THE USE OF THE DELPHI TECHNIQUE IN PROBLEMS OF EDUCATIONAL INNOVATIONS

Olaf Helmer

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Olaf Helmer*

The RAND Corporation, Santa Monica, California

1. THE DELPHI TECHNIQUE

The so-called Delphi Technique is a method for the systematic solicitation and collation of expert opinions. It is applicable whenever policies and plans have to be based on informed judgment, and thus to some extent to virtually any decision-making process.

Instead of using the traditional approach toward achieving a consensus through open discussion, the Delphi Technique, in its simplest form, "eliminates committee activity altogether, thus ... reducing the influence of certain psychological factors, such as specious persuasion, the unwillingness to abandon publicly expressed opinions, and the bandwagon effect of majority opinion. This technique replaces direct debate by 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. Some of the questions directed to the respondents may, for instance, inquire into the "reasons" for previously expressed opinions, and a collection of such reasons may then be presented to each

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respondent in the group, together with an invitation to reconsider and possibly revise his earlier estimates. Both the inquiry into the reasons and subsequent feedback of the reasons adduced by others may serve to stimulate the experts into taking into due account considerations they might through inadvertence have neglected, and to give due weight to factors they were inclined to dismiss as unimportant on first thought."*

The principles involved in this procedure can be described by reference to a particular example. In the course of an inquiry into the future of automation, one of the questions addressed to each member of a panel of experts was to estimate the year when a machine would become available that could comprehend standard IQ tests and score above 150. The responses, as can be imagined, consisted of a set of estimates spread over a sizeable time-interval, from about 1975 to 2100. In a follow-up questionnaire a summary of the distribution of responses previously obtained was fed back to the respondents by stating the median and—as an indication of the spread of opinions—the interquartile range (that is, the interval containing the middle 50% of the responses). Each respondent was then asked to reconsider his previous answer, possibly revise it, and, if his new response lay outside the interquartile range, to state briefly why he thought the answer should be that much lower or that much higher than the majority opinion.

The effect of placing the onus of justifying relatively extreme responses on the respondents had the effect of causing those without strong convictions to move their

*See "On the Epistemology of the Inexact Sciences," by Olaf Helmer and Nicholas Rescher, Management Science 6 (1959), p. 47.

estimates closer to the median, while those who felt they had a good argument for a "deviationist" opinion tended to retain their original estimate and defend it.

In the next round, in addition to again summarizing the previous responses (which were now spread over a smaller interval), the respondents were given a concise summary of reasons presented in support of extreme positions. They were then asked to revise their second-round responses, taking the proffered reasons into consideration and giving them whatever weight they thought was justified. In this case, a respondent whose answer still remained outside the (new) interquartile range was required to state why he was unconvinced by the opposing argument. In the final (fourth) round, criticisms of the reasons previously offered were resubmitted to the respondents, and they had one last chance to revise their estimates in view of the counterarguments. The median of these final responses was taken to represent the nearest thing to a group consensus. In the case of the high-IQ machine, this median turned out to be the year 1990, with a final interquartile range from 1985 to 2000. In this instance, the procedure caused the median to move to a much earlier date—presumably under the influence of convincing arguments—and it caused the interquartile range to shrink considerably. This convergence of opinions has been observed in the majority of cases where the Delphi approach has been used. In a few of the cases where no convergence toward a relatively narrow interval of values took place, opinions began to polarize around two distinct values, so that two schools of thought seemed to emerge; this may have been an indication that opinions were based on different sets of data or different interpretations of the same data. In such cases, it is conceivable that a continuation through several more rounds of the anonymous debate by questionnaire, which the Delphi process represents, might eventually have

tracked down and eliminated the basic cause of disagreement and thus led to a true consensus. But even if this did not happen, or if the process were terminated before it had a chance to happen, the Delphi technique would have served the purpose of crystallizing the reasoning process, leading to one or several positions on an issue and thus helping to clarify it, even in the absence of a group consensus.

A number of variants of this simplest form of the Delphi process are worth exploring. Among them, the following two refinements have been experimented with and show a good deal of promise.

