

THE DELPHI TECHNIQUE: AN INFORMAL HISTORY OF ITS USE IN AGRICULTURAL EDUCATION RESEARCH SINCE 1984.

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Abstract

This investigation addresses the use of the delphi technique in agricultural education research from 1984 to the present. Delphi has been used steadily in the discipline over the course of that time with the exception of an activity peak in 1991-1993. Its most frequent application is in the area of curriculum planning. Delphi appears to be a unique alternative to tie more traditional kinds of evaluation and survey work and will likely see continued use in the future of agricultural education research. However, there are some indications that the validity of the technique, relative to its use in agricultural education, should be tie focus of additional study.

The delphi technique refers to a methodology developed at The Rand Corporation in the late 1940's designed to elicit expert opinion in a systematic manner (Sackman, 1974). Delphi's initial application was in the area of technological forecasting. The subsequent two decades saw the use of delphi expand into investigations of the fields of business, science, medicine, and education. Helmer and Rescher (1959) described delphi as a "...carefully designed program of sequential individual interrogations (best conducted by questionnaires) interspersed with information and opinion feedback derived by computed consensus from the earlier parts of the program."

The delphi technique was roundly criticized by Sackman (1974). However, his description of what he called a "conventional delphi" provided an excellent overview of the method. Sackman first observed that the application objectives of delphi were three-fold: forecasting events; generating quantitative estimates; and, producing qualitative evaluations. The application objectives are usually driven by a need to build consensus although, in some instances, the goal may be heuristic in nature.

Sackman listed the following characteristics

of a conventional delphi:

- The data collection is via a structured, formal questionnaire administered to a group of individuals identified as appropriate subject matter specialists. There is no definitive questionnaire kind or format.
- The delphi director or the participants may generate the questionnaire items. In some cases, it may be a cooperative effort.
- The participants receive specific instructions to ensure the proper completion of the questionnaire.
- The questionnaire is administered to the participants on two or more occasions.
- All administrations of the questionnaire following the first one include statistical feedback from the previous round.
- The statistics are typically a measure of central tendency and one of variability.
- The delphi director may solicit verbal feedback from some or all of the participants and publish that information on subsequent rounds.

- Individual responses are kept anonymous during all administrations of the questionnaire.
- The delphi director generally requires written justification for extreme responses.
- The cycle of iteration and feedback continues until the delphi director determines that a sufficient convergence of opinion is reached.

Helmer (1966) stated that the virtue of the delphi technique lay in its requisite elimination of face-to-face confrontation by "...substituting a computed consensus for an agreed-on majority opinion." Delphi attempts to resolve several problems often associated with committee activities such as the undue influence of powerful personalities, the individual's desire to conform to majority opinion, and the difficulty of relinquishing support for an opinion once it is voiced publicly.

Purpose and Objectives

The intent of this study was to examine how investigators have used the delphi technique in research in agricultural education (and closely related fields) during, roughly, the past decade. Delphi has been a frequently used methodological tool in the agricultural education discipline but no recent, organized overview of that use is extant in the literature. The absence of information concerning agricultural education research inquiries via delphi suggests that there has been a lack of coordinated research efforts using the methodology and that, currently, there may be a need to address delphi's continued use within the discipline.

Methods and Procedures

The study is a review of the literature where investigators applied the delphi technique to examine questions related to agricultural education. The review was not exhaustive but, confined to four sources and limited to descriptions that specifically mentioned the delphi technique or a modification of delphi. There is one caveat-publications in the

literature dealing with topics closely related to agricultural education (or used by agricultural educators) have been included due to the inherent difficulty in distinguishing topics as being strictly of an agricultural education research nature.

The sources included three peer reviewed journals; Journal of Agricultural Education (and its predecessor, Journal of the American Association of Teacher Educators in Agriculture), Journal of Extension, and Journal of Vocational Education Research. The fourth source was Summaries of Research and Development Activities in Agricultural Education, included to account for dissertations, masters theses, and staff projects. These four serials were determined by the authors to constitute the most likely texts in which to locate research pertinent to the study. The time frame for the literature review was confined to 1984 through 1996.

