Turf for Texans: Basic to Advanced Turfgrass Instructional Modules for the Texas Master Gardener Program

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RESEARCH PAPER

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Abstract

State budgets for extension programming continue to decline nationwide, despite rising demand for educational programs at the local level. Turfgrass specialists and extension educators responsible for developing educational materials in the Texas Master Gardener Program sought stakeholder input for an innovative curriculum by using innovative data collection methods. The purpose of this study was to gather stakeholder input for the most Frequently Asked Questions (FAQs) in basic to advanced turfgrass management curricula for the *Turf for Texans* Master Gardener Program. A proportional stratified sample (n = 66) of county agents, master gardener program coordinators, and volunteers from 11 Texas Cooperative Extension Service districts responded to this Web-based, modified Delphi study.

Participants identified, ranked, and rated 37 FAQs in the basic modules (Introduction to Texas Lawn Care, How Lawn Grasses Grow, and Grass Species and Varieties Adapted for Texas) and 42 FAQs in the advanced modules (Nutrient Management, Irrigation Matters in Texas, and Pests and Integrated Pest Management). Turfgrass specialists and extension educators used the prioritized information to further develop the *Turf for Texans* instructional modules.

Interactive, online data collection methods provided rapid feedback in the consensus-building process. In times of shrinking financial support for extension programming, agricultural communications professionals and county extension agents can use this methodology to develop similar consensus-building activities for other extension programming issues. Stakeholder input can be achieved, with minimum time and expense, while curriculum developers will not waste time developing materials that clientele will not find useful.

Keywords: Extension, Master Gardeners, FAQs, Delphi, CD-ROM Instructional Modules

Introduction

Cooperative extension has a rich history of developing outreach programs that have a direct and relevant impact on stakeholders' lives. In order to develop relevant programming, clientele are asked for input during the development stages for many programs. Often, requesting and incorporating timely and relevant input to program curricula can be a time-consuming, expensive process. Decreasing state and federal resources are forcing extension personnel to seek alternative methods to continue their rich tradition of stakeholder input in the program curricula development processes.

Extension education programs have traditionally been offered in a workshop format. This format has allowed for direct interaction with participants, which fosters knowledge and experience exchanges that provide ideas for future workshops. Some drawbacks of the workshop format include the amount of time needed to complete the workshop and fiscal constraints placed on extension personnel.

Conceptual Framework

The cooperative extension service uses various learning formats in delivering educational programs to extension clientele. These formats have included television, interactive satellite, and Web-based delivery methods.

Closed circuit television was the learning format used in Indiana to teach swine breeding to extension clientele. The topics included reproduction, housing, nutrition, and disease immunity. Closed circuit television sessions replaced county swine producer meetings. Results from pre- and post-tests to measure learning comprehension showed that participants' learning scores were increased by over 27% (Branson & Davis, 1985). This early study showed that

extension clientele were willing to learn, and did learn technical subject matter, using new educational technologies.

A program on weight control and exercise was delivered via cable television to 300 leaders from northeastern Minnesota (Sunnarborg, Bradley, & Haynes, 1988). A group of fifty experimental subjects were selected from the pre-registrants. A group of fifty control subjects were selected from previous extension program participants. The control group was not allowed to view the cable television program. A pre- and two post-tests were administered to the groups. A total of 25 control and 21 experimental subjects completed all the tests. The findings revealed that the experimental group increased their knowledge scores by 23%. The experimental group had a higher percentage of participants who followed a planned exercise plan after the program. Participants from each group did exercise three or more times a week and reduced their caloric intake. The results indicate that television could be used effectively to teach weight control and exercise issues to extension clientele.

