CHAPTER 5

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

As I travel the road of life, I find myself looking.
I look in front of me and in the distance I can see,
Lights, forms, structures, people, motion — neither of which I can make out.
I strain my eyes to focus more clearly.
But the results are the same — full of life but difficult to determine.
Then, I look to my left and what do I see?
My personal life — my home, my collections, my animal friends.
I see my friends, my hopes, my desires.
I see happy times and I see the difficult ones.
I turn to look to my right and I see my professional life.
My job, my career, my business family, my students.
I see lectures and labs in session.
I see notes, computers, and equipment in operation.
Problem solving and critical thinking fills the air.
I see graduates and I see productivity.
I see life-long learning.
Then, I pause and look behind me.
I see this morning and yesterday.
I see last week and last month.
I see last year and five years ago.
Then comes ten, twenty, and thirty years ago.
I see mom and dad.
Some times are clear and some are vague.
But all are a memory that can never be taken from me.
I'm happy and I'm sad — a bitter sweet kind of feeling.
A human thing.
Then I turn again, my personal life and my professional life have changed.
They're different from before — I'm confused, but yet I feel growth and change.
Then I look in front of me — new visions, different obstacles, new paths.
Just like life — things change as you are caught... Looking.
All for what? Happiness and satisfaction or hope and survival?
Enjoy the moment as you catch yourself .... Looking!
(Looking, Eddie Dean Seagle, Unpublished Poetry, 1999)

No one can predict precisely the characteristics of the work environment in the year 2020, but reality and wisdom both point in the direction of change. We must plan and not be caught simply looking. If vocational education curriculum is based on the past or present work environment, the graduates cannot be prepared for any future work environment. John Naisbitt (1982) stated that, "We must put down our old industrial tasks and pick up the tasks of the future" (p. 58). Flanders (1988), Varnadore (1989), and McAllister (1992) noted that educators must use futuristic techniques as a tool for maintaining the up-to-date curriculum.

The traditional methods of curriculum planning and development have been formed based on present or past job analyses. This study used the futuristic Delphi technique of research to determine the characteristics of the turfgrass industry in the year 2020. A curriculum based on a proven research technique can be developed from these predicted characteristics of the turfgrass industry in the year 2020.

A literature search revealed little research concerning futures studies in the turfgrass discipline, especially with specific implications for turfgrass curriculum content in agricultural education programs. The literature search also revealed that futuristic research data were appropriate to employ for curriculum development in vocational education.

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 turfgrass course work in agricultural education programs.

Review of Research Procedures

A review of the methods of futures research used by previous investigators provides insight to the selection of the Delphi technique to determine the characteristics

of the turfgrass industry in the year 2020. The suitability of this method for agricultural education curriculum research has been documented by Flanders (1988), Varnadore (1989), and McAllister (1992). The study used the original Delphi instrument, whereas their studies implemented a modified instrument.

A search of the literature revealed that the Delphi instrument would be best for conducting this study. The instrument was developed from round one that was circulated to the Delphi panel of experts as an open-ended, categorical instrument. The categories were selected from a review of the literature in turfgrass dealing with future predictions of the turfgrass industry. A draft of the instrument was reviewed by a panel of 20 persons who had expertise in turfgrass, in futures research, and/or in vocational education. The panel evaluated the items for importance and reviewed the instrument for content and face validity. The final copy of the instrument in round two contained 147 items.

Thirty-eight experts in the turfgrass field were selected to participate in the study through a national nomination process. The nominators were turfgrass specialists at all land grant colleges and universities in the nation (teaching, research, and extension), turfgrass personnel at two and four year institutions offering turfgrass as a major (teaching and demonstration), and executive and/or administrative personnel at numerous affiliated professional associations. Thirty-four of the 38 most frequently nominated experts agreed to participate in the rounds of the Delphi instrument.

The study consisted of an initial Delphi round for panel member comments on specific categories identified from the literature review. After the data of the first round were collected and organized, the instrument was developed using the same nine categories. After the results of the second round were compiled and summarized, the mean of each item was mailed to the Delphi panel along with the third round.

Descriptive statistics were used to analyze the data from the last two rounds of the Delphi instrument.

Review of the Findings

Chapter Four reports the findings and data collected from the panel of 25 participating experts in the turfgrass industry utilizing the Delphi instrument. All twenty-five experts were male and 24 (96%) Caucasian and one (4%) mixed race. They were well-educated with 3 having bachelor's degrees, 5 having master's degrees, and 17 having doctoral degrees. The group had a total of 806 years experience, a mean of 32.2 years in turfgrass. Respondents ranged from 44 to 83 years of age, a mean of 57.6 years.