Results and Findings

Nineteen articles appeared in the three peer reviewed journals named above where investigators employed the delphi technique or some modification. Coincidentally, nineteen abstracts in Summary of Research and Development Activities in Agricultural Education included descriptions of delphi or modified delphi as integral to specific investigations. Over that time and including all four sources, delphi found applications in agricultural education research, on average, twice a year from 1984 to 1990. However, 1991 witnessed a flurry of research activity involving delphi, with more than double the number of reports of delphi applications than the most active year preceding it (1989). Use of delphi tapered off slowly during 1992 and 1993. The numbers of its applications dropped to (or slightly below) pre- 1991 levels by 1994.

Journal Articles

Where articles describing the use of the delphi technique were published in peer reviewed journals, thirteen appeared in the Journal of

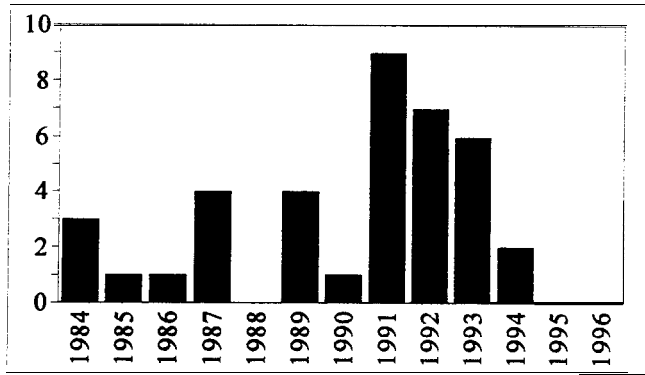


Figure 4 of investigations in which delphi was used

Agricultural Education, three in the Journal of Vocational Education, and three in the Journal of Extension. One of these papers was an analysis of the delphi technique relative to its possibilities for Extension research. Another article, a research publication, referred to the use of a quasi-delphi. Ten research articles described utilizing modified delphi approaches while the remaining seven did not qualify the use of the methodology, implying that they were conventional delphi applications.

The majority of studies where delphi was used dealt with some aspect of curriculum development (Sutphin & Camp, 1990; Camp & Sutphin, 1991; Chizari & Taylor, 1991; Frick, Kahler, & Miller, 1991; Frick, 1993). Three articles dealt with an evaluation of perceptions (Blezek & Dillon, 1991; McCampbell & Stewart, 1992; Tavernier & Hartley, 1994). The identification of research needs provided the focus for three more articles where the delphi technique was used (Buriak & Shinn, 1989; 1993, Branan & Rohns, 1991).

Determination of essential competencies is another area where the delphi technique has found applications (Johnson & Schumacher, 1989; Ruhland, 1993). Two research publications used delphi to identify critical resources (Kittridge, 1992; Hinton, 1994). Other articles engaged the delphi technique to: establish program objectives (Smith & Kahler, 1987); identify barriers to effective programming (Rennekamp & Gerhard, 1992);

provide a review of the delphi technique (Gamon, 1991), accomplish technological forecasting (Vamadore & Iverson, 1991).

No single author among those represented in the three refereed journals examined in this review appeared to have used the delphi technique with any high degree of frequency. Those individuals who were cited several times include P. Buriak, W.G. Camp, M.J. Frick, A.A. Kahler, G.C. Shinn, and H.D. Sutphin.

Abstracts in *Research and Developmental Activities in Agricultural Education Research*

Abstracts contained in the research summaries displayed the same variety of delphi applications as those published in the journals. Differences existed in research purpose (e.g., degree work, future publication, commissioned study), how delphi was applied, and topical matters of interest. Thirteen abstracts referenced the use of a modified delphi technique. Another three abstracts discussed, presumably, conventional delphis, and of the remaining three, one noted a structured delphi, one a multidisciplinary delphi, and another used a variant called the ethnographic delphi futures research. Investigators used the delphi technique nine times in research leading to a Ph.D. Six delphi applications were employed in research towards an M.S. Two students utilized the delphi technique while in pursuit of an Ed.S. In one case an abstract described a delphi application as the methodology used in a staff study! and another mentioned employing delphi in a state education funded project.

