on Higher Education and the American Association of
Colleges for Teacher Education (AACTE). They found that there were 98 Ph.D.s in education programs and 97 Ed.D. programs in education, with 72 (58.1%) institutions offering both degrees. The Ph.D. was offered by 26 institutions while 25 offered only Ed.D. Approximately 7% of the Ph.D. programs were under the control of the Graduate College and 38% were administered by dual arrangements. Twenty-one percent of the Ed.D. programs were under the control of the College of Education, 38% under the control of the Graduate College and 39% were operated by dual arrangement. Thus, identifying quality indicators and establishing standards would dispel the fear of loss of quality arising from who controls the doctoral programs in education.

Blackburn and Lingenfelter (1956) conducted a study on Assessing Quality in Doctoral Programs: Criteria and Correlates of Excellence. That study discussed critical problems in the assessment of excellence, reviewed a catalog of criteria and assessment techniques and indicated necessary conditions for adequate doctoral programs. Blackburn and Lingenfelter also suggested a model for the evaluation of doctoral education.

Brown and Slater (1960) carried out a study that surveyed conditions affecting the pursuit of the doctoral degree in education. This study was more embracing since all
available individuals who received the Ed.D. or Ph.D. in education between 1956 and 1958 were included in this particular study. The respondents represented 91 institutions which awarded the doctorate in education. Findings revealed information regarding circumstances and events leading up to doctoral study, pursuit of the degree, attitudes toward selected situations encountered during the program, and period of residency and achieving the degree. Six critical factors were identified which underlie conditions affecting pursuit of the doctorate degree in education:

1. Sociological factors of the respondents,
2. Age of the respondents,
3. Length of the doctoral programs,
4. Financial factors and occupational sources of students,
5. Kinds of positions accepted after receipt of the doctorate,
6. Institutional control factors affecting pursuit of the degree.

Clark (1977), working for the Educational Testing Service, surveyed the program review practices of university departments. Her report summarizes the questionnaire responses from 454 university department heads concerning information collected in the most recent self-study or review of their departments. The responses included judgments about the
importance of collecting each information element for:
   1. Internal department use for program planning and improvements,
   2. University use for department monitoring and decisions about resource allocation,
   3. Judgments by external groups such as accrediting agencies or state coordinating boards.

More than 70% of the respondents indicated possible use of the common form to obtain information or opinions from students, faculty or alumni, when undertaking future departmental self-studies.

Clark and Downey (1978) went further in their quest to learn more about graduate studies. Sponsored by the Council of Graduate Schools in the United States, they carried out an overview and history of quality assessment in master's programs. They presented a brief history of the Council of Graduate Schools and Educational Testing Service efforts to assess the quality of graduate programs. Through a National Science Foundation grant, quality characteristics were initially studied within a limited number of doctor's degree programs in chemistry, history, and psychology. Most data were collected through a questionnaire completed by enrolled doctoral students, faculty members who taught graduate students, and recent graduates of the participating doctoral programs. The research developed assessment materi-
als in the following areas: faculty training and performance, student ability and experiences, physical and financial resources available to the program, judgments about the learning environment, judgments about the academic offerings and procedures and accomplishments of recent graduates. The research focused on information that could be collected in standard ways from different programs in different disciplines and with different purposes.

Another investigation was a follow-up study of 308 graduates who received the Ed.D. degree from Colorado State College during the period 1958 to 1963. This was a doctoral dissertation research conducted by Eiken (1965). The recommendations of his appraisal of the doctoral program at Colorado State College were:

1. To provide more financial aid in the form of assistantships, fellowships, and grants.
2. To further develop and extend the research training provided the doctoral students.
3. To make greater provision for more independent work in the candidate's doctoral preparation.
4. To lighten the loads of faculty members assigned to work with doctoral students.
5. To provide more group process work, particularly seminars.
6. To consider preparation for college teaching a primary function of the doctoral program.
Gregg and Sims (1967), writing on the quality of faculties and programs of graduate departments of educational administration, provided some information about five factors commonly deemed to be a reflection of the quality of an educational program; namely, eminence of faculty, availability of support services, size of faculty and range of competencies, and the strength of related departments.

Moore and others (1960) analyzed the nature of selected conditions and requirements of doctoral programs in the field of education in order to identify areas needing improvement, to reveal distinctive practices which showed promise, and to project future doctoral production in the field. Findings, which included general information on 65 Ph.D. and 75 Ed.D. programs in 92 institutions on their recent production of doctoral graduates in education, were concerned with admission requirements, curricula requirements and related conditions of recruitment, finance, housing, and dropouts, and on projected production and anticipated changes. Conclusions were drawn regarding such factors as structured versus flexible programs, overspecialization, expected curricular modification, supply and demand in various areas of subject concentration, age limitation for admission, need for selective recruitment, financial aid, and institutional control on program length.

Further, Reilly (1977), working on factors in graduate
student performance, investigated a set of criteria dimensions upon which graduate faculty can base judgments of student performance in the departments of chemistry, English, and psychology. Eight factors emerged which were fairly consistent across each of the three fields:

1. Independence and initiative,
2. Conscientiousness,
3. Critical facility,
4. Enthusiasm,
5. Research and experimentation,
6. Communication,
7. Teaching skills, and
8. Persistence.

In 1977, features of the various nontraditional doctoral programs in education were discussed at the 51st Annual Meeting of the American Educational Research Association. The results showed that the different programs vary with respect to their philosophy, requirements of the program, administrative structure, instructional methods, and student roles. Three major criteria for evaluating doctoral programs which were presented included:

1. Nature of the doctoral degree itself,
2. Basic approach to curriculum and instruction, and
3. Personal, social and professional outcomes of the program.
Yanch (1960) reported the results of a conference that was attended by 137 representatives of institutions that awarded the doctorate in education. The conferees were invited to: (1) study the findings of a research study, "An inquiry into conditions affecting the pursuit of the doctoral degree in the field of education," and (2) explore the desirability and possibility of drafting some minimal standards which should serve as a guiding pattern for the improvement of all doctoral programs. His summary included the findings and recommendations for tentative areas for standardization. Also included in his editorial comment were each of these subtopics: recruitment of candidates, admission practices, requirements in instructional programs, personal factors affecting completion of the degrees, future expectations and general characteristics of the surveyed institutions and degree recipients.

Previous Graduate Studies in Industrial Education

The efforts to improve American education in the 1950s and 1960s were not limited to science and mathematics. In industrial education, research and development have facilitated changes in the definition of the field, the curriculum base, the educational goals and objectives of industrial arts programs. Moreover, the job of improving educational programs continues and has not been easy.
Streichler (1966), Householder (1969), and Cochran (1970) reported on several research and curriculum development projects that addressed the need for improvement in industrial arts education during the 1960s. Householder (1969) reported:

Dissatisfaction with contemporary industrial arts programs coupled with a great deal of effort in improving content selection and analysis procedures has led to a large number of proposals for new educational programs for industrial arts. Some of these curriculum proposals were the results of funded curriculum projects; other proposals resulted from the efforts of individuals or small groups with little or no funding (p. 11).

The preceding citation supported the emphasis on efforts directed towards the improvement of industrial education programs at all levels.

Koble and Thrower (1966), while maintaining that a search of the research studies reveals that little has been done in the area of research in measurement and evaluation techniques in industrial arts, wrote:

This area of education is so nearly void of conclusive research that it is impossible to identify gaps, simply because there are not gaps but wide open panoramas (p. 38).

John D. Shinkle (1977), writing on a survey of graduate schools, made these concluding remarks:

As a precursor to future research, this survey has identified a critical mass of institutions which provide and are committed to the furtherance of graduate training in vocational education. And even though this survey focussed on the quantitative aspects of graduate study, neither qualitative nor quantitative standards when used alone are adequate or sufficient
for determining institutional capacity. The accumulation of only quantitative data will have limited bearing on the merit (quality) of the programs within a given institution; conversely, the determination of quality will be of little use if not linked to the realizable aims of the institution and the number of students to be served. ...there is no formula or equation which will afford an accurate assessment of the institutional capacity to provide graduate training in vocational education but two of the most important qualitative dimensions which will necessitate more attention in the future are (1) the mission of the vocational education department and (2) the performance characteristics of the departmental staff and the institution (p. 27).

More specific to the qualitative aspects of performance characteristics, it will be necessary to consider several additional factors. For instance, the flow of personnel majoring in areas regarded as vocational education must be measured qualitatively as well as quantitatively. Faculty characteristics in terms of number, rank and status for advising graduate students must be closely examined. It is also essential that the record of the faculty with respect to its professional contributions to the field be evaluated as an indicator of institutional capacity to provide the desired training programs. In addition, it will be desirable to determine the nature of and access to contributory subject matter or disciplines of study which will enhance the professional development experiences of those persons enrolled in vocational education graduate training programs.

