

Antonio Carlos Bramante \*



**A TÉCNICA DELFOS  
NA CONSTRUÇÃO CURRICULAR**

\* Doutor em Educação Física (The Pennsylvania State University/USA), Coordenador do Programa de Pós-Graduação em Educação Física da UNICAMP e Professor na Faculdade de Filosofia, Ciências e Letras de Sorocaba (Fundação Dom Aguirre).

## ABSTRACT

*Since it was first conceptualized almost 40 years ago, the Delphi technique has been through different phases, from secrecy and obscurity to extensive use and permanence. The idea of gathering a group of experts to, first forecast events and later assess complex issues, became popular in a number of fields, particularly in education. The systematic generation of opinions by experts, interspersed with the group's feedback through a number of rounds has been considered as an effective method to obtain information in educational matters, including curriculum development. Most of exploratory studies applying the Delphi technique have covered selected elements of curriculum development such as values statements, definition of goals and objectives, and contents needed in specific areas of knowledge. Many investigations attach the time framework to these studies to forecast the period in which experts believe their predictions are likely to occur. Although there are few studies approaching the development of recreation and parks curriculum, the literature does present some research conducted in related fields.*

## RESUMO

*Desde que foi concebida há quase 40 anos, a técnica de Delfos atravessou diferentes fases, do sigilo e da obscuridade, ao uso amplo e à estabilidade. A idéia de reunir um grupo de especialistas para, primeiro, prognosticar eventos e, depois, fixar questões complexas, tornou-se popular em alguns campos, particularmente em educação. A geração sistemática de opiniões por especialistas, intercalada com o "feedback" do grupo através de um certo número de etapas, tem sido considerada como um método eficiente para se obter informações sobre questões educacionais, inclusive desenvolvimento de currículo. A maior parte dos estudos exploratórios que aplicam a técnica de Delfos tem abrangido elementos selecionados de desenvolvimento curricular tais como definição de valores, metas e objetivos, e conteúdos necessários em áreas específicas de conhecimento. Muitas investigações associam a estrutura do tempo a estes estudos para projetar o período dentro do qual os especialistas acreditam que seus prognósticos provavelmente ocorrerão. Embora haja poucos estudos abordando o desenvolvimento de currículos de recreação e de parques, há literatura que apresenta algumas pesquisas realizadas em campos afins.*

O texto ora apresentado, na versão original em inglês, é parte da revisão bibliográfica da tese de doutorado do autor ( \* ). A decisão de publicá-lo deve-se ao fato de inúmeros trabalhos virem utilizando a técnica de Delfos. Essa técnica pode ser uma alternativa metodológica para obtenção de dados em pesquisas realizadas nos diversos campos do conhecimento, sem que sejam observados muitos dos princípios que a originaram e, posteriormente, a aperfeiçoaram.

## THE DELPHI TECHNIQUE

According to Linstone and Turoff, "the Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem" ( 1975, p.3 ).

The Delphi method was first conceptualized in 1953 by Olaf Helmer in conjunction with Norman Dalkey in order to address a specific military problem. Expert opinion was applied to estimate, from the viewpoint of a Soviet strategic planner, an optimal U.S. industrial target system and the number of A - bombs required to reduce the munitions output by a prescribed amount ( Helmer 1983 ).

Since it first started to be used the Delphi technique has been subject to study of different areas of knowledge, under a number of perspectives, through distinct phases. Rieger ( 1986 ) identified and classified these phases since the genesis of the Delphi technique. The first initiatives were labeled as a "phase of secrecy or obscurity" which occurred under the sponsorship of the RAND Corporation to develop military forecasting. With the Delphi's declassification by the U.S. military, a phase of "novelty" took place during the mid-60s when this technique was used as a forecasting instrument in many American industries and human services. A wave of "popularity" took place in the use of Delphi technique during the following decade with approximately 500 new reports being identified within this period. A time for further reflection occurred during the mid-70s, mainly after a severe attack on the Delphi technique reported

by Sackman ( 1975 ). This author questioned the scientific respectability of the technique when measured against the psychometric standards of the American Psychological Association. He also questioned its application by stating that it lacked a conventional scientific research paradigm. His views were extensively argued by Goldschmidt ( 1975 ) in a special issue of the "Technological Forecasting and Social Change" entirely dedicated to the analysis of the Delphi method ( Volume 7, 1975 ). Finally, Riger considered the past five years as a phase of "continuity". The author found 441 Delphi doctoral dissertations completed during the time period 1980-84, as listed in the Dissertation Abstracts International data base. Most of these studies however only used the Delphi as an instrument, with very few devoting significant effort to test how effective it was in consideration to the scientific parameters of the technique. This trend seems to continue since that from 1985 till June 1986, 361 new dissertations were reported in the same source.