These nineteen research summaries can be classified in essentially the same manner as the delphi applications included in the peer reviewed journals, with the same cautionary note. Some abstracts describe work that quite likely transcends clear cut boundaries. Nonetheless, the descriptive categories used by the authors do convey the wide scope of delphi applications found in agricultural education research today. Curriculum development

was one of the primary uses for the delphi technique as mentioned in the abstracts (Sutphin, 1987, Hartsfield, 1991, Long, 1991, Jackson & Bowen, 1992, Hughes, 1993).

One aspect of delphi descriptions in the abstracts different from the peer reviewed journals was the more frequent use of the delphi technique to predict future technological developments (Polgreen, 1989, Vamadore, 1989, Collins, 1992, Embrick, 1992, McCallister, 1992).

Three studies focused on identification of barriers to progress in various topical areas in agricultural education (Bogges, 1985, Weerakkody, 1986, Moremodi, 1993). Two research activities described in the abstracts involved delphi in the identification of essential competencies specific to agricultural education students (Curry, 1984, Scanlon, et. al., 1984). An evaluation of perceptions directed toward change was accomplished twice in this time period (Casey, 1987, Harritt, 1987).

Unique uses of the delphi involved specification of certain personal qualities in student leaders (Murphy, 1993) and the identification of research priorities for agricultural research in production farming (Matsebula, 1984).

No single university was found to have described the use of delphi in agricultural education research significantly more frequently than any of the others represented in the abstracts. However, the University of Georgia at Athens reported the most delphi applications in the abstracts with a tally of four. The Pennsylvania State University at University Park followed with three delphi applications mentioned in the abstracts.

Conclusions and Implications

A number of interesting observations can be made from this history of the use of the delphi technique in agricultural education research since 1984. Delphi has obviously been widely used in

agricultural education research-especially in the area of curriculum planning. Although it is not employed with nearly the frequency of more traditional evaluation and survey techniques, the method does seem to have been accorded a reasonable degree of acceptance.

With regard to the flurry of research activity involving delphi in the early years of the 1990's little can be claimed in the way of a definitive explanation. It is, perhaps, most likely that the numbers of investigations during that time were the result of an earlier influential text, proceedings report, or peer reviewed journal article. It might be speculated that the Buriak and Shinn (1989) study was one such possible source of interest in delphi.

Attention should be paid to the discrepancy in frequency of delphi applications in forecasting technological advances as reported in the three peer reviewed journal articles included in this study versus those described in the Summaries of Research and Development Activities in Agricultural Education. If delphi is a useful tool in the prediction of future affairs, as its developers intended, it has a place in planning agricultural education to meet the needs of society in the future. The fact that only one delphi forecasting study appeared in a refereed article and five were described in the abstracts may indicate a certain degree of mistrust among agricultural education researchers concerning this particular use of delphi.

In a similar vein it was readily apparent that only one abstract, a doctoral dissertation, formed the basis for a paper in one of the three refereed journals reviewed for delphi applications. Interestingly enough, that dissertation was a delphi forecasting application-the only one uncovered among the peer reviewed journals examined. It does not seem likely that all of those graduate studies would have found their way into the research base outside of the mainstream agricultural education research journals. This may imply a lack of confidence in the delphi technique in general, or it may be indicative of some other inherent difficulty

in moving graduate work on to further publication.

One final implication of this review concerns the high proportion of studies where something other than a conventional delphi was described. Only ten articles employed a delphi without additional qualification. The majority used modifications and variants of the delphi technique. Little could be determined about the nature and extent of those modifications, etc., but the question should be raised about how far a methodology can be bent before it breaks. This suggests an avenue of further research regarding delphi-serious investigation into the validity of the technique in agricultural education research.

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