Educational delivery methods and techniques have changed much since 1988. Researchers in Texas used interactive video, the Trans-Texas Videoconference Network, to produce a seven-hour Food Protection Management instructor training seminar in 1996. Dooley, Van Laanen, and Fletcher found that a majority of students (71.9%) felt the training at a distance was as effective as face-to-face training. Students recommended overwhelmingly (96.6%) that technology be used for future trainings. Students' self-reported knowledge levels also showed a substantial increase in knowledge of food protection management techniques. Students who reported their knowledge levels as "very knowledgeable," increased from 14.6% to 51.7%. Prior to the training session, those reporting little knowledge of the material was 21.4% of the population. No students reported they had "little knowledge" after the training. Although this

study used distance education techniques only, it can be concluded that this delivery method was successful in teaching food protection management techniques to students in Texas.

Researchers in Arizona compared students in a traditional sports nutrition workshop with students in a workshop taught using satellite television. Ricketts, Hoelsher-Day, Begeman, and Houtkooper (2001) reported no significant differences between groups in average scores on evaluation items. Their results further supported the idea that learning comprehension was not dependent on delivery format used to teach the subject.

A traditional water quality workshop was compared with a satellite broadcast in Pennsylvania. Swistock, Sharpe, and Dickison (2001) found the satellite program to be as effective as the traditional workshop. The workshop objective (at least 20% of workshop participants will test their water after the program) was met easily by both the traditional and satellite students. Researchers also measured how many attendees learned at least two new ideas in both formats. Results indicated that twice as many individuals in the satellite program learned two new ideas when compared to the traditional workshop format. Another finding revealed that the cost of the satellite program was 2.3 times less than the cost of the traditional workshop sessions. This study supports the idea that distance education formats can be as effective, and less expensive to deliver, as traditional face-to-face workshops.

Rost and VanDerZanden (2002) used a basic soils online learning module, developed for the Oregon State University Extension Service Master Gardener Program, to compare learning performances of two groups of extension clientele. One group of participants completed the online module in their homes, while the other group completed the module in a face-to-face classroom setting. Learning (knowledge gain scores) was evaluated using a pre-/post-test design. Rost and VanDerZanden found no significant differences in knowledge gained between the

groups. Their results indicated that educational delivery format was not a factor in learning comprehension.

Alternative methods for collecting stakeholder input to extension program curricula provide extension personnel with timely, relevant feedback during the curricula development process. One inexpensive alternative to holding several face-to-face or traditional postal mail surveys is achieved through the modified Delphi technique, using a Web-based medium.

The Delphi technique was developed by the Rand Corporation in the late 1950's as a forecasting methodology. Unlike the nominal group process, the Delphi does not require face-to-face participation. It is a "systematic solicitation and collation of judgments on a particular topic through a set of carefully designed sequential questionnaires interspersed with summarized information and feedback of opinions derived from earlier responses" (Debecq, Van de Ven, & Gustafson, 1975, p. 10). The Delphi technique affords researchers an opportunity to collect large amounts of input over a wide geographic area. Delphi techniques incorporate expert panel members' opinions, value judgments, and agreement in the consensus-building process (Somers, Baker, & Isbell, 1984).

Decisions about which participants to invite to a Delphi should be considered carefully. Ludwig (1997) recommended:

> Randomly selecting participants is NOT acceptable. Instead, characteristics and qualifications of desirable respondents should be identified and a nomination process used to select participants. Because the group number will be small (12-15), the researcher needs to locate and target individuals who are "expert," have knowledge and experience to base their futuring activities upon, and are self-motivated. Delphi should

not be used with groups that have difficulty in reading or expressing themselves in written communication. (p. 2)

Ladner, Wingenbach, and Raven (2002) found Web-based and traditional paper-based survey methodologies were equally valid and reliable for social science research. A difference between the two groups resulted in the aggregate response rate. The Web-based group's response rate exceeded the traditional group, 72 to 7, within the first week of data collection. This study provides strong evidence for using Web-based surveying methods in social science research.