The 147 items in the instrument were measured against two predetermined criteria to determine if consensus had been reached. Thirty-three items (22%) failed to meet both consensus criteria as described in Chapter Four. Consensus was reached on 114 of the 147 items with 113 (77%) in the "agree" range, and one (0.7%) in the "disagree" range on the Likert-type scale.

The standard deviations (Table 6, p. 101) and interquartile ranges (Appendix P) were measures of variability in the scores. The smaller standard deviations and interquartile ranges as reported on round three indicated decreasing variance. Thus, the 124 cases (84%) in the interquartile range remained the same indicating stability and convergence of opinion or a move toward consensus.

The Pearson product-moment correlation coefficients and the Wilcoxon matched-pairs signed-ranks test gave a measure of stability for the data. The Pearson product-moment correlation coefficients for round two and three responses by item are presented in Table 7. The responses were found to be very stable from round two to round three in 145 or 99% of the items as indicated by the Pearson product-moment correlation

coefficient procedure (Cohen, 1988). This indicates that there was little value in a fourth round of the Delphi technique in this study. The procedure indicated stability in the data.

The Wilcoxon matched-pairs signed-ranks test was performed on each item of the 147 items (Table 8, p. 113). In the case of this statistical procedure, the lesser of the signed ranks of scores was used for this calculation. The p value was based on the probability of getting zero difference in the matched pairs score, signifying no change in answers from round two to round three. Twenty-seven items (18%) had a p value of 1.0000 indicating that there was no change in answers from round two to round three. In analyzing Table 7, p values less than .05 indicate significance. In this study no items were found to be significant at the .05 level. All 147 items (100%) did not change significantly from round 2 to round 3. This statistical procedure also indicated stability in the data.

Therefore, the mean and standard deviations, the Pearson product-moment correlation coefficients, and the Wilcoxon matched-pairs signed-ranks test are all in agreement as consensus was reached on 114 of the 147 items.

Conclusions

Based on the review of the literature and findings of this study, several conclusions were reached. These were:

1. The turfgrass industry will change rapidly into the year 2020 with increased emphasis on the need for expanded computer applications and training, more sophisticated maintenance equipment, more "on-line" training through the world wide web, environmental issues, contract services, new and better turfgrass cultivars, more education and certification, effective communication and people management skills,

expanded "treated" or reclaimed water use programs, integrated pest management, and best management practices. Continuing education will become increasingly important in order to keep all employees current with changing values and technology. Emerging new technologies, including equipment, cultivar development, and reclaimed water applications, will provide alternate approaches to problems throughout the turfgrass industry.

2. The panel of experts nominated in the turfgrass industry are considered opinion leaders in the turfgrass field. The 25 participating members of the panel of experts in this study were either in prominent positions in the turfgrass field with 13 (52%) being university educators (teaching, research, or extension), 4 (16%) were professional association directors, 3 (12%) were in turfgrass business and industry, 2 (8%) were turfgrass consultants, 2 (8%) were golf course superintendents, and 1 (4%) was a federal researcher. All twenty-five experts were male and 24 were Caucasian and one mixed race. They were well-educated with 3 having bachelor's degrees, 5 having master's degrees, and 17 having doctorate degrees. The group had a total of 806 years experience with a mean of 32.2 years of experience in turfgrass. Respondents ranged in age from 44 to 83 years of age with a mean of 57.6 years.

3. The Delphi technique was successful in effecting consensus among a panel of turfgrass experts regarding future characteristics of the industry. Using descriptive statistics, responses were considered stable from round two to round three, thus, another round of the Delphi technique would not have shown significant changes in response.

4. There will be increased employment opportunities for highly trained employees in turfgrass, and a corresponding need for up-to-date training programs in turfgrass. Emerging technologies will provide newer and different jobs requiring specific problem-solving skills and effective communication skills. Professional and trade organizations will be more active in continuing education and lifelong learning.
5. There is a need to continuously update the turfgrass curriculum content in agricultural education programs. Turfgrass industry and discipline leaders should be used as resources in the development and updating of curricula. Specific curriculum subject areas identified in this study are outlined in the recommendations.

Implications

As a result of the findings and conclusions presented in this study, the following implications are presented:

1. The turfgrass industry will likely continue to provide opportunities for employment of effectively trained employees. And, agricultural education programs will likely continue to offer the turfgrass option. Furthermore, agricultural education teachers will likely need more assistance in adapting to and managing change. And, curriculum specialists will likely be employed in each agricultural education district office to provide assistance in preparation and implementation of the curriculum.
2. Leaders in the turfgrass industry are recognized as opinion leaders and are considered capable of forecasting the future of the industry. It is probable that these opinion leaders in the turfgrass industry can best determine the

content of turfgrass course work in agricultural education to prepare students for future turfgrass jobs.