It is worth mentioning some basic findings in Riger's recent analysis on the utilization of the Delphi technique :

- 1 . The output in the quantity of the Delphi dissertations is not matched by quality ;
- 2 . Research into investigating the aspects of the Delphi technique is low in relation to its application ;
- 3 . A majority of dissertations apply the technique in the field of education. This statement is confirmed by tracking their evolution through the years : eight studies up to 1972, 196 from 1973 till 1982 and 89 from 1983 till June 86 ( source : *Dissertation Abstracts International* ).

According to Judd ( 1972 ), the use of Delphi technique in education has been concentrated into three main areas : ( 1 ) educational goals and objectives, ( 2 ) curriculum and campus planning, and ( 3 ) development of education criteria. The author reported that the first endeavor toward curriculum planning using the Delphi technique took place during the fall and winter of 1968-69, noting that the attitude of the administrators pioneering Delphi studies in this area was singular to the fact that the researchers' identification and location where they were taking place were constantly omitted.

The data derived from a Delphi study can be valuable as a guide to curriculum planning. From the experts predicting behaviors, skills and knowledge needed to prepare professionals in almost any area can be assessed in terms of desirability and / or probability of events. These can also be compared with curriculum objectives and content. ( Sullivan and Brye 1983 ).

Most Delphi technique applications in the education field have been characterized by the following elements :

- 1 . Anonymity of response ;
- 2 . Multiple interactions ;
- 3 . Convergence of the distributions of answers ;
- 4 . A statistically grouped response ( median, quartile and range ), preserving intact a distribution that may still remain wide.

Billingsley ( 1984 ) labelled “Curriculum Delphi Technique” his initiative to develop, validate and implement a new program toward agriculture journalism and suggested its use when dealing with interdisciplinary subject nature. Based upon the “Policy Delphi” the author coined that term to designate a process in which panel members would generate and screen concepts and bring significant ideas to the attention of the researcher rather than having him / her reaching a final decision on the topic to be studied.

The concept of “Policy Delphi” was first developed from the traditional technological forecast tool to examine policy issues and establish normative parameters by utilizing the same methodology procedure. Turoff ( 1970 ) was one of the predecessors of this approach and defined policy issues as “an issue for which rational individuals advocate differing resolutions” ( p. 140 ) and ascertain that the policy question is one for which there are no experts, only advocates and referees, or “informed” members. The author posed several important questions on the utilization of the Delphi technique, stating that

No hard and fast exist to guide the design of a particular Delphi. Success of the Delphi is dependent upon the ingenuity of the design team and the background of the respondent group. The utility of the results depends upon the close cooperation between the design team and the intended user body ( the individual or individual(s) expecting some sort of product from the exercise which is useful to their purposes ) or at least a clear understanding by the design team of the goals or requirements of the user body. The Delphi requires a degree of qualification to be imposed upon subjective judgmental factors and the definition of their qualification is a matter of principal concern to the design team. ( Turoff 1970, p. 151 )

Four main potential dangers are outlined by Turoff when using policy Delphi :

- 1 . Individuals may misinterpret the Delphi exercise to be a policy *decision* tool as opposed to a policy *analysis* tool ;
- 2 . Once a Delphi exercise has started there is no way to guarantee or control for a specified pattern of response.

3 . An item under consideration in the Delphi may be lifted out of the context of the exercise and made public by one of the respondent(s) as a supposed item under consideration by the policy body ;

4 . The Delphi has been used as a political tool as opposed to an analytical tool.

A policy Delphi deals mostly with statements, arguments, comments and discussion, trying to filter the essential from the superfluous. It provides the best possible information to ensure that all the options are on the table for decision-analysis. The use of heterogeneous groups is the best way to stimulate a systematic exploration of all the pros and cons of specific resolutions. In order to establish an evaluation of the respondent groups, the expression should undergo a rating scale procedure with items carefully defined to ensure proper assessment. The selection and definition of proper words to identify the respondent's position in a given issue is probably the most difficult task of the majority of Delphi design teams and certainly of uppermost concern in the area of policy issues. The rating scales are also of fundamental importance to verify the respondent's stability throughout the Delphi process.