Previous studies have shown repeatedly that learning technical subject matter is not dependent upon the educational delivery system used to teach extension clientele. While closed circuit television and rapid Internet access may have limitations in rural households, the relatively low cost of computers with CD-ROM drives has not limited families from purchasing and using these technologies in their homes. No studies were found which tested the learning levels of participants using the CD-ROM format. However, prior to testing the CD learning format, it is important to be mindful of extension stakeholder input in developing the materials for CD-based instructional products. Decreasing state funds for extension programming have forced many states to seek alternative methods to continue providing quality educational programs for their clientele at the county level. Extension clientele input for developing instructional modules in the *Turf for Texans Master Gardener Program* was sought using innovative methods.

Purpose and Objectives

The purpose of this study was to gather stakeholder input for the most Frequently Asked Questions (FAQs) in basic to advanced turfgrass management curricula for the *Turf for Texans* Master Gardener Program. The following objectives guided this study.

1. Identify FAQs for three basic and three advanced turfgrass instructional modules in the *Turf for Texans* Master Gardener Program.
2. Rank the importance of the identified FAQs.
3. Rank participants' agreement levels of the identified FAQs for inclusion in the basic and advanced turfgrass instructional modules.

Methods and Procedures

Descriptive survey methodology, with a modified Delphi technique, was used in this study. Web-based survey data collection methods (Ladner, Wingenbach, & Raven, 2002) were used after obtaining approval to conduct the study through the Texas A&M University Institutional Review Board (#2002-0276).

The target population ($N = 339$) consisted of all Texas county extension agents, program coordinators, and volunteers who participated in a Texas Master Gardener Program during 2003. A proportional stratified sample from 11 Texas Cooperative Extension Service districts was obtained by contacting two agents from each district, who in turn, chose at least one coordinator and one volunteer from their respective master gardener programs. All participants were sent formal letters requesting their participation in the study. The sample consisted of 22 agents, 22 program coordinators, and 22 volunteers ($n = 66$).

The first instrument consisted of open-ended questions designed to obtain a wide range of responses. Using their own master gardener experiences, county agents, coordinators, and

volunteers identified the top five FAQs for basic and advanced turfgrass management in each of six *Turf for Texans* instructional modules. The identified FAQs were used to develop content for the modules. Electronic mail reminders were sent to non-respondents to complete round one; all data were collected in three weeks. A total of 20 agents, 4 coordinators, and 12 volunteers (n = 36) from 33 counties in the 11 districts responded to round one, resulting in a 55% response rate.

A Q-sort (Kerlinger, 1986) committee formulated the second instrument using participants' FAQs from round one data collection. A team of extension turfgrass specialists, graduate students, and agricultural education faculty members condensed and combined initial responses into statements without altering their original meanings. A panel of experts from the Departments of Soil and Crop Science and Agricultural Education reviewed the instrument for face validity.

In the second round of data collection, respondents were instructed to read each FAQ for each module and rate the level of importance (Likert-type scale: 1 = Not Important…4 = Very Important) for including the FAQ in its respective turfgrass instructional module. Electronic mail notices requesting participation in round two were sent to all 66 participants. A total of 16 agents, 7 coordinators, and 12 volunteers (n = 35) responded, resulting in a 53% response rate. All data were collected in two weeks.

Upon conclusion of data collection in the second round, all statements were ranked according to their grand mean scores, sorted by level of importance, and posted in a third instrument on a secure Internet site. The third instrument allowed respondents to rate their agreement levels (Likert-type scale: 1 = Strongly Disagree…4 = Strongly Agree) with the importance levels for each FAQ in each turfgrass instructional module. Electronic mail notices requesting participation in round three were sent to all 66 participants. A total of 15 agents, 5

coordinators, and 10 volunteers (n = 30) responded, resulting in a 46% response rate. All data were collected in 10 days.

Descriptive statistics were derived for each instructional module. ANOVA tests were used to determine significant differences among subgroups. Instrument reliability was assessed using Cronbach's alpha coefficient in rounds two and three. Module 1 (Introduction to Texas Lawn Care) resulted in a Cronbach's alpha of .83 in round two and .74 in round three. Module 2 (How Lawn Grasses Grow) had Cronbach's alphas of .82 and .89. Module 3 (Grass Species and Varieties Adapted for Texas) had Cronbach's alphas of .77 and .91. Module 7 (Nutrient Management) resulted in a Cronbach's alpha of .86 in round two and .91 in round three. Module 8 (Irrigation Matters in Texas) had Cronbach's alphas of .84 and .91. Module 9 (Pests and Integrated Pest Management) had Cronbach's alphas of .89 and .87.