3. The Delphi technique is effective in achieving consensus and will be more likely utilized in determining curriculum content.
4. There will likely be increased opportunities in the turfgrass industry for effectively trained employees with high school, vocational school and technical college education, as well as graduates of baccalaureate, masters, and doctoral programs. Furthermore, vocational and technical programs will likely need to emphasize and teach communications and human relations skills, as well as critical thinking and problem-solving skills. In addition, turfgrass enterprises will likely further promote training and continuing education for their employees as lifelong learning is realized.
5. The specific curricula subject areas outlined in the recommendations are based on the opinions of the most frequently nominated turfgrass experts in the United States. Thus, it is probable that they be consulted and their services utilized in updating turfgrass curriculum in agricultural education programs.

Recommendations

As a result of this research study, it is recommended that:

1. The Delphi technique should be employed as a common method to project curriculum content for agricultural education course work.
2. The turfgrass curriculum in agricultural education should be continuously updated using leaders in the turfgrass profession as resources in the planning and development of curricula. The curriculum should be updated

every five years so that students will be prepared for all but the most recent advances in technology. This would benefit both the turfgrass industry and the vocational education curriculum specialists.

3. Teachers of agricultural education should be continuously updated with the assistance of turfgrass industry resource people. Prospective teachers should be required to take course work in turfgrass. The content of this course work should have been kept current utilizing futuristic methods. Workshops and seminars should be conducted on a regular schedule and include representatives from turfgrass enterprises, public and private.
4. Post-secondary vocational programs should offer more educational services for the turfgrass industry. Most of the continuing education programs currently being offered are directed towards restricted use pesticide licensing. Adult training and continuing education for industry employees is a need that vocational education at the post-secondary level can further provide.
5. As opportunities increase in the turfgrass industry, turfgrass course work in agricultural education should be expanded and emphasized. Recruitment of students into turfgrass programs should be based on expanding career opportunities. Groups that are traditionally lacking in representation in turfgrass, such as minorities and women, should be actively recruited into turfgrass programs. Employment opportunities for students with turfgrass beyond the secondary level should be included in the curriculum. The turfgrass industry should be viewed with a continuing positive and professional image, and principles of professionalism, etiquette, and ethics should be included in the curriculum.

6. Curricula for turfgrass course work in agricultural education should be expanded to include the application of the basic cultural practices of mowing, fertilization, and irrigation. The students should be prepared for lifelong learning through continuing education, whether private or public. The turfgrass industry has become more complex requiring more advanced and refined job skills. Communications, social, and problem-solving skills should be included in the curriculum. Students should be exposed to environmental concerns, worker safety, economics, and governmental regulations that impact production, maintenance, and management of turfgrass. Furthermore, future generations of turfgrass employees will further need to assimilate knowledge of behavioral science and social-cultural systems into biological and technical conceptions of turfgrass.
7. The curriculum content identified by this study should be included in the turfgrass curriculum in agricultural education. The 32 specific content areas are:

    Computer competency and applications

    World wide web training and competency

    Sophisticated turfgrass maintenance equipment and operation

    Environmental concerns and water conservation and use

    Environmental stewardship

    Contractual services in turfgrass maintenance

    New cultivar understanding

    Certification needs

    Effective communication skills

    Human resource management

Risk management

Business management skills

Understanding and complying with environmental regulations

Integrated pest management programs

Continuing education

Lifelong learning

Best management practice programs

Chemical fate

Wildlife and plant preservation

Natural area protection

Recordkeeping

Nutrient management programs

Public relations

Pesticide application

Consulting services

Remote sensing technologies

Genetic engineering

Ecology services

Management companies

Pest scouting

Professional and trade organizations

Ethics

Suggestions for Further Study

1. Further research should be conducted to more specifically determine futuristic trends in different segments of the turfgrass industry (i.e., sod production, commercial lawn care, and sports field management, etc.)
2. Further study should be conducted on why the items were ranked in the category "Undecided."
3. The comments from the panel of experts should be analyzed and identified as either positive, negative, or problematic to further understand their value in the identification of curriculum content.
4. A study should be conducted at the state and/or regional level to determine if there are any major differences from the results of this national study.
5. The specific curriculum content areas should be used in the development of curriculum competencies.
6. A replication of this study should be conducted at least every five years to determine if significant changes have occurred.

Summary

The turfgrass industry will change rapidly into the year 2020 and the Delphi technique was successful in effecting consensus among a panel of turfgrass experts regarding the future characteristics of the industry. These characteristics are applicable in the development of curriculum content and specific program competencies in educational programs in agriculture. Continuously updating this content will result in marketing a better graduate to fill employment opportunities requiring highly trained employees in turfgrass.

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