## **THE DELPHI APPLICATION**

During the past five years there has been an increasing number of dissertations in the education field using the Delphi technique. Rieger reported this evolution from 58.6% in 1981 to 74.5% in 1984 of the total number of dissertations using Delphi and written during this period ( Rieger 1986 ). One of the most utilized sub-areas of research using this technique in education has been the curriculum development and evaluation covering a large spectrum of specialties.

Clinch ( 1973 ) developed an exploratory study to establish a social work curriculum using the Delphi technique so that behaviors in which students should gain competence could be assessed. The researcher used two approaches to obtain his data : a modified Delphi method to determine the domains of knowledge and an interactive process to transform that domain of knowledge into components. A group of 69 experts representing different interest groups were surveyed to define concepts and skills required for competence in Community Organization and Social Planning practice at the end of the decade ahead in the first round. Their opinions were refined and became the proposed curriculum goals. During the two following rounds of the questionnaire the goals were rated in importance

in order to achieve the group's consensus. An interactive process was also undertaken, this time utilizing seven faculty members to arrange the items previously defined into curriculum components. The author found the Delphi method more dependable than the interactive process providing a rationale for such conclusions and recommending further investigations for the procedure of translating a domain of knowledge of a curriculum into curriculum components.

Hollis ( 1977 ) investigated issues concerning the speech communication discipline and their implications for designing a curriculum. A panel of 996 experts composed the initial group who received the first round of questionnaires. This number fell to 313 people who participated in the remaining two rounds of the study. Opinions and rating scales indicated the probability and desirability of the elements of Speech Communication curriculum of the elements of Speech Communication curriculum of the future.

A curriculum planning study in religion for the Catholic College utilizing the Delphi technique was undertaken by Giammalvo ( 1978 ) based on the premise that renewal in the church has caused significant changes in curriculum. Two groups of experts were identified by the researcher nationwide in order to address the issues concerning the future of religious studies curricula : catholic bishops and theologians in Departments of Religion in Catholic Colleges and Universities. During the first round of questionnaires respondents were asked to list three priorities to be included in religious studies curricula for the next 10 years. Generic statements were prepared based upon the information provided and a second round of questionnaires was sent to both groups of experts to rate their importance. The mean of each statement was calculated and, in the third round, respondents were asked to re-evaluate their original rating for each priority in light of additional information provided. Upon receipt of final questionnaires, a list of priorities was considered for planning religious studies curricula in Catholic College and Universities over the next 10 years. The author concluded that, overall, the Delphi methodology provided foundation for curricula planning of major elements by confronting differences in opinion and showing consensus on major priorities.

Lawrence ( 1980 ) applied the Delphi technique in a four-round study to determine Automotive Technologist curriculum content taking into account the area's uncertainty and complexity. He also wanted to develop a list of competencies as part of his study. The panel of experts for this investigation came from three sources : ( 1 ) Chair-persons of Automotive Technology Programs, ( 2 ) the Educational Director of the Motor Vehicle Manufacturers Association,

and ( 3 ) the President of A'droit Placement Consultants, Inc. The final product was viewed by the researcher as a potential element likely to be implemented in a curriculum according to some specific conditions.

Metal fabrication technology was selected by Phillips ( 1984 ) as an area of study. He determined through the Delphi technique what courses were necessary to construct a four-year baccalaureate degree level program at Texas A & M University. After three rounds of Delphi, a panel of experts selected and ranked the courses that should comprise the curriculum in this area of study in terms of importance. A unique and possibly arguable set of recommendations concerning the use of Delphi were made by the researcher : ( 1 ) a narrower spectrum of curriculum development should be considered, ( 2 ) researchers should use a more close-ended round one instrument with spaces to add information, and ( 3 ) in this case, only two Delphi rounds should be used.

Rosenbaum ( 1985 ) used the Delphi technique to design a curriculum to prepare students for careers in non-broadcast private telecommunications based on the fact that the job market was shifting from radio and television stations to organizations which use electronic media for private communications purposes. His major objective was twofold : ( 1 ) to identify a set of experiences, skills and knowledge needed by college graduates for career in this new emerging area, and ( 2 ) to construct a descriptive curriculum to meet those needs. A group of 144 professionals was surveyed by means of the Delphi technique using four succeeding questionnaires interspersed with feedback. Again, the first round questionnaire was used to generate a broad list of curriculum components, followed by the panelists' rating and re-rating their importance based on information provided by previous rounds. The researcher finally grouped them into 13 curriculum areas with a recommended model.