The first introduces weighted opinions. If it were easy to measure objectively the relative trustworthiness of different experts, the greatest, if not exclusive, weight would be given to the opinions of those who are most trustworthy. In view of the absence of such measures, we have experimented with the idea of relying to some extent on the experts' self-appraisal of their relative competence and found the results quite promising. This device was used recently when twenty members of UCLA's Business Administration faculty made forecasts of ten economic and business indices. The procedure was as follows: In addition to going through four rounds of Delphi arguments, the respondents were asked to rank their relative competence regarding each of the ten indices. Then, instead of using the median of all twenty final responses as the group consensus for each index (and thus as the group's prediction), only the responses of individuals who ranked themselves relatively highest for that particular index were used; the median of these self-appraised most competent judgments was accepted as the group consensus.

While the statistical evidence for the superiority of this selective use of responses, based on the respondent's

self—appraisal, is as yet insufficient, in the few cases where it was tried and subsequently checked against the facts, it led to a more reliable consensus.

The second refinement of the basic Delphi process is its application within a simulated decision—making exercise. A typical situation to which this mode of using expertise is applicable is in making recommendations for budgetary decisions on the basis of cost—benefit estimates.*

When expected costs and benefits of alternative programs (weapon system procurement programs, public health programs, anti—poverty programs, educational reform programs, crime control programs, etc.) are clearly measurable in objective terms, there is no need to resort to the use of mere opinions. But in practice, benefits resulting from given policy alternatives are almost never capable of unambiguous measurement. Even in the case of cost estimates, it is usually only the dollar expenditures which can be accurately predicted, while social costs may be as elusive as the benefits. In such cases, the consensus of judgments by experts may be needed to obtain an appraisal.

Specifically, when a panel of experts recommends a program of measures in some area satisfying a given budgetary constraint, it is almost certain that their opinions of the dollar costs of the constituent measures will vary slightly, while their opinions of the associated intangible social costs and benefits will vary considerably. These divergent judgments must be reconciled before a single program, representing the group's joint preference can be chosen. Delphi procedures, built into the simulated

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*An expert can make budgetary recommendations without engaging in decision—making simulation by pointing out the comparative advantages of this or that contemplated measure or by proposing an entirely new one. His recommendation activity simulates decision—making only if he acts as though the overall decision were his, hence proposes an entire program for spending a given budget.

decision—making process, can be used as a systematic, rational approach to what otherwise would be a haphazard compromise effort.

2. THE RANGE OF APPLICATIONS OF THE DELPHI TECHNIQUE TO EDUCATIONAL PLANNING

The general method outlined above, including its variants, can be applied to all phases of educational planning, at the federal, state, local, or individual institutional level: a district superintendent of public schools, intending to institute a curriculum reform, may want to take opinion soundings through the Delphi technique among selected administrators and teachers within his district; a state educational planning office might decide on a building program after first consulting, via Delphi, with the local superintendents; a university's long—range expansion program must reconcile the views of its various departments, and a Delphi approach, using one or two administrators and a cross—section of departmental representatives as a panel of respondents, may well be the most appropriate way to achieve this; or, on the national level, the U.S. Office of Education may wish to establish a comprehensive program of educational innovations: this is a multifaceted problem, with a number of opportunities for the application of the Delphi technique.

Since educational innovations planned today will probably not be introduced for several years, and since the effects of such innovations—in terms of increased ability among new graduates to cope with the vicissitudes of life—may not be noticed for many years thereafter, decisions regarding such innovations cannot really be made rationally without a reasonably clear image of what the socioeconomic and technological environment of the next few decades will be. A general long—range forecasting

study of this kind was conducted a few years ago* using the Delphi technique, but a more up-to-date study, placing proper emphasis on the aspects most relevant to education, would provide a useful foundation for planning educational innovations.

In view of the projected character of our future environment and the effect we wish to exert on it through educational endeavor, it is necessary to establish appropriate educational goals. This is largely a matter of preference judgments, to be obtained through the Delphi method from a cross-section of educators, psychologists, sociologists, and community leaders.

After these preparatory steps, a wide survey of suggestions for potential educational innovations should be made; this compilation should be pared down by eliminating items that, on careful consideration, offer little promise of contributing to the educational goals previously established.

Then an estimate of the dollar cost of each item in the resulting list of contemplated innovations should be made. For some of the items on the list (those which represent simple extensions of present-day practices), established costing procedures based on current data will furnish reasonably accurate cost estimates. For others, the opinions of experts may have to be obtained. It should be noted here that usually these estimates will not be single numbers but functions of the extent to which the innovation is to be instituted; for example, computer-controlled instruction can be introduced at various levels of intensity and coverage, requiring a wide range of associated expenditures.

