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CHARACTERISTICS OF THE TURFGRASS INDUSTRY IN 2020:
A DELPHI STUDY WITH IMPLICATIONS FOR
AGRICULTURAL EDUCATION PROGRAMS

by

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of the
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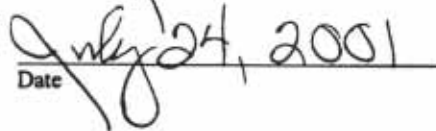
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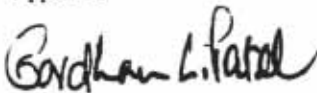


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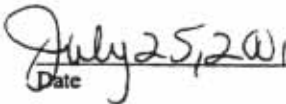


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EDDIE DEAN SEAGLE

Characteristics of the Turfgrass Industry in 2020: A Delphi Study with Implications for
Agricultural Education Programs
(Under the direction of MAYNARD J. IVERSON)

The primary purpose of this study was to determine the characteristics of the turfgrass industry in the year 2020 in order to recommend curriculum content for agricultural education programs of the future. Specific objectives were to determine: the general characteristics of the turfgrass industry in the year 2020, a demographic profile of opinion leaders in the turfgrass industry, whether the Delphi technique could be used to achieve consensus among turfgrass experts, the workforce requirements of the turfgrass industry, and the educational requirements of those employed in the turfgrass industry in the year 2020.

This was a national study using a three-round Delphi technique. The panel of experts was nominated by turfgrass professionals (teaching, research and extension) at all the land-grant institutions, the four-year and two-year colleges offering turfgrass, and the executive boards of related turfgrass associations. The 38 most frequently nominated experts were invited to participate in the study. A structured Delphi instrument consisting of nine categories was developed from the literature. This instrument was circulated to the panel of experts for comments on each category. Their responses were used in the development of a structured Delphi instrument consisting of 147 items on a Likert-type scale. The instrument was reviewed for content and face validity by an 19-member panel.

Consensus was achieved on an item if at least 60% of the respondents were in agreement and the composite score fell in the "agree" or "disagree" range. The mean and standard deviations indicated that the central tendency was a movement toward consensus. The responses were found to be very stable from round 2 to round 3, as indicated by the Pearson product-moment correlation coefficient procedure and the Wilcoxon matched-pairs signed-ranks test.

It was concluded that:

1. The turfgrass industry will grow and change rapidly into the year 2020, with increasing emphasis on protecting the environment through best management practices.
2. Opinion leaders in the turfgrass industry can best determine curriculum content for turfgrass programs of the future.
3. The Delphi technique was effective in determining consensus among turfgrass experts regarding future characteristics of the industry.
4. There will be increased employment opportunities and a corresponding need for training programs in turfgrass.
5. There is a need to continually update the turfgrass curriculum in agricultural education programs.

Thirty-two content items were identified as essential inclusion in agricultural education curriculum.

INDEX WORDS: Agricultural Education, Vocational Education, Vocational Agriculture, Occupational Studies, Curriculum, Delphi Technique, Futures Research, Turfgrass Industry

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The author wishes to dedicate this dissertation to his daughter, Autumn Lee, with the hope and prayer that she may enjoy a full Christian life as she completes her senior year of high school and pursues her college education. "Laissez les bon temps rouler!"

Ecclesiastes 3:1-8; Isaiah 40:31; Psalms 116, 122:8; Matthew 7; Romans 12: 6-8

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CHAPTER I

INTRODUCTION

Nature . . . She is the universal artist, creating the greatest contrasts from the simplest material, while achieving, without seeming to strive for it, an ultimate perfection . . . Each of her works has its own peculiar quality; everyone of her manifold appearances symbolizes a single concept and yet somehow blending they achieve unity. One must obey nature's laws even while he denies them; he is forced to produce with her aid even when he imagines that he is able to work against her. ("Nature: A Poetic Fragment, Johann Wolfgang von Goethe, in The Arts and Man by Raymond S. Stites, 1940)

Turf is one of the blessings of nature and includes both service and beauty, a concept which originated when man started to domesticate animals (Huffine & Grau, 1971). From a Biblical standpoint, the first chapter of Genesis (1:11-12) reveals the benevolent nature of creation: "And God said, Let the earth bring forth grass, . . ." Also, Solomon proclaims (Proverbs 19:12), "The king's wrath is as the roaring of a lion; but his favor is as dew upon the grass." As people became more aware of their surroundings, they begin more specifically to acknowledge each component in that environment. Thus, turfs were developed by modern specialists in order to further enhance the environment (Beard, 1973).