To conclude the literature review in Delphi technique application in the education field, a rather interesting study was conducted by Lewis ( 1984 ). She identified major characteristics and circumstances associated with selected Delphi studies which produced data that were used in decision making in higher education and their perceived impact. During a first attempt to cover 60 Delphi studies undertaken in the higher education field from 1967 to 81, 300 educators were contacted in the first round. A reduced response of 32.3% of the educators, representing 26 of those studies, accepted to participate in the study. A telephone interview was also performed with 10 respondents - each representing a different study - to support and clarify the questionnaire findings. One major finding was



concerned with the nature of the Delphi application : 70% of the studies were for problem solving rather than its initial forecasting purposes, and curriculum and instruction were considered as major areas in which Delphi results were used. In terms of perceived impact, the researcher stated that the public relations aspect was most felt ( panelists selection based upon influence and political expediency rather than their expertise). Finally, the author suggested that normally the impact of the study is directly related to such aspects as ( a ) whether there is a recognized problem to which a solution is actively being sought, ( b ) the study involves, preferably, as Delphi panelists, those persons who will be affected by the solution of the problem and whose cooperation will be needed to have this solution work, and ( c ) the persons who conduct or commission the study are in a position to act on the results.

Historically, physical education has been the major area of study from which recreation has derived in the United States. This area has received considerable attention from researchers in terms of the Delphi technique application, both as forecasting tool and instrument to provide data for curriculum development.

Takovick ( 1976 ) used the Delphi technique to forecast the future of physical education in higher education in the United States. A panel of 100 experts was selected, based upon their position, including all presidents-elect of the American Alliance for Health, Physical Education, Recreation and Dance and a four-round Delphi was conducted in a period of seven months. A listing of 59 projected opportunities, trends, events and developments were generated by the expert panel on round one. Projections as to the probable date of occurrence of each event were continually rated and re-rated throughout remaining rounds. A rating of desirability and impact of each event, using a Likert scale, was obtained on round two and refined in round three. Finally, in round four, panelists were asked to suggest possible strategies for hastening desirable and delaying undesirable events. It is interesting to note two major findings which may have further repercussion on the recreation area : ( a ) a curriculum comprised of leisure-time activities will dominate the required physical education programs and ( b ) the demand for the person holding the doctorate degree in Physical Education will decrease significantly and will give way to staff specialists in leisure activities.

The future of professional preparation in physical education was also the object of a study through the application of the Delphi technique by Sheffield ( 1982 ). His study examined the interaction of undergraduate specialization, diversified career choices, and the

teacher education preparation. An initial panel with 69 members completed three rounds of questionnaire with a response rate of 85%. Ninety-one items / events were analyzed regarding the probability and desirability ratings and 18 other items / events were also generated to both inhibit and enhance the development of negative item / events.

A recent study was completed by Klostreich ( 1985 ) to predict future trends in physical education curriculum at the undergraduate level using the Delphi technique. Following the same pattern presented in most of the studies previously described, a panel of 50 experts was asked to complete a series of three questionnaires. The result was a list of 34 trends with a high probability of occurrence, their desirability, and the estimated time period for them to take place. This procedure provided physical education administrators and curriculum specialists a valuable tool for future planning.

The application of the Delphi technique has also been utilized to guide several studies in the recreation field to forecast probable occurrence of events as well as for providing data for curriculum evaluation and implementation.

D'Amours ( 1975 ) conducted an exploratory forecasting exercise into the future of the leisure service profession in order to develop a new source of guidelines for educational planning, curriculum development and evaluation of recreation education at the university level by using the Delphi technique. A panel of 36 experts, one half representing educators, the other half practitioners, was subdivided into three groups, randomly assigned, classified as educators, practitioners and educators / practitioners. They all evaluated a set of 56 predictive statements related to the future of the leisure service profession. The probability estimate, the nature of consensus within and among groups, and the convergence profile were the criteria to assess the prediction procedure as a guiding statement for educational purposes. The author found a consensus among experts in regard to the following aspects : ( a ) professional preparation should be viewed in terms of humanistic learning, ( b ) a need for stronger interdisciplinary and multidisciplinary approaches, and ( c ) the establishment of functional relationships between leisure and other human behavioral disciplines.