McKee (1977) writing an overview of graduate training programs stated:
Unfortunately, graduate programs were expanded too fast with too little planning. Presently, we are having to contend with the problems associated with the results of this action. Early in the 1970's, the Council of Graduate Schools (CGS) became so concerned with this proliferation of programs that it has issued several position statements regarding the Council's perceptions of what constitutes quality graduate education.... Because a number of entrepreneurs have seemingly overstepped professional bounds with respect to the nontraditional programs, there is a definite and growing national concern for quality in graduate education programs (p. 71).

Lindbeck (1972, p. 152) suggested that the primary purpose of the master's program in industrial arts is the development of depth in an area of technical competency. This would enable industrial arts teachers to improve those skills they already possess while expanding their knowledge of new technical information and practices useful in their teaching. The remaining portion of their graduate program would be equally divided between professional studies in industrial arts and education to improve their professional competencies in instructional technology and elective fields outside their major field of specialization to expand their liberal education. Thus, the master's program may be perceived as providing depth in an area of technical specialization and breadth in fields that will enhance personal and professional competencies.

The issue of applying laboratory and technical credit for graduate programs has been a continuing issue in industrial education (Karnes, 1954; Karnes and Lux, 1961). While
it seems reasonable to provide technical studies to improve and expand the technological competencies of industrial educators, graduate faculties have questioned the kind of laboratory experiences that might merit consideration for graduate credit. Some industrial educators have suggested that industrial education should provide breadth in the mastery of technological practice and technical deficiencies should be remedied as part of the graduate program. To allow a graduate student to apply undergraduate technical courses even under the guise of independent study or special problems should not be accepted. Such technical deficiencies should be treated as any other academic prerequisite and should be completed in addition to one's graduate program and not as meeting minimal requirements for the graduate degree.

Buffer (1979) stated that, among others, the issues that demand attention in graduate industrial education include:

1. The purpose of graduate degree programs,
2. Practice oriented programs,
3. Research oriented programs,
4. Program breadth versus specialization,
5. Technical competencies,
6. Research activities, and
7. Alternative and external graduate programs.

Buffer concluded that "only through the continued self-
monitoring and evaluation of graduate programs can the integrity of scholarship in the profession be maintained, improved, and expanded."

Buffer (1979), writing on graduate education in industrial arts, expressed the view that the doctorate with an emphasis in industrial education was rapidly becoming a requirement for faculties of industrial arts teachers. In the Tenth Yearbook of the American Council of Industrial Arts Teacher Education (ACIATE) entitled, "Graduate Studies in Industrial Arts," Karnes and Lux (1961) suggested that the doctorate was necessary for those who planned to conduct research and whose major responsibilities were in connection with the professional aspects of industrial arts education. Those persons who primarily teach technical courses in teacher education departments may not feel compelled to pursue graduate study through the doctorate since studies included in doctoral programs may not contribute to the development of the required technical competencies. However, instructors of laboratory courses should be encouraged to seek training and be rewarded for obtaining additional competencies in their area of technical specialization. The Ed.D. and the Ph.D. are the two most prominent doctoral degrees in industrial education awarded by American universities. The Ed.D. with a specialization in industrial education is currently available from 35 universities, the Ph.D.
from 27 universities, while 13 universities offer both doctoral degrees (Dennis, 1977). No institutions have awarded a doctorate of any other title, although the Graduate Studies Committee (1974) of the ACIATE reported the existence of two Doctor of Arts (D.A.) programs with some three more being planned for 1972-1976 period (Wright, 1977). A Doctor of Industrial Technology (D.I.T.) is now available at the University of Northern Iowa.

Buffer (1979) wrote:

Patterns of doctoral programs in industrial education are varied. Most do not allow or provide minimal opportunities to earn graduate credit in technical areas of specialization. A majority of the course work is in professional areas of curriculum, philosophy, history, administration and supervision, research methodology and statistics; related education areas; and non-related education areas outside the college of education (Harris and Tomlinson, 1974; Miller and Ginther, 1954). Some doctoral programs are highly prescriptive and do not allow much latitude for the selection of major or minor areas of concentration whereas other programs are individually designed by the candidates in cooperation with their advisor and graduate students committee (p. 229).

Kaufman (1976) conducted a national assessment of factors that contribute to job satisfaction of the industrial arts educators. The one personal factor that correlated positively with perceived satisfaction was the earned doctorate. Kaufman reported that only 37% of the assistant professors indicated they held the doctorate, whereas 56% of the associate professors and 74% of the full professors possessed the terminal degree. Although 63% of the assistant
professors did not possess the doctorate, over half of them (54%) had been granted tenure. The doctorate has not been required for employment of the industrial arts educator since approximately 48% of those with assistant professorial rank lack this terminal degree.

An examination of the most recent announcements of industrial arts faculty vacancies received by the Ohio State University from June 1977 to May 1978 illustrated that 123 (74%) of the total 166 positions require or prefer that the applicant have a doctorate (Buffer, 1979). However, it is apparent that the doctorate is becoming the education criterion for employment for those whose primary responsibility will be teaching laboratories as well as professional courses. Wright (1977) reported that 229 doctorates in industrial education were conferred in 1973-1974, a growth of 301% over an eight-year period. Several new doctoral programs have contributed to this increase. For instance, of the 49 institutions now awarding the doctorate in industrial education (Dennis, 1977), 17 or 35% awarded their first doctorate within the past 10 years.

Buffer (1979) writing on graduate education in industrial education stated:

The collection and analysis of information identified a number of issues and concerns that are related to quality graduate programs. For example, the multitude of graduate degree designates, differences in entrance and exit criteria, increase in degree productivity, especially among less established institutions, changes
in degree attainment required for employment as teacher educators and the evolvement of new graduate degree programs suggest that the profession does not have full agreement regarding the nature of quality graduate education. The ACIATE has addressed these questions and has published a yearbook, Graduate Study in Industrial Arts (Norman and Bohn, 1961) and two monographs, An Analysis of Graduate Work in Institutions with Programs in Industrial Arts Educational Personnel (Miller and Ginther, 1965) and Graduate Programs in Industrial Education (Graduate Studies Committee, 1974). Scholarly issues and problems regarding graduate studies in industrial education have been described in these publications (p. 219-320).

Today, the availability of quality professional programs has become more crucial as the professions have become more demanding, mirroring the increasing complexity of socio-cultural conditions. A review of the dissertation titles and abstracts suggests no differences in research topics (Jeldon, 1977) pursued in fulfillment of the demonstrated research requirement for either the Ph.D. or the Ed.D. in education. The majority of the doctoral programs in industrial education lead to an Ed.D. However, there appears to be a trend which suggests that the Ph.D. is becoming the more popular designation. In 1966-1967, 62 (81.5%) of the doctorates awarded were Ed.D.; however, 105 Ed.D. degrees were granted in 1976-1977, representing 51.5% of the doctorates and a loss of 30% in the number of persons electing the Ed.D.

Buffer (1979) stated that the advisor-advisee relationship, next to the descriptive character of the institution, is probably the most significant factor influencing the quality of graduate education. Spurr (1970) suggests that educa-
tion is a valid field of study in its own right and one of the most important professions in the country. Graduate faculties must ensure that the Ed.D. maintains its standards of excellence and accepts only quality dissertations based on an evaluation or assessment of educational practice, theory building, utilization of research data and comparative studies.

Programs projected as interdisciplinary have been promulgated and advertised as timely and innovative. Elberg (1977) suggested that these interdepartmental programs are merely representative of the broad base graduate programs that were taken for granted in the past. Graduate study and research, especially at the doctoral level in the social sciences in which education is an integral part, has been criticized as being,

...too detailed and trivial in scope, in purpose, in the type of mental discipline required; (placing) too much emphasis on facts and too little on ideas and concepts; (being) uninspiring in subject matter; and (being) unworthy of the research required for the highest academic degree (Carmichael, 1961, p. 24).

Carmichael (1961) also finds faults with the educational system and, more specifically, with leaders in graduate education for encouraging the narrow specialization on essentially trivial subjects rather than directing scholarly efforts towards basic ideas, general concepts, and issues relevant to our changing world.

A study was conducted to identify research and develop-
ment activities and interests of industrial arts professors (Buffer and Campbell, 1976). A questionnaire mailed to each current member of ACIATE asked recipients to report research activities initiated or concluded within the last five years, 1969-1975. The instrument was sent to 1,020 educators; 543 (53%) were returned. An analysis of the data indicated that the number of persons involved in research and development activities was 226, the number not involved was 295, representing 43% and 47%, respectively. Crucial research and development topics regarding industrial arts teacher educators as perceived by industrial arts educators included the following:

1. K-12 curriculum development,
2. Teacher preparation including accountability, certification, and competency based instruction,
3. Career education,
4. Instructional strategies,
5. Philosophy of industrial arts, and
6. Relationship of industrial arts and vocational education.

Bargar, Okorodudu and Dworkin (1970) studied graduate education programs and the research productivity of their doctoral recipients. It was found that those who were involved in nonthesis research activities with their advisors and or other faculty tended to conduct post-
doctoral research. Also, those graduate students who assumed major responsibilities in research activities were more productive than those who had minored in projects.