Findings

Due to space limitations, only results from the third (final) round of the modified Delphi are presented. Also, the basic and advanced modules were part of a larger study that included three "intermediate" modules, which are not presented in this paper.

Thirty-six respondents with Texas Master Gardener Program experiences ranging from less than one to over 20 years (M = 4.73), identified the top five FAQs for turfgrass management in their Texas Master Gardener Programs. After eliminating duplicates, a total of 10 FAQs were identified for Module 1 (Introduction to Texas Lawn Care). Table 1 illustrates respondents' agreement levels for the 10 FAQs in Module 1 (Introduction to Texas Lawn Care). Results are sorted by descending grand means.

Table 1

Descriptive Statistics: Introduction to Texas Lawn Care Instructional Module (n = 30)

	M[a]			
FAQs	Agents (*n* = 15)	Coordinators (*n* = 5)	Volunteers (*n* = 10)	Grand (*n* = 30)
What determines if a lawn is healthy?	3.15	3.40	3.00	3.14
Are there benefits of having turf in my landscape?	3.08	3.40	3.00	3.11
What are the environmental benefits of turf?	3.00	3.40	3.00	3.07
What are the different uses of turfgrass?	3.00	3.20	3.10	3.07
Are there different levels of lawn maintenance (low, medium, or high and which level should I use for my lawn?	3.00	2.80	3.10	3.00
What is the definition of a "good" lawn?	3.08	2.80	2.80	2.93
How can I get help taking care of my lawn?	2.92	2.60	2.70	2.79
What is the value of the turfgrass industry: growers, retailers, maintenance?	2.85	2.60	2.80	2.79
What is the basic terminology used in lawn care?	2.85	2.60	2.78	2.78
What are the good things about having a lawn?	2.69	2.60	2.70	2.68

Note. Four-point, Likert-type scales measured levels of importance. [a]1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree.

The consensus-building process of this modified Delphi technique was useful in helping respondents prioritize the most important FAQs in the Introduction to Texas Lawn Care instructional module. Overall, the FAQ deemed most important in round two [*Are there different levels of lawn maintenance (low, medium, or high); which level should I use for my lawn?*], dropped to fifth most important in the third round. The second (*what determines if a lawn is healthy*) and third (*are there benefits of having turf in my landscape*) most important FAQs in round two became the first and second most important in round three. No significant differences were found among respondents' agreement levels of the FAQs for this instructional module.

A slightly similar situation occurred between rounds when respondents rated their agreement levels of the FAQs for Module 2 (How Lawn Grasses Grow). The two most important FAQs in round two (*what techniques can I use to plant grass* and *what are the differences*

between warm and cool season grasses) switched positions of importance in round three (Table 2). Although their overall agreement increased for the FAQ concerning *keeping a lawn green all winter*, respondents were least concerned about this FAQ in round three. No significant differences were found among respondents' agreement levels of the FAQs for this instructional module. Results are sorted by descending grand means.

Table 2

Descriptive Statistics: How Lawn Grasses Grow Instructional Module (n = 30)

	M^a			
FAQs	Agents (n = 15)	Coordinators (n = 5)	Volunteers (n = 10)	Grand (n = 30)
What are the differences between warm and cool season grasses?	3.21	3.40	3.40	3.31
What techniques can I use to plant grass?	3.29	3.20	3.30	3.28
Why do you sod some grasses and others you seed?	3.15	3.60	3.20	3.25
Why is leaf area important for growth?	3.07	3.00	3.30	3.14
What conditions are necessary for healthy stem growth?	3.00	3.00	3.40	3.14
What temperatures are best for root and shoot growth?	3.14	3.40	3.00	3.14
How do turfgrass roots grow?	3.07	3.20	3.00	3.07
Are there differences in how turfgrass grows, compared to other landscape plants?	2.93	3.00	3.00	2.97
Where is the growing point on grass?	2.93	3.00	3.00	2.97
What conditions induce dormancy in turfgrass?	3.07	2.75	2.90	2.96
What is the difference between a stolon, a rhizome, and a tiller?	3.00	2.60	2.90	2.90
Which grass produces the least amount of seed heads?	3.00	3.00	2.70	2.90
What is the anatomy of lawn grass?	2.93	2.40	2.90	2.83
How can I keep my lawn green all winter?	2.86	2.80	2.70	2.79