The present state and the future direction of recreation and leisure for rural Americans were assessed by Gelvin ( 1981 ) using the Delphi technique in a nationwide survey. A group of 83 panelists, representing recreation educators, cooperative extension agents, rural sociologists, rural mental health workers and rural leaders participated in this four-round Delphi study. They were to

identify and rate three major issues : ( a ) the contribution of recreation and leisure to the quality of rural life, ( b ) major barriers concerning provision of this type of services and ( c ) their needs in this area. The first round generated 183 issue statements which were ranked in terms of importance in subsequent rounds. Kendall's Coefficient of Concordance was used to determine agreement among panelists by region and sub-panel, and statistics were tested at the 01 probability level. After considering his three specific areas of concern, the researcher concluded that the instrument used revealed a high level of agreement among panelists, both in terms of sub-panel and region.

Chai ( 1977 ) utilized the Delphi technique to identify possible and probable conditions of leisure at or near the year 2000. The experts' selection criterion applied in this study seems biased since it included only physical education professionals to forecast this multifaceted area of knowledge. An initial group of 120 people were asked to list statements which revealed their perceptions of leisure by the year 2000. A reduced rate of response to this first inquiry ( 36% ) originated 103 statements of possible future conditions or events. In a second round the researcher asked the respondents to rate each statement on a scale from one to seven in terms of the probability of events occurring, desirability of occurrence, the year they might take place and the degree of confidence the expert had in responding to that statement. A mean score for each index was calculated and sent back to the panel for the third and last round for their reconsideration in view of this new information. Among those events judged highly probable to occur in relation to a time frame it is interesting to observe that ( a ) a greater demand for recreation / leisure specialists will be felt by 1986, ( b ) more research in the leisure field and a more direct alignment of physical education with leisure field is likely to happen by 1987, and ( c ) leisure will be a major source of income and expenditure on a national scale by 1989.

In a less orthodox use of the Delphi technique, in conjunction with scenario generation, Hyde ( 1984 ) developed a study to forecast higher education leisure services in the year 2000. A propositional inventory of 130 items was assessed by a panel of 12 experts through a three-round Delphi to ascertain the probability of occurrence and their impact which generated a probable scenario. Twelve practitioners evaluated the feasibility of using the scenario in the planning process for institutions of higher learning. The researcher

concluded that scenario writing was useful in forcing the reader to consider the total university environment in order to provide decision-making alternatives.

More recently Ellis et al. ( 1985 ) described a Delphi to curriculum evaluation of an accredited program in recreation and park administration. They worked with a heterogeneous panel of 56 experts selected from different job settings representing four areas of specialization : ( a ) therapeutic recreation, ( b ) municipal recreation, ( c ) outdoor recreation, and ( d ) commercial recreation. The first round instrument requested from respondents five to ten general attitudes and abilities that graduates of recreation and park curriculum should have, but often lack. Forty-three percent of the initial group originated a list of 178 different attitudes and abilities which were condensed to 47 items. In order to prioritize which statements were in need of greatest attention the authors used the concept of "felt need". This was accomplished by evaluating each item in terms of importance and the extent to which it was lacking, by using a five-point rating scale for both indexes. For each attitude and ability there was a "felt need" score, by multiplying the "importance" rating times the "extent lacking" rating. The average score was obtained for each item and they were order ranked. The findings revealed that recreation and park curricula should be examined in terms of their emphasis on finance, marketing, writing, communication, and management, rather than activity planning and leadership. The authors also considered some of the study's weaknesses that might have interfered with the final results : ( a ) selection criteria to define the panel of experts which should be applied more rigorously, ( b ) additional rounds that would generate a higher degree of consensus, and ( c ) the way the central question was posed that may have had ambiguous understanding since a number of abilities and attitudes could have been excluded by respondents only because they felt that graduates already possess them. Finally, the Delphi technique was commended as an efficient administrative tool to evaluate the field of leisure studies overall.

## BIBLIOGRAFIA

BILLINGSLEY, G. Curriculum Delphi aids curriculum planning. *Journalism Educator*, v. 39, n. 2, p. 7-10/14, 1984.

CHAI, D. X. Future of leisure : Delphi a Application. *The Research Quarterly*, n. 48, p. 518-524, 1977.