Buffer (1979) conducted a study of the external doctorate in education to (a) analyze common program requirements of the major external institutions in the United States and (b) determine the acceptability of the programs by administrative personnel in industrial arts. Entrance and exit requirements appear to have been designed for full-time educators whose educational pursuits demand continued employment. However, three of the five programs reviewed did not require administrative or teaching experience or certification. A master's degree from an accredited or "approved" institution was required by most of the institutions for admission to their doctoral program; however, two of the institutions also provided an external master's degree. None of the institutions listed a minimal grade point average nor were standardized test scores or personal interviews required.

Chairpersons and college deans of industrial arts were surveyed to obtain information relative to the acceptability of the external doctorate as a criterion for initial employment, promotion within ranks, tenure and approval to advise graduate students (Buffer, 1979). A majority of the respondents felt that the external degrees were generally not acceptable. However, a few suggested that the earned doctorate
was only one factor to be considered, especially as it relates to tenure and promotion.

Wolansky and Resnick (1979), in a review of doctoral programs in industrial education, observed that despite the longevity of the program or the degree offered (Ed.D. or Ph.D.), the pattern of the doctoral study is quite consistent across institutions. Students may well be advised, therefore, to choose an institution on the basis of particular strengths of the program, particular research orientation or particular faculty with which the student would prefer to study. Based on their assessment and the consistency of the pattern of doctoral study, the authors recommend that further studies in this area focus on the qualitative distinctions among programs so that the best practices may be adopted for the further development of the profession.

Summary

Related literature showed a growing public awareness of the importance of graduate education. Since the success of a nation's educational system lies in the hands of the professional educators who have earned their doctorate in education, the quality standards of these professional educators must be maintained. Related literature also showed that there has been a great deal of concern, both internal and external, about the quality of graduate education in America. Those
who are involved with graduate training in industrial education need to be on the leading edge in terms of assessing the level of quality which exists in their programs and then taking the necessary action to raise the level of quality in those areas of the programs where deficiencies occur.

The review of literature revealed that due to the rapid expansion of graduate study during the 1960s, the stage was set for most of the problems which we had been trying to cope with since the 1970s. Graduate programs were expanded too rapidly with too little planning. As a result, we had to contend with the problems associated with the unfortunate results of this action.

Early in the 1970s, the Council of Graduate Schools (CGS) became concerned with this proliferation of programs, and since then the CGS has issued several position statements regarding the Council's perceptions of what constituted quality graduate education. The Council of Graduate Schools, in its concern for graduate study, has pursued a very active role with various accrediting bodies--in particular, the new Council on Post Secondary Accreditation. Recently, this Council on Post Secondary Accreditation made an outstanding recommendation to all regional accrediting bodies and to which the CGS subscribes enthusiastically.

However, the trend now appears that some entrepreneurs have overstepped professional bounds with respect
to nontraditional programs. This behavior has generated a
definite and growing national concern for quality in gradu­
ate education programs. The matter of a present oversupply
of doctoral graduates in some fields is also a trend and
concern of great consequence.

Answers to some pertinent questions should be forthcom­
ing. Should there be an artificial limit established to in­
hbit enrollment in certain programs simply because there
are not enough jobs available or should the students be
allowed to use their initiative and scholarly ambitions to
enroll in a given program knowing that the job market is
tight? The CGS position in this instance was that we need to
continually develop the best information possible regarding
the existing state of the job market so that the students
can be aware of the conditions before they enroll in a pro­
gram. Another issue which is receiving national attention
involves the matter of increasing opportunities for graduate
studies for members of minority groups, women and the handi­
capped persons. The CGS is working with groups to find ways
and means of effectively increasing the opportunities for
these populations.

Relevant literature on the doctorate in industrial edu­
cation is sparse, but most of the available literature holds
similar views that these issues need urgent attention:

1. Quality indicators and characteristics to assess
graduate programs,
2. Graduate program breadth versus specialization,
3. Technical competencies,
4. Research activities, and
5. External graduate programs.

Since professional graduate programs are the means to higher ends, initial attention should be focused on the end product—the desired characteristics to be manifested in graduates and the standards of judgment to be used. Since education is concerned with complex human beings, all of the characteristics cannot be identified and all of the dimensions of quality cannot be quantified.

Although end product specification can provide a set of criteria on which to partially base qualitative judgments, the current state of the art precludes exclusive reliance upon such specification. Therefore, it is still necessary to depend, in part, on the determination of quality in terms of the graduate education process. Still, it is essential to realize that a focus on process is at best a proxy for attending to outcomes. With the internal and external pressures on the American educational institutions, it has become pertinent that quality indicators of excellence be identified for use in the assessment of doctoral programs in both industrial education and other sections of professional education.
CHAPTER III. METHODOLOGY

Introduction

This chapter presents the procedures adopted for the study. The procedures have been divided into the following sections:

1. Population and sample
2. Questions to be answered
3. Instruments for collecting data
4. Analysis of data.

Definition of Population and Identification of Sample

The population for the study was composed of industrial education faculty who advise or teach doctoral students, current industrial education doctoral students and recent doctoral alumni of industrial education departments in 20 different states and institutions in the United States. Only institutions that offer doctoral programs in industrial education were considered. Members of the faculty who do not teach or advise doctoral students were not surveyed.

Within this population, the sample was made up of the following:

1. All industrial education professors who advise or administer doctoral students in the 20 selected institutions,
2. Three current doctoral students in each of the selected institutions,
3. Two or three recent doctoral alumni of the selected institutions.

A list of the eligible people was obtained from each of the participating institutions. The researcher sought advice on appropriate population and sample from his advisory committee members and other professors at Iowa State University. Three groups of subjects eventually emerged for the study:

Group 1. Graduate faculty (administrators, advisors, or coordinators of graduate programs).
Group 2. Students (current doctoral students)
Group 3. Alumni (recent doctoral graduates of the institutions selected).

Questions To Be Answered

1. To what degree is there a consensus on what constitutes quality indicators in the assessment of doctoral programs in industrial education?
2. What consistency exists among the three principal groups regarding quality indicators and specific characteristics subsumed under these indicators?
Development of the Instrument

A questionnaire was used for this study because of the wide geographic distribution of the subjects. The ideas of some authors and researchers (as cited by Buffer, 1979) as well as the suggestions of some professors within the colleges of education and science and humanities, Iowa State University, were utilized in developing the questionnaire. Of particular importance in this exercise (questionnaire development) were the ideas obtained from members of the advisory committee, graduate students of education, Iowa State University graduate faculty, and the Council of Graduate Schools' (CGS) self-assessment service kits.

The developed questionnaire was structured in six sections. The first section sought information about the quality indicators of the graduate faculty, the second section sought information regarding quality of the students, the third and fourth sections sought information regarding quality of instruction and the quality of the administrators, respectively. The fifth and sixth sections sought information about curriculum and quality resources, respectively. There was a total of 98 variables that were rated by all the respondents. The cut-off point for the acceptable quality indicators as shown on the scale was the 50th percentile or the "0" of the normal scale. However, our analysis later showed that the acceptable quality indicators had their lowest point at the 62nd percentile (.31 on the normal scale).
Pilot Testing of the Instrument

The first draft of the questionnaire was reviewed by industrial education faculty and members of the advisory committee. On the basis of their suggestions and comments, necessary revisions were made.

The questionnaire was distributed to the current doctoral students in the Department of Industrial Education, Iowa State University, to respond to and to make necessary comments that could help in further revision of the instrument. Four professors within the College of Education were also requested to read and make comments on the questionnaire. A preponderance of inappropriate responses to some items on the questionnaire was received from the graduate students. The items were examined for ambiguity and improper wording. Inadequate instructions became apparent by the responses to some of the items, while other areas of the questionnaire were found to be poorly worded. The necessary changes of rewording and changing instructions were carried out.

Collection of Data

The questionnaire was mailed to each subject in April 1980, together with a cover letter and a self-addressed stamped envelope for returning the completed questionnaire. At the end of three weeks, some 71 responses had been returned. An allowance of one additional week was provided
before a follow-up to the nonrespondents was undertaken. At the end of the fourth week, six (6) more responses were obtained. After four weeks, a follow-up letter was sent to the subjects who had not returned the questionnaire. The letter requested the subjects to complete and return the questionnaire as early as possible. In case the first copy of the questionnaire was lost or not received, a second copy accompanied the follow-up letter. As a result of this follow-up, 22 additional responses were received. A total of 99 responses was received from the first and second mailings. These responses were from the 16 institutions that responded. Four of the 20 institutions did not respond. The 99 responses represented a total of 80 percent return.

Analysis of Data

The data obtained from the returned questionnaire were coded on IBM forms in preparation for keypunching and to facilitate analysis using the computer. During the coding, it was discovered that 7 returned questionnaires did not contain enough information so they were discarded. This left a total of 92 questionnaires which contained responses from 16 institutions to be analyzed.