A cost-benefit estimate for individual innovations is necessary, in order to determine the overall net benefits

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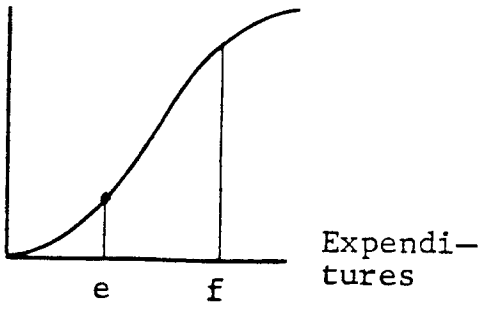
*Theodore Gordon and Olaf Helmer, "Report on a Long-Range Forecasting Study," RAND Corporation Paper P-2982 (1964); subsequently published as an appendix to "Social Technology" by Olaf Helmer, Basic Books (1966).

expected to be derived from a given dollar expenditure for each proposed educational innovation. This relationship is typically represented by a curve such as that shown, indicating that expenditures, if any, should reasonably be confined to an approximate interval from e to f, because expenditures below e yield insignificant returns, while expenditures above f yield rapidly diminishing marginal returns. Again, an attempt to reconcile initially differing opinions, represented by different curves, can be made by a Delphi inquiry.



And finally, on the basis of these cost-benefit estimates a program of educational innovations can be constructed by allocating a given budget among the items on the list of innovative proposals. If these items were entirely independent of one another, an optimal allocation could be computed at this point, using the principle of maximizing marginal returns. However, because they are intricately interconnected (in terms of costs as well as benefits), an appeal to judgment must once more be made, and a combined simulation-Delphi use of experts may be indicated.

3. DESCRIPTION OF A DELPHI PILOT EXPERIMENT RELATED TO EDUCATIONAL INNOVATIONS

A number of Delphi pilot experiments were carried out along some of the lines suggested in Sec. 2 in an Educational Innovations Seminar held at the Institute of Government and Public Affairs, UCLA, in 1965.* The respondents for these experiments varied, consisting of the

*The Educational Innovations Seminar project was supported by a grant from the Kettering Foundation.

following groups:

A. members of the Educational Innovations Seminar, augmented by an outside group of experts in various fields related to education (totalling 45 initially, and 22 at a later stage);

B. members of the Steering Committee of the Educational Innovations Seminar (numbering 5);

C. participants in the Conference on Educational Innovations* (numbering 32, almost all of whom had also been members of A).

Group A was subjected to three questionnaires. The first of these solicited suggestions for specific educational innovations. After being collated and edited for clarification, the innovations were listed in the second questionnaire and respondents were required to evaluate them in terms of importance, desirability, and feasibility; also, each respondent was given another opportunity to add further innovative proposals that might have occurred to him since the first round. Adding the more significant new suggestions to the innovations list, and deleting those found relatively unacceptable by the respondents in the second round, a list of 93 distinct proposals was compiled. These were then grouped in Questionnaire 3 under appropriate headings:

Increase in student participation	(A1–7)
Educational R + D	(B1–10)
Model facilities	(C1–4)
Administration of school systems	(D1–12)
Internal administration of schools	(E1–5)
Professional staff	(F1–18)
Costly new equipment	(G1–3)
Reorganization of instruction and program	(H1–22)
Adult retraining	(I1–4)
Education in the home	(J1–5)
Education of deprived populace	(K1–3)

and arranged in a hierarchical pattern. Omitting for simplicity those items which eventually were found to have received insufficient endorsement from Groups A and C, this pattern is reproduced on p. 11. The descriptions of

*A part of the Kettering project, held at Lake Arrowhead, California, December 17–20, 1965.

the individual items are here given in abbreviated form; the complete wording is reproduced on pages 12 through 20, including those items omitted in the hierarchical chart. The numbers displayed on the right-hand side of the chart represent suggested dollar expenditures and will be explained presently.

Instead of attempting to ascribe costs or cost curves to the proposed innovations, Group B assigned each item to one of four gross cost categories:

F: essentially free (under $ 1 million),
L: low cost ($ 1 to 10 million),
M: medium cost ($ 10 to 100 million),
H: high cost (over $ 100 million).