CLINCH, R. W. A Delphi method for establishing a social work curriculum : an exploratory study ( Doctoral dissertation, Syracuse University, 1973 ). *Dissertation Abstracts International*, n. 34, 6351 A, 1973.

D'AMOURS, M. C. ( ed. ). *International directory of academic institutions in leisure, recreation and related fields*. Québec : Université du Québec à Trois-Rivières / World Leisure and Recreation Association, 1986.

ELLIS, G. SMITH, K., KUMMER, W. G. A Delphi approach to curriculum planning. *Parks and Recreation*, v. 20, n. 9, p. 52-57, 1985.

GELVIN JR., J. Identification of the priority issues of recreation and leisure for rural-americans : a nationwide Delphi survey. ( Doctoral dissertation, Universit of Oregon, 1981 ). *Dissertation Abstracts International*, n. 42, 2292 A, 1981.

GIAMMALVO JR., P. Curriculum planning in religion for the catholic college : a Delphi study ( Doctoral dissertation, George Peabody College for Teachers, 1978 ). *Dissertation Abstracts International*, n. 39, 4756 A, 1979.

GOLDSCHMIDT, P. G. Scientific inquiry or political critique ? *Technological forecasting and social change*, n. 7, p. 195-213.

HOLLIS, P. Speech communication curriculum of the future : a Delphi profile ( Doctoral dissertation, Texas Tech University, 1977 ). *Dissertation Abstracts International*, n. 38, 4446 A, 1978.

HELMER O. *Looking foward, a guide to future research*. Beverly Hills! Sage Publications, 1983.

HYDE, S. A. A Delphi forecast of higher education leisure services in 2000 A.D. : a program process model ( Doctoral dissertation, Texas A & M University, 1984). *Dissertation Abstracts International*, n. 45, 3497 A, 1985.

JUDD, R. C. Use of Delphi method in higher education. *Technological Forecasting and Social Change*, n. 4, p. 173-186, 1972.

- KOSTREICH, D. A. Predicting future trends in physical education at the undergraduate level : a Delphi study ( Doctoral dissertation, Brigham Young University, 1985 ). *Dissertation Abstract International*, n. 46, 2228 A, 1986.
- LAWRENCE, E. E. Application of the Delphi technique in determining automotive technologist curriculum content ( Doctoral dissertation, Virginia Polytechnic Institute and State University, 1980 ). *Dissertation Abstract International*, n. 41, 3404 A, 1980.
- LEWIS, D. E. Characteristics of selected Delphi Studies and their perceived impact in higher education ( Doctoral dissertation, the University of Florida, 1984 ). *Dissertation Abstract International*, n. 45, 2275 A, 1984.
- LINSTONE, H. A., TUROFF, M. *The Delphi method, techniques and applications*. Reading ( MA ) : Addison - Wesley Publishing, 1975.
- PHILLIPS, R. I. The development of curriculum using the Delphi technique ( Doctoral dissertation, Texas A & M University, 1984 ). *Dissertation Abstract International*, n. 45, 3567 A, 1984.
- RIEGER, W. G. Directions in Delphi developments : dissertations and their quality. *Technological Forecasting and Social Change*, n. 29, p. 195-204, 1986.
- ROSENBAUM, J. A College and University Curriculum designed to prepare students for careers in non-broadcast private telecommunications : a Delphi method survey of professional video communicators ( Doctoral dissertation, Columbia University Teachers College, 1985 ). *Dissertation Abstract International*, n. 46, 2548 A, 1986.
- SACKMAN, H. *Delphi critique, expert opinion, forecasting and group process*. Lexington ( MA ) : D. C. Heath, 1975.
- SHEFFIELD, E. A. The future of professional preparation in physical education : a modified Delphi study ( Doctoral dissertation, University of Southern California, 1982 ). *Dissertation Abstracts International*, n. 43, 1081 A, 1982.

SULLIVAN, E., BRYE, C. Nursing's future : use of the Delphi technique for curriculum planning. *Journal of Nursing Education*, n. 22, p. 187-189, 1983.

TAKOVICH, J. The future of physical education in higher education in the United States : a Delphi study ( Doctoral dissertation, west Virginia University, 1976 ). *Dissertation Abstract International*, n. 37, 4965 A, 1977.

TUROFF, M. The design of a policy Delphi. *Technological Forecasting and Social Change*, n. 2, p. 149-171, 1970.