The analysis design, put in statistical form, was:

For each item,

\[ Y_{ijk} = \mu + \alpha_i + \beta + (\alpha\beta)_{ij} + e_{ijk} \]
For each item or question, an ANOVA was computed, involving two factors: institution and type of respondent (hereinafter referred to as groups). These ANOVAs were meant to recognize these sources of variability: institution, group, institution by group interaction, and the variability of the respondents within an institution and a group.

Consensus would be defined as no significant differences in the main effects or interaction. Lack of consensus would be the result of institution differences, group differences, the interaction or any combination of these sources.

The questions were classified into groups on the basis of these ANOVAs. There would be eight possible outcomes varying from no significant effects to all three significant effects. These groups of items would be reexamined according to the item content and according to the classification which might be gleaned from examining the data content of the groups formed from the ANOVAs.

The results of the analysis of variance were resubmitted to a committee of Industrial Education experts for their
final review and recommendations. Only the indicator variables which obtained the unanimous acceptance of the committee of experts were considered as the ultimate quality indicators of excellence. For the composition of the members of the committee of experts in Industrial Education see Appendix 3.
CHAPTER IV. FINDINGS

The purpose of this chapter is to present a brief analysis and interpretation of the data. This study focused on the problem of identifying and analyzing a list of quality indicators for use in the assessment of doctoral programs in the field of industrial education.

Questions of the Study

The analysis with interpretation was to answer the questions of the study as stated in Chapter I.

1. To what degree is there a consensus on what constitute quality indicators in the assessment of doctoral programs in industrial education?

2. What consistency exists among the three principal groups regarding quality indicators and specific characteristics subsumed under these indicators?

Analysis of data was performed by coding on IBM forms the raw data from each respondent. These data were then keypunched.

For each question, an ANOVA was computed involving two factors: institution and the type of respondent (population). These ANOVAs recognized four sources of variability: institution, population, institution by population interaction, and a variability of the respondents within an institution and a population. The mean responses to the questions also
revealed the differences in the rating of the various schools and yielded results of agreement and disagreement (consensus and lack of consensus) within and between institutions, within and between the subgroups within the population. The findings resulting from the analysis were treated under these headings:

1. Areas of consensus (no significant differences)
2. Areas of school or institution differences
3. Areas of group differences
4. Areas of institution (school) and population (group) interaction effects
5. Committee of experts review and recommendations.

Areas of Consensus

There was agreement on 60 variables (indicators) among the participants. This meant that all the schools and all the groups shared similar views on these 60 indicators. However, consensus on these indicators would not be interpreted to mean that they were all indicators of high quality. The variables with very high ratings tended to suggest they were indicators of very high quality while the variables with moderate ratings suggested indicators of moderate quality, and variables of low consensus ratings suggested low indicators.

The following were the indicators of no significant
differences (consensus) with their ratings, means, and standard deviations included.

**Variables of consensus (no significant differences)**

<table>
<thead>
<tr>
<th>Overall mean</th>
<th>Std. dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of students</td>
<td></td>
</tr>
<tr>
<td>1. Doctoral students must maintain a high graduate GPA, above a 3.0 on a 4.0 scale</td>
<td>1.67</td>
</tr>
<tr>
<td>2. Graduate students are given provision for flexibility to meet individual needs</td>
<td>1.67</td>
</tr>
<tr>
<td>3. Doctoral students should have some minimum teaching experience</td>
<td>1.66</td>
</tr>
<tr>
<td>4. Graduate students are given opportunity for independent study or problems.</td>
<td>1.62</td>
</tr>
<tr>
<td>5. Doctoral students are required to complete a minimum total hours of credit in research, in major, and in minor</td>
<td>1.61</td>
</tr>
<tr>
<td>6. Recruiting of doctoral students is based on the most qualified applicants</td>
<td>1.46</td>
</tr>
<tr>
<td>7. Doctoral students express satisfaction with the research component of their programs</td>
<td>1.29</td>
</tr>
<tr>
<td>8. Doctoral students express satisfaction with their courses in their major</td>
<td>1.16</td>
</tr>
<tr>
<td>9. Doctoral students have opportunity to minor in other fields</td>
<td>1.04</td>
</tr>
<tr>
<td>10. Doctoral students must have favorable letters of recommendation before admission</td>
<td>.94</td>
</tr>
<tr>
<td>11. Doctoral students express satisfaction with their course work in their cognate</td>
<td>.82</td>
</tr>
<tr>
<td>12. Graduate students are required to demonstrate high performance at the qualifying institutional examination before admission</td>
<td>.48</td>
</tr>
</tbody>
</table>
13. Doctoral students are involved in publication before and after graduation  & .41 & .90

14. Low attrition or high percent of entering students complete the degree  & .41 & .88

15. Doctoral students receive professional honors and recognition as evidence of accomplishments  & .31 & .78

**Quality of faculty**

1. Academic training of graduate faculty should include an earned doctorate  & 1.63 & .57

2. Graduate faculty encourage graduate students to attend national and local conventions  & 1.49 & .41

3. Availability of quality support staff  & 1.07 & .84

4. Graduate student's committee must include persons from other departments  & 1.03 & .89

5. Faculty members must meet graduate faculty status to teach doctoral students  & .99 & 1.00

6. Persons chairing graduate student committees must demonstrate published research skills  & .96 & .99

7. Student-faculty ratio is maintained in faculty advising  & .89 & .72

8. Graduate faculty contribute articles to refereed publications  & .82 & .69

9. Graduate faculty participate in reviewing panels and editorial boards  & .67 & .73

10. Graduate faculty are involved in leadership activities at the national and international level  & .58 & .83

11. Graduate faculty are involved in leadership activities on the campus  & .53 & .76

12. Only "full graduate faculty" professors may advise doctoral students  & .52 & .99
13. Graduate faculty are involved in leadership activities at the state level .49 .70

14. Graduate faculty teaching is limited to graduate school .42 .75

15. Graduate faculty are involved in non-refereed publications .38 .87

**Quality of administrators**

1. Administrators provide clear and consistent written policies for faculty and student concerns 1.62 .44

2. Administrators are rated highly as knowledgeable by faculty 1.60 .42

3. Administrators are evaluated by faculty and peers periodically 1.45 .44

4. Administrators have frequent contact with graduate students 1.09 .82

5. Administrators possess experience in teaching at graduate level, research and service 1.03 .89

6. Administrators are involved in professional activities (state or national associations) 1.00 .81

7. Administrators attain the rank of full professors .76 1.04

**Quality of curriculum and instructions**

1. Clearly established standards of performance are made known to students 1.57 .43

2. The curriculum is tailored to the educational objectives of the graduate student 1.56 .44

3. There is a provision for variety and depth of course offerings 1.53 .44

4. The extent to which course offerings and content reflect clearly stated objectives of the program is shown 1.47 .52
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Students evaluation of instructors are processes to maintain quality instruction</td>
<td>1.40</td>
</tr>
<tr>
<td>6.</td>
<td>Adequate instructional space is provided</td>
<td>1.17</td>
</tr>
<tr>
<td>7.</td>
<td>Admission and retention standards are related to program objectives</td>
<td>.97</td>
</tr>
<tr>
<td>8.</td>
<td>Evaluation of courses and overall program is done by current students</td>
<td>.92</td>
</tr>
<tr>
<td></td>
<td><strong>Quality of facilities</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Quality library facilities are available</td>
<td>1.77</td>
</tr>
<tr>
<td>2.</td>
<td>Availability of funding for graduate assistantships</td>
<td>1.76</td>
</tr>
<tr>
<td>3.</td>
<td>Availability of quality of equipment for research and teaching</td>
<td>1.60</td>
</tr>
<tr>
<td>4.</td>
<td>Adequate budget allocation based upon inflation rates and program growth is provided</td>
<td>1.47</td>
</tr>
<tr>
<td>5.</td>
<td>Adequacy of computing facilities</td>
<td>1.19</td>
</tr>
<tr>
<td>6.</td>
<td>Quality laboratory equipment and facilities are available</td>
<td>1.05</td>
</tr>
<tr>
<td>7.</td>
<td>Adequate budgeting for faculty and student research grants</td>
<td>1.05</td>
</tr>
<tr>
<td>8.</td>
<td>Quality of research funding</td>
<td>1.02</td>
</tr>
<tr>
<td>9.</td>
<td>Availability of research consultants</td>
<td>1.01</td>
</tr>
<tr>
<td>10.</td>
<td>Adequate budget for instructional equipment</td>
<td>.95</td>
</tr>
<tr>
<td>11.</td>
<td>Available budget for student recruitment</td>
<td>.72</td>
</tr>
<tr>
<td>12.</td>
<td>Availability of counseling and guidance services</td>
<td>.57</td>
</tr>
<tr>
<td>13.</td>
<td>Availability of students' records to faculty</td>
<td>.52</td>
</tr>
</tbody>
</table>
Two variables needed special attention and these were the variables that earned very low and negative ratings:

"Opportunity is provided for intellectual and social interaction" had a rating of $\bar{X} = .01$ and $S = .93$.