Turf is the most widely grown, most discussed, and least appreciated commodity in the United States (Hanson & Juska, 1971). In discussing this topic, such terms as "turf," "turfgrass," and "grass" have been used through the years. However, more professional discussions center around the terms "turf" and "turfgrass." As far as research done with turf and turfgrass, Hanson and Juska stated that much of the initial work on the development and management of turfgrasses was conducted by agronomists who had some training and experience in growing grasses for pasture and forage.

However, the first published report related to turfgrass research was initiated in 1880 by a noted botanist, Dr. W. J. Beal, of the Michigan Agricultural Experiment Station (Beard, 1982). Interest in the science of turfgrass culture began to manifest itself. Beard indicated that other projects were initiated at the Connecticut Agricultural Experiment Station in 1886, the Rhode Island Agricultural Experiment Station in 1905, and the Arlington Turf Garden, Arlington, Virginia in 1916.

To further expand its potential, the federal government cited and allocated funding in turf through the Agricultural Appropriations Act in 1901. Although these federal allocations of funds for research in turfgrass were made, it was not until the end of World War II that most agricultural experiment stations initiated turfgrass research programs (Huffine & Grau, 1971).

The term "turf" was popularized in the United States during the 1900's (Huffine & Grau, 1971). Even though its popularity continued to grow, it carried an unfavorable connotation for many years, especially when it was associated with horse racing and gambling at the track. Also, "turf" carried the label of "golf turf--the playground of the idle rich" until about 45 years ago.

Turf industries have been defined in various ways including geographic influence, scope and size, products, market and trade practices, human resources, and public and political policies (Nutter & Watson, 1971). Even though turfgrass has experienced a long existence, it was not until the latter half of the 20th century that the turfgrass industry actually began booming. Thus, public and political policies are either new or currently being developed.

Nutter (1965) noted that the turfgrass industry encompassed the production and maintenance of specialized grasses as required in the development and management of facilities for utility (erosion control), aesthetics (ornamentation), and recreation (sports).

It involves turfgrass science and technology, manufacturing, and marketing of turfgrass products and services, business management, human resources, effective communications, and environmental management skills (Nutter & Watson, 1971; Wagner, 1999; Grigg, 1999; Ellis, 1999; Jaques, 1998; Dysart, 1995; Fry, Thien, Miller, Elsea, & Krause, 1998).

This suggests some important questions about the future of turfgrass and the role of agricultural education. What will the turfgrass industry be like in the future? What careers will be available in the turfgrass industry? Will today's turfgrass curriculum in agricultural education prepare students for jobs in an increasingly technological turfgrass industry? Can vocational educators look into the future and develop a curriculum to satisfy and complement this end?

O'Kelley (1969) defined curriculum as "the sum total of the student's experiences and activities under the direction of the school, including teaching materials and methodology" (p. 29). Since curriculum is the life of agricultural education, changes made in the curriculum are long term and far reaching (Iverson & Robinson, 1990). Thus, curriculum content is the basic building block of curriculum planning; without constant monitoring and revision, it becomes stagnant, outdated, and ineffective (Flanders, 1988).

Unfortunately, the opinions of futurists are largely being ignored (Flanders, 1988). This is inopportune since futurists can help us identify trends that are shaping the world of tomorrow. John Naisbitt (1982) stated "We must put down our old industrial tasks and pick up the tasks of the future" (p. 58). Today's global society is undergoing fundamental shifts and reassessing value and meaning of all things.