Note. Four-point, Likert-type scales measured levels of importance. [a]1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree.

Only the FAQs identified in the third basic turfgrass management instructional module (Grass Species and Varieties Adapted for Texas) had some consistency between the second and third rounds of this modified Delphi study (Table 3). The FAQ, "*what factors should be*

considered when selecting a lawn grass," was rated most important in both rounds. The *most economical grass to grow* and *having several grass species in one yard* were the two FAQs ranked lowest in the third round, except they switched positions. No significant differences were found among respondents' agreement levels of the FAQs for this instructional module. Results in Table 3 are sorted by descending grand means.

Table 3

Descriptive Statistics: Grass Species and Varieties Adapted for Texas Instructional Module (n = 30)

	M^a			
FAQs	Agents (n = 15)	Coordinators (n = 5)	Volunteers (n = 10)	Grand (n = 30)
What factors should be considered when selecting a lawn grass?	3.47	3.60	3.40	3.47
How do I decide which grass is best suited for my area?	3.47	3.60	3.40	3.47
Which grass variety is best suited for me in my area of Texas?	3.41	3.80	3.40	3.47
What is the most drought-tolerant turfgrass?	3.29	3.80	3.60	3.47
What is the best turfgrass for shaded areas?	3.35	3.60	3.50	3.44
Which turfgrass will tolerate heavy traffic?	3.35	3.40	3.60	3.44
What is the best turfgrass for sunny areas?	3.29	3.40	3.50	3.38
What are the grass species and their areas of adaptability?	3.24	3.40	3.30	3.28
What is the best grass for my lawn?	3.24	3.40	3.20	3.25
What is the most cold-tolerant turfgrass?	3.06	3.00	3.10	3.06
Are there differences between varieties within species of turfgrasses?	3.00	3.20	3.00	3.03
Is it okay to have several grasses in one yard?	3.06	3.20	2.90	3.03
What is the most economical grass to grow?	3.00	2.80	3.10	3.00

Note. Four-point, Likert-type scales measured levels of importance. [a]1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree.

In the "advanced" Nutrient Management instructional module, the top two FAQs from round two (*when to fertilize* and *how often to fertilize*) remained the same for round three. Table 4 illustrates respondents' agreement levels for the 15 FAQs in Module 7 (Nutrient Management).

No significant differences were found among respondents' agreement levels of the FAQs identified in the Nutrient Management instructional module. Results are sorted by descending grand means.

Table 4

Descriptive Statistics: Nutrient Management Instructional Module (n = 30)

	M[a]			
FAQs	Agents (*n* = 15)	Coordinators (*n* = 5)	Volunteers (*n* = 10)	Grand (*n* = 30)
When do I need to fertilize?	3.47	3.80	3.70	3.60
How often should I fertilize?	3.47	3.80	3.60	3.57
How much fertilizer should I apply?	3.47	3.60	3.70	3.57
What do the numbers on the fertilizer bag mean?	3.40	3.20	3.80	3.50
Can I use a "weed and feed" product?	3.53	3.00	3.50	3.43
What are some of the environmental concerns regarding fertilization?	3.47	3.40	3.40	3.43
What are the differences between pelletized, soluble, and slow release fertilizers?	3.40	3.40	3.40	3.40
Why is a soil test important?	3.33	3.40	3.44	3.38
How and where can I get my soil tested?	3.27	3.20	3.67	3.38
Are there any real differences between all those fertilizers at the garden center?	3.40	3.40	3.30	3.37
Should all the recommended amounts of nutrients be added at one time or divided into several applications?	3.33	3.60	3.10	3.30
What are the differences between organic and inorganic fertilizers?	3.27	3.60	3.20	3.30
If I fertilize more, I have to mow more often; what is a "happy" medium?	3.13	3.20	3.00	3.10
If I have old fertilizer, can I use it now instead of buying more?	3.13	2.80	3.10	3.07
What time of day should I apply fertilizer?	2.93	3.00	3.00	2.97