"Recruitment of doctoral students is based on quota from minority and nonminority" had ratings of $\bar{X} = -.38$ and $S = 1.00$.

The ratings of these two variables indicated that they were not quality indicators at all.

Areas of School Differences

The institutions differed significantly at .01 level on 12 variables. There also were significant differences at .05 among the institutions on five additional variables. These variables were as follows:

**School differences at .01 level**

1. A distinction is made between "graduate faculty" and general faculty
2. Graduate faculty are involved in presenting papers and research findings
3. Graduate faculty are involved in providing consultancy services
4. Release time is provided graduate faculty for research
5. Doctoral students are involved in paper presentations
6. Doctoral students gain academic awards because of their scholarly achievements
7. Appropriate teaching methods and evaluation procedures are employed and monitored by administrators
8. Students progress through the program is based on imposed time limitation
9. Balance of outside work in addition to class work—term papers, readings etc.
10. Administrators are regarded highly by the faculty
11. Balance of foreign students attracted by the program
12. Availability of adequate financial aid

**School differences at .05 level**

1. Graduate students must have had a high undergraduate GPA (second quartile or better)
2. Doctoral students participate in independent research
3. Doctoral students hold important institutional offices as evidence of accomplishments
4. Availability of health care services
5. Adequate budget for student support services

Since the schools were unidentified, these variables (indicators) could not be interpreted. Table 1 shows the schools numbered 1 through 16, the variables, the ratings and the levels of significant differences. Seven variables needed special attention as not all schools distinguish between "general faculty" and "graduate faculty" or such a
Table 1. Variables and their ratings according to school

<table>
<thead>
<tr>
<th>Indicator variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School differences at .01 level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student progress through the program is based on imposed time limitations</td>
<td>-</td>
<td>.95</td>
<td>.57</td>
<td>.81</td>
</tr>
<tr>
<td>Balance of foreign students attracted by the program</td>
<td>-.99</td>
<td>.15</td>
<td>.70</td>
<td>.35</td>
</tr>
<tr>
<td>Administrators are regarded highly by the faculty</td>
<td>1.75</td>
<td>1.35</td>
<td>1.42</td>
<td>1.58</td>
</tr>
<tr>
<td>Balance of outside work in addition to class work (term papers, readings, etc.)</td>
<td>1.37</td>
<td>.45</td>
<td>1.04</td>
<td>.63</td>
</tr>
<tr>
<td>Appropriate teaching methods and evaluation procedures are employed by administrators</td>
<td>1.51</td>
<td>1.39</td>
<td>1.22</td>
<td>1.00</td>
</tr>
<tr>
<td>Doctoral students are involved in paper presentations</td>
<td>-.05</td>
<td>.25</td>
<td>.44</td>
<td>.76</td>
</tr>
<tr>
<td>Doctoral students gain academic award because of their scholarly achievements</td>
<td>-.31</td>
<td>.13</td>
<td>.28</td>
<td>.24</td>
</tr>
<tr>
<td>Graduate faculty is involved in providing consulting services</td>
<td>-.15</td>
<td>.09</td>
<td>.19</td>
<td>.49</td>
</tr>
<tr>
<td>Graduate faculty is involved in presenting papers and research findings</td>
<td>.49</td>
<td>.91</td>
<td>.61</td>
<td>1.32</td>
</tr>
<tr>
<td>Release time is provided graduate faculty for research</td>
<td>.14</td>
<td>.73</td>
<td>.36</td>
<td>.52</td>
</tr>
<tr>
<td>A distinction is made between &quot;graduate faculty&quot; and general faculty</td>
<td>-.80</td>
<td>.05</td>
<td>.14</td>
<td>.81</td>
</tr>
<tr>
<td>Adequate student financial aid is available</td>
<td>.92</td>
<td>.66</td>
<td>.94</td>
<td>.95</td>
</tr>
</tbody>
</table>

| **School differences at .05 level**                                                |    |    |    |    |
| Doctoral students hold important institutional offices as evidence of accomplishments| -.43| -.06| -.09| .02|
| Doctoral students participate in independent research                               | .88| .70| .80| 1.09|
| Graduate students must have had a high undergraduate GPA (2nd quartile or better)   | .16| .36| .82| .20|
| Health care services are available                                                  | .21| .25| .09| .94|
| Adequate budget for student support services is secured                              | .38| .69| 1.10| .63|

^Figures show the mean ratings for each school.
## School number

<table>
<thead>
<tr>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
</table>

### School differences at .01 level

- .09  .24  .96  .04  .43  .41  .27  .57  .28  .14  -.43  -.15  
- .33  1.11  .89  -.19  -.25  -.22  -.61  1.03  -.34  -.26  -.23  -.62  
1.60  1.29  1.35  1.72  1.71  1.54  2.07  1.98  1.21  2.33  1.75  1.18  
1.53  .84  1.43  1.19  1.78  .67  .63  .71  .63  1.03  1.48  .17  
.64  .38  1.52  1.35  1.57  1.28  1.54  1.37  1.63  1.28  1.56  1.28  
.38  .18  1.81  .83  .22  .67  .76  .46  .46  .35  -.17  .34  
.85  .44  .53  .25  .89  .10  .08  .26  -.85  -.85  -.23  .43  
.67  .19  1.27  1.25  .32  .47  .26  .20  -.32  -.43  -.34  .34  
.89  .72  1.72  1.31  .65  .91  1.63  .74  .53  .54  .28  .36  
.92  .18  1.16  1.10  .49  .83  1.79  1.13  -.26  .60  .74  .94  
.15  .52  1.02  .87  .55  .82  1.16  .71  .28  -.34  .04  .48  
1.60  .28  1.39  1.03  1.73  .45  .58  .14  .36  .86  1.32  1.34  

### School differences at .05 level

.07  .07  .79  -.19  .24  .16  -.18  .60  -.71  -.85  -.69  .28  
1.23  .92  1.89  1.30  1.19  .49  .34  1.48  .51  2.33  .88  .63  
.69  .92  1.61  .34  .50  .54  1.00  1.63  .78  1.17  .74  -.15  
1.14  .37  1.01  .96  1.40  .85  -.39  .45  -.25  1.20  .62  .60  
.84  .42  .84  .91  1.65  1.07  -.19  .93  -.34  1.20  1.03  .69  

---
distinction may be made but not perceived by the students. These variables included:

1. Administrators are regarded highly by faculty
2. Appropriate teaching methods and evaluation procedures are employed and monitored by administrators
3. Release time is provided graduate faculty for research
4. Doctoral students participate in independent research
5. Availability of health services is maintained
6. Adequate budget for student support services is secured
7. Availability of student financial aid

Areas of Group Differences

The analysis revealed 10 variables that were significantly different among the three groups (faculty, students, alumni) at .01 and .05 levels. Table 2 shows the variables (indicators) as rated by the three groups. Here also, the differences might reflect merely the perspectives of the three different groups rather than any disagreement on the relative importance of the indicators. Since the faculty and the alumni might be more informed and involved, the variations in the ratings could be due to the fact that the students were less informed and less concerned with these variables.

1. Graduate faculty are involved in promoting high morale and team work among staff and students
2. Administrators facilitate the award of assistantships to the highest qualified applicants
### Table 2. Variables with significant differences

<table>
<thead>
<tr>
<th>Indicator variables</th>
<th>Faculty</th>
<th>Students</th>
<th>Alumni</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Distinction is made among graduate faculty members such as &quot;associate&quot; or &quot;full graduate faculty&quot;</td>
<td>.42</td>
<td>-.17</td>
<td>-.03</td>
</tr>
<tr>
<td>2. Graduate faculty are involved in promoting high morale and teamwork among staff and students</td>
<td>1.60</td>
<td>1.32</td>
<td>1.61</td>
</tr>
<tr>
<td>3. Doctoral students receive inter-institutional awards</td>
<td>-.20</td>
<td>.18</td>
<td>-.27</td>
</tr>
<tr>
<td>4. Administrators facilitate the award of assistantships to the highest qualified applicants</td>
<td>1.37</td>
<td>.81</td>
<td>1.32</td>
</tr>
<tr>
<td>5. Administrators provide the necessary organizational structure to facilitate program leadership and decision making capabilities</td>
<td>1.67</td>
<td>1.40</td>
<td>1.70</td>
</tr>
<tr>
<td>6. Administrators promote research applications to secure funding for support of graduate study</td>
<td>1.32</td>
<td>1.04</td>
<td>1.59</td>
</tr>
<tr>
<td>7. Availability of supervised internship and or practicum</td>
<td>.92</td>
<td>.66</td>
<td>1.31</td>
</tr>
</tbody>
</table>

**Group differences, .01 level**

1. Graduate faculties are members and/or hold offices in professional organizations .80 1.02 .32
2. Administrators of doctoral programs possess recognized scholarship and leadership abilities 1.40 .90 1.40
3. Administrators provide clear and consistent written policies for faculty and student concerns 1.60 1.53 1.81
3. Administrators provide the necessary organizational structure to secure funding for support of graduate study

4. Availability of supervised internship and or practicum is ensured

5. Administrators of doctoral programs possess recognized scholarship and leadership abilities

6. Administrators provide clear and consistent written policies for faculty and student concerns

Areas of Significant Differences Both Among Schools and Among Groups

The schools and the groups differed significantly at .01 level on these variables:

1. Graduate students score highly on the GRE examination

2. Administrators have attained full graduate faculty status

Since there was disagreement among the schools and among the groups, lack of consensus was clearly manifested in the two variables.