How each individual views the rate, scope, and substance of change is influenced by the personal values and perceptions of the observer (Hawking, 1988). Turfgrass is in a

state of change. Traditional management philosophies are being challenged by both professional organizations and the public. Some speak of the need for entirely new management paradigms (Wagner, 1999; Grigg, 1999; Ellis, 1999; Wake, 1999; Jaques, 1998, Dysart, 1995; Fry, Thien, Miller, Elsea, & Krause, 1998).

One thing that certainly can be predicted is that there will be change, even though most systems are compelled by assumptions of stability. Events of minimal probability are usually ignored even though some unpredictable events are likely to occur. Change comes to a system from the ends of a bell-shaped curve, which are variations of the system. Planning explores possible futures and develops strategies to address those futures (Brighton, 1987).

Sherman (1983) indicated that there will be a significant shift from manufacturing to service-related jobs. Most of these jobs will require more education, and employers will be looking for applicants who have an education that links academic and vocational education studies into a meaningful whole (National Commission on Secondary Vocational Education, 1984).

The future will bring about change, and vocational educators must be ready to accept and react to this challenge. Curriculum development processes have to be adjusted to meet the challenges of the future. Shane (1981) suggested that vocational educators must become involved in curriculum development that considers jobs for tomorrow and the demands of the changing work place.

Statement of the Problem

Based on current technological changes and trends in the work place, the future work environment will certainly be characterized by rapid, constant change. If vocational education curriculum content is based simply on the past or present, an injustice will be

done to graduates who will be unprepared for the future. Vocational educators must use futuristic techniques to update curriculum content. A futuristic research strategy utilizing the Delphi technique is an accepted approach to curriculum development (Adler & Ziglio, 1996; Finch & Crunkilton, 1999).

Varnadore (1989) stated that "if educators are to prepare students to enter the society of the future as workers, then curriculum needs to be planned relative to the needs of these students upon graduation" (p. 2). McKenzie (1987) suggested that students must be educated in creating the tools to meet future needs in order "to prepare students for a society in which adaptation and versatility are prized" (p. 132). Turfgrass management is a viable, profitable, enjoyable, and environmentally-friendly profession that will continue to experience rapid growth and development throughout the 21st century (Turgeon, 1999; Balough & Walker, 1992).

A review of the literature revealed very little concerning "futures" research in the turfgrass area and nothing that had specific implications for determining turfgrass curriculum content in agricultural education programs. Nevertheless, a study by Flanders (1988) on the nursery/landscape industry and another by Varnadore (1989) on the meats industry were excellent models for futuristic curriculum planning in agricultural education. Also, McAllister (1992) on the forestry industry and Combs (1994) in home economics education offered similar excellent models. Program planning is often done in reaction to a social change, but rarely do educational planners use futures research as a basis for planning. Futures research can guide planning, when one is developing curriculum based on the objectives gained from this planning.

Purpose of the Study

The purpose of this study was to determine characteristics of the turfgrass industry in the year 2020. By doing so, program planners will be able to make recommendations based on futuristic research. The results of this study will be useful as a basis for program planning and curriculum development in agricultural education.

This study was needed because the literature search revealed no futures research with specific implications for determining turfgrass curriculum content in agricultural education programs. In addition, further justifications for the study include:

1. Turfgrass instruction in agricultural education programs is a viable means of preparing students for careers in turfgrass and turfgrass related jobs.
2. Regularly updated curriculum content needs to be available to agricultural education teachers to prepare students for turfgrass jobs in the year 2020.
3. The turfgrass industry generates significant dollars annually and accounts for the employment of a considerable number of workers each year throughout the United States. Agricultural education (turfgrass) programs can have a positive impact on the economy of the United States by providing skilled and competent graduates with the ability to become rational and critical thinkers in problem-solving activities as workers.
4. The study is timely. It is crucial that futuristic projections of this format be made since the only certain constant is change.

Objectives of the Study

The primary objective of this study was to make recommendations for curriculum content for turfgrass course work in agricultural education programs. This determination was accomplished by employing futures research to determine the characteristics of the

turfgrass industry in the year 2020. The definition of “turfgrass industry” is found on page 11 of this chapter.