Note. Four-point, Likert-type scales measured levels of importance. [a]1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree.

A similar situation occurred between rounds when respondents rated their agreement levels of the FAQs for Module 8 (Irrigation Matters in Texas). The two most important FAQs in round two (*irrigation frequency* and *indicators that lawns need watering*) maintained their

relative importance during round three (Table 5). Again, no significant differences were found among respondents' agreement levels of the FAQs identified in the Irrigation Matters in Texas instructional module. Results are sorted by descending grand means.

Table 5

Descriptive Statistics: Irrigation Matters in Texas Instructional Module (n = 30)

	M^a			
FAQs	Agents (n = 15)	Coordinators (n = 5)	Volunteers (n = 10)	Grand (n = 30)
How often should I water my turfgrass?	3.67	4.00	3.78	3.76
What is a good indicator that my lawn needs watering?	3.67	4.00	3.70	3.73
How much water does my lawn need?	3.60	3.80	3.70	3.67
When should I water my lawn?	3.60	3.80	3.60	3.63
What are the signs of drought stress?	3.53	3.80	3.70	3.63
Water runs off my lawn while watering - Why?	3.53	3.60	3.60	3.57
Do trees in the landscape affect the amount of water required by turfgrass?	3.60	3.80	3.30	3.53
How do I determine "inches of water" per watering?	3.60	3.20	3.60	3.53
Should I water shady and sunny areas differently?	3.40	3.60	3.30	3.40
What is the best sprinkler system to use on turfgrass?	3.47	3.40	3.30	3.40
How deep should the moisture front be for adequate turf irrigation?	3.47	3.40	3.30	3.40
Does water quality (in different parts of Texas affect turfgrass?	3.40	3.40	3.40	3.40
Of loamy and sandy soils, which holds the most available water?	3.07	3.60	3.44	3.28
What is meant by uniformity of application?	3.27	3.20	3.20	3.23
How do I use the PET Network information to determine when to water?	2.93	2.80	2.90	2.90

Note. Four-point, Likert-type scales measured levels of importance. [a]1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree.

The FAQs identified in the third advanced turfgrass management instructional module (Pests and Integrated Pest Management) maintained some consistency between the second and third rounds of this modified Delphi study (Table 6). "*What common Texas turfgrass diseases might attack my lawn*" moved from third to first most important FAQ in round three; "*What*

common Texas insects attack lawns" dropped from first to second most important FAQ in this round. No significant differences were found among respondents' agreement levels of the FAQs identified in the Pests and Integrated Pest Management instructional module. Results in Table 6 are sorted by descending grand means.

Table 6

Descriptive Statistics: Pests and Integrated Pest Management Instructional Module (n = 30)

	M[a]			
FAQs	Agents (*n* = 15)	Coordinators (*n* = 5)	Volunteers (*n* = 10)	Grand (*n* = 30)
What common Texas turfgrass diseases might attack my lawn?	3.60	3.60	3.80	3.67
What common Texas insects attack lawns?	3.53	3.60	3.70	3.60
How can I determine if I have a disease problem or an insect problem?	3.53	3.60	3.60	3.57
What is the difference between pre- and post-emergence weed control?	3.33	3.40	3.80	3.50
How do I control insects in my lawn?	3.40	3.40	3.40	3.40
Should I use a weed and feed or separate fertilizer and herbicide?	3.27	3.60	3.50	3.40
How do I prevent disease from attacking my lawn?	3.27	3.40	3.50	3.37
What is Integrated Pest Management (IPM)?	3.27	3.40	3.40	3.33
Should I spray my lawn to prevent diseases?	3.33	3.20	3.20	3.27
What are organic controls for different insects, diseases, and weeds that affect Texas turfgrass?	3.27	3.40	3.20	3.27
Is weed control in some turfgrasses more of a problem than in others?	3.27	3.20	3.20	3.23
Lawn bugs, weeds, and diseases overwhelm me; what can I do about these pests?	3.27	3.40	2.80	3.13