Areas of Interaction Effects

The analysis revealed significant interaction effects at .01 level involving the following variables:

1. Graduate faculty are involved in social interaction with the graduate students

2. Graduate faculty do participate in graduate students' club
3. Graduate students' satisfaction with the program (course work) is secured

4. Placement services are available

Table 3 shows the interaction effects as manifested by the schools' and groups' means while Figures 1, 2, 3, and 4 show the graphs of the interaction. The interaction was such that whichever group was highest or lowest depended on the specific schools. In many instances, the alumni made the highest and the lowest ratings for the variables in different schools. Since these four variables secured significant interaction effects, they probably constituted poor quality indicators.

Committee of Experts Review and Recommendation

The Industrial Education Committee of Experts reviewed and refined the findings of the analysis of variance. They unanimously expressed acceptance of 49 quality variables as the quality indicators of excellence for use in the assessment of doctoral programs in industrial education. The committee based its reactions on the available statistical data and its graduate education experience. The following were the final acceptable quality indicators of excellence:

Quality of faculty

1. Academic training of graduate faculty should include an earned doctorate
Table 3. Schools by groups interaction

<table>
<thead>
<tr>
<th>School</th>
<th>Group 1</th>
<th></th>
<th></th>
<th></th>
<th>Group 2</th>
<th></th>
<th></th>
<th></th>
<th>Group 3</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
<td></td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
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<td>.99</td>
<td>.71</td>
<td>1.98</td>
<td>.47</td>
<td>.34</td>
<td>.87</td>
<td>-1.13</td>
<td>1.50</td>
<td>-1.28</td>
<td>1.58</td>
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<tr>
<td>2</td>
<td>.33</td>
<td>-.03</td>
<td>.48</td>
<td>.20</td>
<td>-.63</td>
<td>-.04</td>
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<td>.84</td>
<td>.28</td>
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<tr>
<td>3</td>
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<td>1.75</td>
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<td>-1.28</td>
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<td>-1.28</td>
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<td>1.28</td>
<td>-.38</td>
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<td>1.23</td>
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<td>.85</td>
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<td>1.13</td>
<td>1.03</td>
<td>-.08</td>
<td>-.51</td>
<td>.63</td>
<td>.13</td>
<td>.60</td>
<td>-.38</td>
<td>1.58</td>
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<td>1.54</td>
<td>1.80</td>
<td>1.68</td>
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<td>.75</td>
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<td>.52</td>
<td>-.00</td>
<td>-.00</td>
<td>.84</td>
<td>.25</td>
</tr>
</tbody>
</table>

\*I refers to Figure 1, II refers to Figure 2, III refers to Figure 3 and IV refers to Figure 4.
Figure 1. Schools by groups interaction effects: Graduate faculty are involved in social interaction with graduate students (F = faculty, S = students, A = alumni)
Figure 2. Schools by groups interaction effects: Graduate faculty do participate in graduate students' club (F = faculty, S = students, A = alumni)
Figure 3. Schools by groups interaction effects: Students satisfaction with the program is secured (F = faculty, S = students, A = alumni)
Figure 4. Schools by groups interaction: Placement services are provided
(F = faculty, S = students, A = alumni)
2. Graduate faculty participate in reviewing panels and editorial boards.

3. Graduate faculty contribute articles to refereed publications.

4. Student-faculty ratio is maintained in faculty advising.

5. Persons chairing graduate student committees must demonstrate published research skills.

6. Availability of quality support staff.

7. Graduate student committee must include persons from other departments.

8. Graduate faculty are involved in leadership activities at the national and international level.

9. Graduate faculty encourage graduate students to attend national and local conventions.

10. A distinction is made between graduate faculty and general faculty.

11. Graduate faculty are involved in presenting papers and research findings.

12. Release time is provided graduate faculty for research.

13. Graduate faculty are involved in promoting high morale and team work among staff and students.

Quality of students

1. Doctoral students must maintain a high graduate GPA, above a 3.0 on a 4.0 scale.

2. Recruiting of doctoral students is based on the most qualified applicants.

3. Doctoral students are required to complete a minimum total hours of credit in research, in major, and in minor.

4. Doctoral students have opportunity to minor in other fields.
5. Doctoral students express satisfaction with their courses in their major.

6. Doctoral students express satisfaction with the research component of their programs.

7. Doctoral students are given provision for flexibility to meet individual needs.

8. Doctoral students are given opportunity for independent study or problems.

9. Doctoral students are involved in paper presentations.

10. Graduate students must have had a high undergraduate GPA.

11. Doctoral students participate in independent research.

Quality of Administrators

1. Administrators are rated highly as knowledgeable by faculty.

2. Administrators are evaluated by faculty and peers periodically.

3. Administrators provide clear and consistent written policies for faculty and student concerns.

4. Administrators are involved in professional activities (state or national levels).

5. Administrators have frequent contact with graduate students.

6. Administrators possess experience in teaching at graduate level, research and service.

7. Administrators facilitate the award of assistantships to the highest qualified applicants.

8. Administrators provide the necessary organizational structure to secure funding for support of graduate study.

9. Administrators have attained full graduate faculty status.
Quality of curriculum and instructions

1. Student evaluation of instructors are processed to maintain quality instruction.

2. Clearly established standards of performance are made known to students.

3. The curriculum is tailored to the educational objectives of the graduate students.

4. The extent to which course offerings and content reflect clearly stated objectives of the program is shown.

5. Evaluation of courses and overall program is done by current students.

6. There is provision for variety and depth of course offerings.

Quality of facilities

1. Adequate instructional space is provided.

2. Quality library facilities are available.

3. Quality laboratory equipment and facilities are available.

4. Adequate budget allocation based upon inflation rates and program growth is provided.

5. Availability of funding for graduate assistantships.

6. Availability of quality of equipment for research and teaching.

7. Availability of research consultants.

8. Adequate budgeting for faculty and student research grants.


10. Adequate budget for instructional equipment.
Summary

The findings, as revealed by the analysis, identified 60 variables of consensus among the three major groups and the schools. Judged by their ratings, these variables would be the probable indicators of excellence. The result of the analysis when subjected to further review and treatment by a committee of industrial education experts on doctoral programs yielded a final number of 49 acceptable indicators of quality. Two variables that secured low and negative ratings were considered as poor indicators.

The institutions differed significantly on 12 variables at the .01 level and on 5 variables at the .05 level. Since the schools remained unidentified, those variables could not be interpreted except to say that their differences might reflect merely the differences in perspective of the various types of the respondents rather than disagreement on relative importance.

Ten variables had group differences significant at the .01 and .05 levels. Here the differences could be due to the fact that the faculty and the alumni were more informed and involved than the students whose ratings were relatively the lowest.

Four variables had school by group interaction effects significant at the .01 level. While the alumni had
the highest ratings for the variables in some schools, the students scored highest in other schools. The faculty also had the highest scores in some schools. The interaction was so meshed that there were no general group similarities; whichever group was highest or lowest depended on the specific school.
CHAPTER V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The problem of this study was to generate, identify and analyze a list of quality indicators for use in the assessment of doctoral programs in the field of industrial education.

The purposes of the study were:

1. To extend knowledge through inquiry and to maintain a steady growth within the field of industrial education.

2. To identify, develop and analyze quality indicators to be employed in the assessment of doctoral programs in industrial education.

3. To expand the existing body of knowledge of graduate programs in industrial education.

4. To assist industrial education to identify the activities and information sources that can be utilized in the doctoral program assessment and review.

5. To elicit more information about the assessment of the doctorate in industrial education than had previously been known. The resulting information would improve the data base, not replace, decisions that
may be made by graduate education administrators and policymakers.

The subjects of the study were:

1. All industrial education professors who advise, administer or coordinate doctoral students in the selected institutions.

2. Three doctoral students in each of the selected institutions.

3. Two or three recent doctoral alumni of the selected institutions.

In response to the two major questions asked, these answers were obtained:

1. To what degree is there a consensus as to what constitutes quality indicators for use in the assessment of doctoral programs in the field of industrial education?

There was consensus (no significant differences) among all of the respondents on 60 indicator variables. As a result of the final review and recommendations by the industrial education committee of experts, a total number of 49 quality indicators of excellence emerged as the final quality indicators of excellence. See pages 65-73 for the accepted quality indicators of excellence.
2. What consistency exists among the three principal groups regarding quality indicators and specific characteristics subsumed under these indicators?