The following specific objectives were developed to direct this study:

1. To identify the general characteristics of the turfgrass industry in the year 2020.
2. To determine whether the Delphi technique was a viable means of eliciting a consensus among those nominated to a panel of turfgrass industry experts concerning the description of the turfgrass industry in the year 2020.
3. To determine the work force requirements of the turfgrass industry and the educational requirements of those employed in the turfgrass industry in the year 2020.
4. To make recommendations for program thrusts and curriculum development in turfgrass-related courses in agricultural education, in order to prepare students for jobs in the turfgrass industry in the year 2020.
5. To develop a demographic profile of those nominated to the panel of experts based upon: (a) education, (b) age, (c) sex, (d) race, and (e) turfgrass industry work experience.

Definition of Terms

Best management practices: In turf, management or cultural practices that minimize inputs and undesirable effects, yet maximize outputs and aesthetic value (McCarty, 2001; Schroeder, Seagle, Felton, Ruter, Kelley, & Krewer, 2000).

Consensus: The collective opinion arrived at by most of those concerned (Gough, 1987).

Curriculum: All the objectives, content, and learning activities in a learning sequence for a particular instructional area (Calhoun & Finch, 1982).

Curriculum content: Specific units of instruction. Those facts, observations, data perceptions, discernments, sensibilities, designs, and solutions drawn from what the minds of men have comprehended from experience and those constructs of the mind that reorganize and rearrange these products of experience into lore, ideas, concepts, generalizations, principles, plans, and solutions (Miller & Seller, 1985, p. 185).

Delphi: An information-gathering technique, originally designed for technological forecasting, that draws on and refines the judgments of experts through a series of mailed questionnaires (Hencley & Yates, 1974).

Delphi technique: A method of soliciting and aggregating individual opinions or judgments, typically of a group of experts, to arrive at consensus views concerning such things as what may happen in the future. The Delphi technique keeps individual responses anonymous so that social influences are minimized and poses the questions in a series of rounds. The results of each round are organized and presented to the participants in a carefully structured way (Cornish, 1976, p. 8).

Forecasting: A technique designed to identify trends and alternatives through a system of logic, simply to provide information and knowledge to upgrade decision making as desirable programs and plans are formulated for the future (Hencley & Yates, 1974, p. 486).

Futures analysis: One of the number of terms used to denote the study of the future. The use of the plural "futures" emphasizes the element of choice concerning what the future will be like (Cornish, 1976, p. 8).

Futurism: The mood or movement that emphasizes the importance of seriously thinking about and planning for the future (Cornish, 1976, p. 8).

Integrated pest management: How to ensure crop protection and maintain appearance and quality through controlling pest populations while minimizing effects on humans and the environment (Bohmont, B. L., 2000; Schroeder, Seagle, Felton, Ruter, Kelley, & Krewer, 2000; and Schumann, Vittum, Elliott & Cobb, 1998).

Golf course: An area of land laid out for golf with a series of 9 or 18 holes, each including tee, fairway, green, rough, and one or more natural or artificial hazards; also called "golf links" (Beard, 1982; Merriam-Webster's Collegiate Dictionary, 2000).

Golf course superintendent: The person entrusted with the development and management of a golf course, having responsibilities in supervising the construction and maintenance of a golf course, servicing and repairing of turfgrass maintenance and construction equipment, recordkeeping, budgeting, financial planning, and human resource management (Beard, 1982).

Planning: The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit (Merriam-Webster's Collegiate Dictionary, 2000).

Technical skills: The specialized tasks that have been learned, or abilities that have been developed in order to carry out the physical or mental performance of the specific occupation (Combs, 1974, p. 9).

Turf: Uniform ground covering of mowed vegetation, usually a turfgrass (McCarty, 2001).

Turfgrass: Grass species or cultivar maintained as a uniform mowed vegetation (McCarty, 2001).