Note. Four-point, Likert-type scales measured levels of importance. [a]1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree.

Conclusions/Recommendations

The purpose of this study was to gather stakeholder input for the most Frequently Asked Questions in basic to advanced turfgrass instructional modules for the *Turf for Texans* Master Gardener Program. From the findings, it can be concluded that *lawn health, differences between warm and cool season grasses,* and *turfgrass selection factors* were the most important FAQs to include in the basic turfgrass management curricula. According to our experts, *when to fertilize, frequency of irrigation,* and *lawn diseases* were deemed the most important FAQs for inclusion in the advanced turfgrass curricula.

By focusing efforts on developing the key topics identified by a stakeholder group, curriculum developers can appeal to the needs and wants through a targeted curriculum. One of the first steps in designing adult education curricula is to conduct a needs assessment (Sork & Caffarella, 1989). Knowles, Holton, and Swanson (1998) provided two assumptions about adult learning that are critical in the needs assessment phase. These assumptions are the need to know and the learner's self-concept. Essentially, adults need to know why they need to learn something new. Also, adults will resist and resent (learner's self-concept) situations in which they feel others are imposing their will on them (Knowles, Holton, & Swanson). Such assumptions about adult learning provide important reasons for using stakeholder input during curriculum development.

The topics (FAQs) deemed most important, or critical, by stakeholders should become the key points used to develop the turfgrass management curricula. The FAQs deemed less important could be used as complimentary or supplementary information that is included in the instructional modules, but only as time and space allow. A curriculum development plan based on these observations allows stakeholders or prospective students the opportunity for ownership

of the instructional materials. Through participation in the curriculum development phase, learners come to understand why they need to learn new material and should not resist the material being presented because of their ownership in the curricula. Using this information, curriculum developers can design a turfgrass management curriculum that meets the needs of the targeted clientele.

It is important to remember that respondents who worked most closely with the *Turf for Texans* Master Gardener Program identified and ranked the FAQs for these instructional modules. Additional research that includes input from state extension turfgrass specialists from all southeastern states may further refine the subject matter importance for each instructional module. Also, the preferred delivery formats and comprehension rates of such materials should be investigated with adult learner groups in various (reading skill levels, non-English speaking audiences, etc.) settings.

Although the identified and ranked FAQs for the basic to advanced turfgrass management instructional modules proved useful in developing curricula for the *Turf for Texans* Master Gardener Program, the authors believe the most important finding was derived from the methodology used to gather stakeholder input. The findings revealed that the modified Delphi technique through online data collection techniques could be used to effectively determine stakeholders' needs in designing basic to advanced turfgrass management curricula. Participants were able to incorporate their opinions (round one), value judgments (round two), and agreement levels (round three) in a consensus-building process for the FAQs used in the turfgrass management instructional modules.

Additionally, stakeholder input was gathered in an economical, shortened frame (6.5 weeks), confirming the Web-based surveying methods proposed by Ladner, Wingenbach, and

Raven (2002). The modified Delphi technique used in this study provided consistency in the data collection procedures, as proposed by Somers, Baker, and Isbell (1984). By including stakeholders' input to build consensus on relevant topics for extension programs, extension personnel can focus greater attention on developing relevant educational materials for their clientele. We recommend these methodologies (modified Delphi technique and Web-based data collection procedures) be used by agricultural communications professionals and extension personnel when seeking stakeholder input for instructional materials development.

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