The three principal groups, the faculty, the students and the recent alumni, held similar views on the 60 indicator variables that secured common agreement, hence there were no significant differences resulting from the rating of these variables. The three groups were consistent as was exhibited by the mean ratings on the items of consensus. Even in the areas where the group differences were significant, the mode of rating reflected a fairly consistent pattern. The faculty had the highest ratings, followed by the alumni and then the doctoral students. Thus, the views of social psychologists which suggested that the more informed and involved a person became, the greater would be the probability of higher ratings. Consequently, the faculty and the alumni rated the items higher because they probably were more involved and informed than the students.

There was no consensus in 16 variables that secured significant institutional differences, 10 variables that had significant group differences, 2 variables that had both school and group differences and 4 variables that had interaction effects.
Conclusions

In summary, these were the major conclusions of this study:

1. Forty-nine indicators emerged as the accepted quality indicators of excellence for use in industrial education doctoral program assessment.
2. Thirty-six variables had institutional, group or interaction differences, and therefore lacked consensus or common agreement.
3. Two variables emerged as poor indicators of quality.
4. Although significant interaction effects were obtained from the ratings of some of the variables, these differences could be due to: (a) the respondents' perspectives rather than differences in relative importance, (b) certain intervening or uncontrolled variables.

Implications of Potential Use of the Assessment Quality Indicators

Program assessment has been the subject of renewed interest in industrial arts for the past two decades. Some of the motivation for increased emphasis on program evaluation has been a direct result of past criticisms of industrial arts practices and procedures. Critical comments have come both from within the profession and from concerned individuals
outside of the profession. Both groups have observed a dis­parity between objectives and the content of industrial arts programs (Householder, 1969).

Program assessment at the doctorate level is attaining an increasing importance as the colleges and universities consider their priorities and allocation of resources. Periodic appraisals of program quality are not a regular activity at many graduate schools. The objectives of this research did not include the application of the findings in an empirical setting. After completing this study, it was considered that further discussion of the potential application of the findings might be helpful to administrators of advanced graduate programs. Too often, insufficient attention is given to the application of research results which could provide earlier benefits to the profession. It should be noted that the major categories identified and the 49 quality indicators subsumed under these categories are not intended to evaluate and rank-order the current Industrial Education doctoral programs. The quality indicators are designed to be used for purposes of self-appraisal and self-improvement of the various doctoral programs. The indicators are designed to complement other efforts in a comprehensive program assessment and to provide essential and common data primarily for program improvement. These indicators will assist in monitoring and reviewing whether or not a program is operating in conformity to its
design and whether or not the program is reaching its specified goals. The indicators should determine the strengths and weaknesses of a program and thereby lead to decision making and strategies to improve the quality of the graduate program at a particular university.

Since the subcomponents of a program—the faculty, the administrators, the students, curriculum and instruction, resources, facilities etc.—are interlocking, any treatment of a part or parts of the components in isolation may not yield the desired effects. Because doctoral programs have different orientation, the weighting of the components would definitely follow the orientation of each specific program, e.g., research oriented programs would place more weight on the research components of the quality indicators, whereas an orientation on technology might place greater weight on the curriculum and/or facilities.

The mission and the goals of any doctoral program would determine which of the quality indicator components receive greater emphasis and weighting. A systematic application of the quality indicators to assess a program would yield valid and reliable evidence as to whether or not certain activities, treatments, and interventions of such a program are in conformity with the program goals. For example, in a typical school "X" which has its program mission statement as "generating new knowledge through research and development and
preparing talented persons in industrial education," all the 49 quality indicators may be employed in assessing such a program but more weight should be placed on the research, curriculum and instruction components of the indicators.

Recommendation

In view of the findings of this study, it was recommended that:

1. Further research be conducted in the area of quality indicators for graduate program assessment.

2. A research on "what validity do the resulting indicators have for differentiating low quality programs from high quality programs" be conducted as an extension of this study.

3. More research be initiated in the most effective ways of applying the indicators for quality assessment in doctoral programs.

4. Consideration be given in replicating this study to the reorganization and inclusions of more variables and more subjects.

5. Periodic studies be carried out on quality indicators so as to continually update and refine the indicators.
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Yarnell, E. A. An appraisal of the doctoral program in educational administration at Ohio State University as perceived by its graduates. (Doctoral Dissertation, The Ohio State University, 1965). Dissertation Abstracts, 1966, 26, 6491. (University Microfilms No. 66-1866).
ACKNOWLEDGMENTS

It is difficult to identify each individual deserving my gratitude and personal thanks for contributing to my education.

The author expresses his appreciation to his major advisor, Dr. William D. Wolansky, for his encouragement, guidance and assistance throughout the graduate program and in the development of this thesis.

To all the other members of my graduate advisory committee, including Drs. William G. Miller, Clifford Smith, Trevor Howe and Richard Van Iten, thank you for monitoring and guiding my graduate program and research.

To Dr. Leroy Wolins and Dr. William G. Miller, thank you for your assistance and consultation on the statistical analysis used in this thesis.

To my dearest wife Vickie Oby, thank you for your love, sacrifice, understanding, and help in all my endeavors.

To my very dear parents Rosaline and Ugoanuzie, thank you for your love, help and support throughout my life. To our son and daughter, Chike and Chioma, thank you for your cheerful cooperation.
APPENDIX
Dear Colleague:

Several education associations have expressed their professional concern for identifying quality indicators to assess doctoral degree programs. We are seeking to identify a set of quality indicators which can be employed in the assessment of doctoral programs in Industrial Education.

Your university has been selected as one of the best institutions to provide us with reactions and suggestions to our questionnaire. All data provided will be kept confidential and no names will be used. Copies of the questionnaire are enclosed for distribution to your faculty members who teach doctoral students, current doctoral students in your department, and two or three recent doctoral alumni of your department.

Please return all the questionnaires to me in the enclosed self-addressed envelope.

Your concern and cooperation in this professional endeavor will be appreciated.

Sincerely,

John A. Ugonabo
Doctoral Student
Department of Industrial Education

William D. Wolansky
Professor and Head
Department of Industrial Education
Instructions: Please assist me with this doctoral program research study.

You are requested to rate items of quality indicators within the following six major categories:

1. Quality of faculty
2. Quality of students
3. Quality of instruction
4. Quality of curriculum
5. Quality of administrators
6. Optimum resources

The basis of your ratings will be employed to establish criteria of quality to evaluate selected doctoral programs.

For each of the items listed on the following pages, you are to describe your rating by using a number from 1 to 99. If you use the number 1, as in the example below, it indicates an unimportant indicator, the number 50 indicates a moderately important indicator or unsure, the number 99 indicates a very important indicator.

Example:

(a) Doctoral students may obtain graduate credit for upper level undergraduate courses taken in other departments.

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<tr>
<th>X</th>
<th>1</th>
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<td>Unimportant indicator</td>
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<td>1.</td>
<td>Academic training of the graduate faculty including an earned doctorate.</td>
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<td>2.</td>
<td>A distinction is made between &quot;graduate faculty&quot; and general faculty.</td>
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<td>Distinction is made among graduate faculty members such as &quot;associate&quot; or &quot;full&quot; graduate faculty.</td>
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<td>4.</td>
<td>Only &quot;full graduate faculty&quot; professors may advise doctoral students.</td>
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<td>5.</td>
<td>Graduate faculty are members and/or hold offices in professional organizations.</td>
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<td>Graduate faculty involved in presenting papers and research findings.</td>
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<td>Graduate faculty participating in reviewing panels and editorial boards.</td>
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<td>8.</td>
<td>Graduate faculty involved in providing consulting services.</td>
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<td>9.</td>
<td>Graduate faculty contribute articles to referred publications.</td>
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<td>10.</td>
<td>Graduate faculty involved in nonreferred publications.</td>
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<td>11.</td>
<td>Graduate faculty teaching limited to graduate school.</td>
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<td>12.</td>
<td>Release time provided graduate faculty for research.</td>
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<td>13.</td>
<td>Student-faculty ratio maintained in faculty advising.</td>
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<td>14.</td>
<td>Graduate faculty involved in leadership activities on campus.</td>
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<td>15.</td>
<td>Graduate faculty involved in leadership activities at the state level.</td>
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<td>16.</td>
<td>Graduate faculty involved in leadership activities at the national and international levels.</td>
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<td>17.</td>
<td>Graduate faculty involved in social interaction with students.</td>
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<td>18.</td>
<td>Graduate faculty participating in graduate students club.</td>
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<td>19.</td>
<td>Graduate faculty involved in promoting high morale and team work among staff and students.</td>
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<td>20.</td>
<td>Graduate faculty encouraging graduate students to attend national and local conventions.</td>
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<td>21.</td>
<td>Persons chairing graduate student committees must demonstrate published research skills.</td>
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<td>22.</td>
<td>Graduate student committees must include persons from other departments.</td>
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*Instructions:* Please indicate your response in the right-hand column by selecting the appropriate measure on the above scale.