Turfgrass industry: The industry involved in the production, marketing, and utilization of turfgrass for aesthetic, utility, or recreational purposes. The facilities branch deals with the management and maintenance of turfgrass facilities. The manufacturing branch provides the products. The servicing branch implements the utilization of both products and facilities. The institutional branch includes schools, colleges, extension, and research. It involves turfgrass science and technology, business management, manpower development, and the manufacturing and marketing of turfgrass products and services (Hanson & Juska, 1971).

Vocational education (Career-technical education): A program of education below the college level, under supervision and control, or under contract with a state or local educational agency and organized to prepare the learner for entrance into a particular chosen occupation, or to upgrade employed workers. Agricultural education is a division of vocational education (Combs, 1974, p. 10).

Limitations

This was a national study designed to make recommendations concerning curriculum content for turfgrass course work in agricultural education. These recommendations are based on futuristic research to determine the nature of the turfgrass industry in the year 2020. Data were collected from a panel of experts from across the United States utilizing the Delphi technique. There are certain inherent limitations which must be considered in the application of the results of this study.

1. Data in this study were the opinions of a national panel of experts in the turfgrass industry. The results of this study were limited by the objectivity of the respondents.

2. The content of the Delphi instrument was developed from information found in scientific literature, trade publications, conference proceedings, interviews, and other publications.
3. The panel of experts was asked about the characteristics of the turfgrass industry in the year 2020, but was not asked specifically about curriculum content. The author of this study recommended curriculum content from an analysis of the respondents' answers.
4. This study was not designed to evaluate the current turfgrass curriculum in agricultural education, only to make recommendations for turfgrass curriculum content in the year 2020.
5. The results of this study are limited within the degrees of reliability and validity for data assembled through the use of the Delphi technique.

Delimitations

There are certain obvious delimitations which must be considered in the application of the results of this study.

1. The geographical distribution of the respondents was not biased and represents those identified as experts during the time of the study.
2. The findings are important for the time period extending through the year 2020.

Assumptions

The following assumptions were made relative to this study:

1. The Delphi technique is a valid method of eliciting a consensus of opinion.

2. The nominated panel of experts represented the most forward thinkers in the turfgrass industry.
3. The panel of experts responded to the Delphi instrument to the best of their knowledge and ability.
4. The results of the second round of the Delphi instrument, when provided to the panel of experts during the third round, caused them to reflect upon their answers in relation to the entire panel's answers, thus facilitating consensus.

Significance of the Study

A thorough review of the literature failed to identify any futures research that had specific implications for determining turfgrass curriculum content in agricultural education. This dissertation is the first study utilizing futuring techniques to determine turfgrass curriculum content in agricultural education programs. The results of this study should have a significant application in turfgrass science as well as in education.

This study is based upon the precept that skills in use today are very likely to be inundated in the very near future and that planning in vocational education should be futuristic in nature as the turfgrass industry becomes more global in strategy and reality. The use of futuristic research techniques in vocational education is critical if workers are to be prepared for the jobs of the future. Vocational educators must not allow programs to be based on past or current occupational analyses. Curriculum content must be based on futuristic research.

The results of this study provided a view, according to eminent opinion leaders in turfgrass, of the future characteristics of the turfgrass industry. In addition to its value to the turfgrass industry and agricultural education (turfgrass) curriculum at the secondary

level, this study should prove useful to other educational organizations. Technical schools and colleges can utilize the data or the results of this study as a model for planning for the future. Furthermore, other disciplines and industries may also find the futuristic technique used in this study to be applicable to their circumstances.

Organization of the Study

Chapter One contains the introduction, statement of the problem, purpose of the study, objectives of the study, definition of terms, limitations, assumptions, significance, and organization of the study.

Chapter Two provides a review of the literature in turfgrass course work in agricultural education, turfgrass discipline, curriculum planning in vocational and agricultural education, and futures research techniques.

Chapter Three presents the study from a methodological viewpoint. It explains the methods and procedures used in this study to collect, organize, and analyze the data.

Chapter Four provides the findings of the study along with the descriptive statistics used to analyze the results.

Chapter Five contains a review of the research procedures, a review of the findings, conclusions, implications, and the recommendations generated from the findings.