**QUALITY OF FACULTY**
### QUALITY OF STUDENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Response</th>
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<tbody>
<tr>
<td>23</td>
<td>Graduate students required to demonstrate high performance at the qualifying institutional exam before admission.</td>
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<tr>
<td>24</td>
<td>Graduate students must have had a high undergraduate GPA (second quartile or better).</td>
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<td>25</td>
<td>Graduate students score highly in the GRE examination.</td>
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<td>26</td>
<td>Doctoral students must maintain a high graduate GPA. Above a 3.0 on a 4-point scale.</td>
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<td>27</td>
<td>Doctoral students should have some minimum previous teaching experience.</td>
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<td>28</td>
<td>Doctoral students must have favorable letters of recommendation before admission.</td>
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<td>29</td>
<td>Doctoral students are expected to be involved in publication before and after graduation.</td>
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<td>30</td>
<td>Doctoral students are involved in paper presentations.</td>
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<td>31</td>
<td>Doctoral students participate in independent research.</td>
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<td>32</td>
<td>Doctoral students receive professional honors and recognition as evidence of accomplishments.</td>
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<tr>
<td>33</td>
<td>Doctoral students hold important institutional offices as evidence of accomplishments.</td>
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<tr>
<td>34</td>
<td>Doctoral students gain academic awards because of their scholarly achievements.</td>
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<td>35</td>
<td>Doctoral students receive interinstitutional awards.</td>
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<td>36</td>
<td>Low attrition—High percent of entering students complete the degree.</td>
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<td>37</td>
<td>Recruiting of the doctoral students is based on the most qualified applicants.</td>
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<td>38</td>
<td>Recruitment of the doctoral students is based on quota from minority and nonminority.</td>
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<td>*</td>
<td>Others:</td>
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<td></td>
<td>Unimportant</td>
<td>Moderately important or unsure</td>
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<td>39.</td>
<td>Faculty members must meet graduate faculty status to teach graduate courses.</td>
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<td>40.</td>
<td>Students' evaluation of instructors are processed to maintain quality instruction.</td>
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<td>41.</td>
<td>Appropriate teaching methods and evaluation procedures are employed and monitored by administrators.</td>
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<td>42.</td>
<td>Evaluation by current students of courses and overall program.</td>
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<td>43.</td>
<td>Admission and retention standards are related to program objectives.</td>
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<td>44.</td>
<td>Clearly established standards of performance made known to students.</td>
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<td>45.</td>
<td>Effectiveness of graduate student advising.</td>
<td>45</td>
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<td>46.</td>
<td>Instruction is designed primarily for full-time rather than part-time students.</td>
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<tr>
<td>47.</td>
<td>Student progress through the program is based on imposed time limitations.</td>
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<td>48.</td>
<td>High degree of student involvement and class participation is expected.</td>
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<tr>
<td>49.</td>
<td>Balance of outside work in addition to class work (term papers, readings, etc.).</td>
<td>49</td>
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<tr>
<td>*</td>
<td>Others:</td>
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</table>
QUALITY OF ADMINISTRATORS

50. Administrators of doctoral programs possess recognized scholarship and leadership abilities.
51. Administrators are involved in professional activities (state or national associations).
52. Administrators attain the rank of a full professor.
53. Administrators have attained full graduate faculty status.
54. Administrators regarded highly by faculty.
55. Administrators rated highly as knowledgeable by faculty.
56. Administrators are evaluated by faculty and peers periodically.
57. Administrators have frequent contact with graduate students.
58. Administrators provide clear and consistent written policies for faculty and student concerns.
59. Administrators possess experience in teaching at graduate level, research and service.
60. Administrators facilitate assistantships given to the highest qualified applicants.
61. Administrators provide the necessary organizational structure to facilitate program leadership and decision making capabilities.
62. Administrators promote research applications to secure funding for support of graduate study and research.

* Others:

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Response
50
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63. Graduate students are required to complete a minimum total hours of credit: in research, in major, in cognate, or in minor.

64. Availability of supervised internship and/or practicum.

65. Opportunity to minor in other fields.

66. Provision for variety and depth of course offerings.

67. Provision for flexibility to meet individual needs.

68. Opportunity for independent study or problems.

69. Curriculum tailored to educational objectives of the graduate student.

70. Extent to which course offerings and content reflect clearly stated objectives of the program.

71. Students satisfaction with their program in terms of all course work.

72. Students satisfaction with their courses in the major.

73. Students satisfaction with their course work in the minor or cognate.

74. Students satisfaction with the research component of the program.

75. Balance of foreign students attracted by the program.

* Others:

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### RESOURCES

<table>
<thead>
<tr>
<th>Resource Description</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of library facilities.</td>
<td>76</td>
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<tr>
<td>Quality of equipment for research and teaching.</td>
<td>77</td>
</tr>
<tr>
<td>Quality of laboratory equipment and facilities.</td>
<td>78</td>
</tr>
<tr>
<td>Quality of support staff.</td>
<td>79</td>
</tr>
<tr>
<td>Quality of research fundings.</td>
<td>80</td>
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<tr>
<td>Availability of graduate student housing.</td>
<td>81</td>
</tr>
<tr>
<td>Availability of counseling and guidance services.</td>
<td>82</td>
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<tr>
<td>Availability of adequate student financial aid.</td>
<td>83</td>
</tr>
<tr>
<td>Availability of health care services.</td>
<td>84</td>
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<tr>
<td>Availability of recreation.</td>
<td>85</td>
</tr>
<tr>
<td>Availability of placement services.</td>
<td>86</td>
</tr>
<tr>
<td>Parking facilities provided.</td>
<td>87</td>
</tr>
<tr>
<td>Intellectual and social interactions, e.g., sororities, fraternities, clubs.</td>
<td>88</td>
</tr>
<tr>
<td>Availability of students records to faculty.</td>
<td>89</td>
</tr>
<tr>
<td>Adequacy of computing facilities.</td>
<td>90</td>
</tr>
<tr>
<td>Availability of research consultants.</td>
<td>91</td>
</tr>
<tr>
<td>Availability of adequate instructional space.</td>
<td>92</td>
</tr>
</tbody>
</table>

* Others: 

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Unimportant | Moderately important or unsure | Very important
### BUDGETING

<table>
<thead>
<tr>
<th></th>
<th>Adequate budget allocation based upon inflation rates and program growth.</th>
<th>93</th>
</tr>
</thead>
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<tr>
<td>94</td>
<td>Available budget for student recruitment.</td>
<td>94</td>
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<tr>
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<td>Adequate budget for instructional equipment.</td>
<td>95</td>
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<tr>
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<td>Adequate budget for student support services.</td>
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<td>97</td>
<td>Available budgeting for faculty and student research grants.</td>
<td>97</td>
</tr>
<tr>
<td>98</td>
<td>Availability of funding for graduate assistantships.</td>
<td>98</td>
</tr>
</tbody>
</table>

* Others: ____________________________________________
Committee of Industrial Education Experts on Doctoral Programs

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Dear Sir:

Enclosed are the results of a research concerned with identifying quality indicators of excellence for doctoral program assessment in the field of industrial education. You as an expert are requested to react to the findings in the following ways:

1. Which of the variables (indicators) of consensus would you eliminate from the list of acceptable quality indicators?

2. Which of the variables from the group of variables with significant institutional differences would you consider fit for use as quality indicators?

3. Which of the variables from the list of variables with significant group differences do you consider fit for use as quality indicators?

4. Which of the variables with significant interaction effects do you consider fit for use as quality indicators?

5. Which other indicator variables, omitted in the study, would you recommend highly as viable quality indicators?

6. Please furnish us with any other suggestions you deem necessary.

Thank you for your cooperation.

William D. Wolansky
Professor and Head

John A. Ugonabo
Doctoral Student
Definition of Terms

1. **Consensus** is here defined as having no significant differences among the schools and the three groups in the rating of the quality indicator variables.

2. **Institutional Differences**: These are the quality indicator variables which as the results of the 16 schools' ratings have significant mean differences at .01 and .05 levels.

3. **Significant Group Differences**: These are the quality indicator variables which as the results of the faculty, students and alumni ratings secured significant mean differences at .01 and .05 levels.

4. **Significant Interaction Effects**: These are the quality indicator variables that have significant school/group interaction effects at .01 level.

\[
\begin{array}{cccccccccc}
-2.33 & -1.28 & -0.84 & -0.53 & -0.26 & 0 & 0.26 & 0.53 & 0.84 & 1.28 & 2.33 \\
1 & 10 & 20 & 30 & 40 & 50 & 60 & 70 & 80 & 90 & 99
\end{array}
\]

The above was the scale used to elicit responses from the subjects. The cut-off point for the acceptable quality indicators as shown on the scale was the 50th percentile or the "0" of the normal scale. However, our analysis showed 60 acceptable quality indicators with the lowest point at the 62nd percentile (.31 on the normal scale).