These estimates referred to a 5-year cost to the federal government if it were to carry out the proposed innovation "in isolation" (that is, if no attempt at systems costing were made, which might reveal substantial savings if several innovations were to be enacted simultaneously).

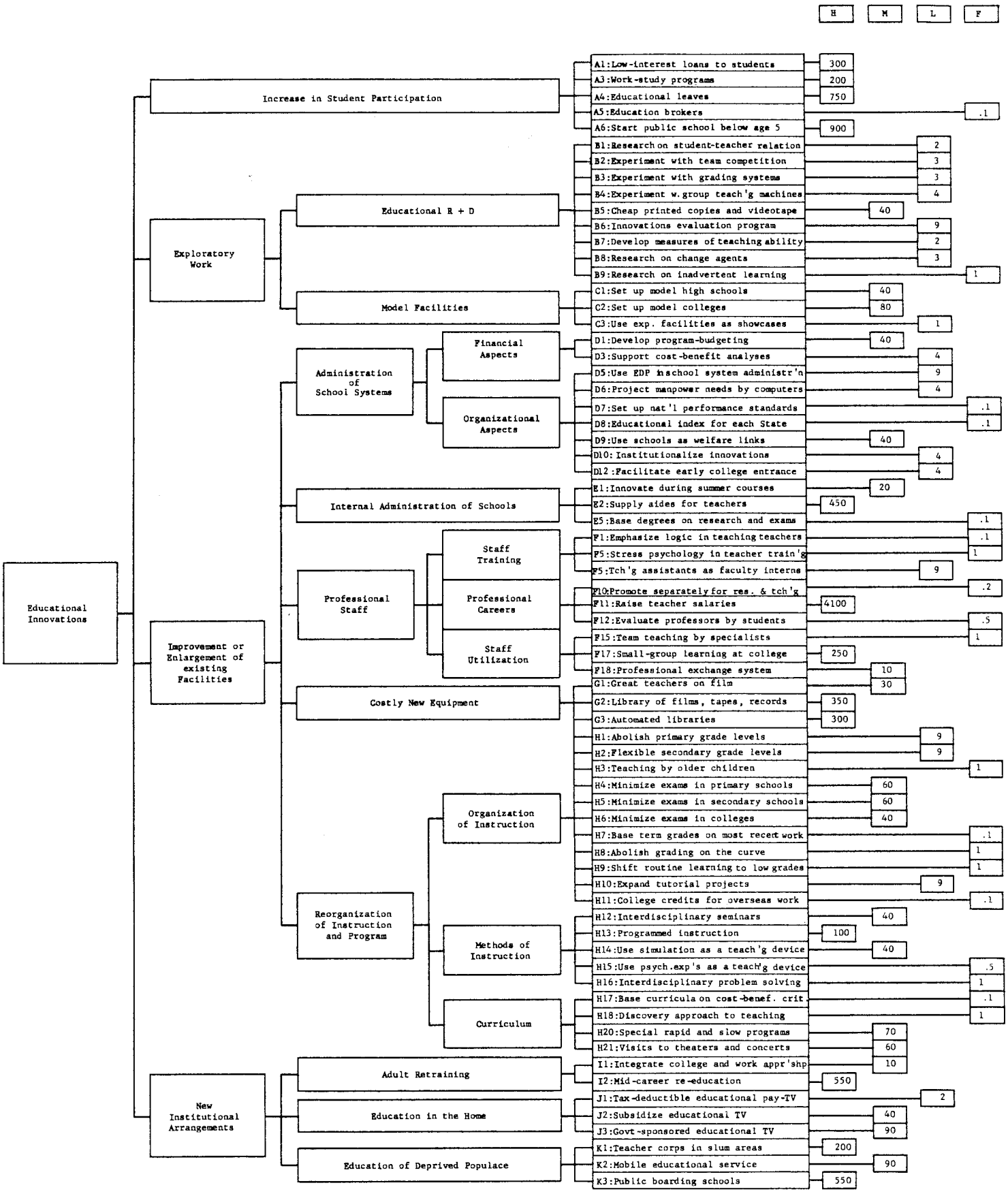
These assignments were presented to Group A in Questionnaire 3, along with an invitation to state objections if a respondent thought that an assignment was inappropriate. Subsequently, at the Lake Arrowhead Conference, the members of Group C also had an opportunity to voice their objections, if any. These revisions by Groups A and C resulted in the gross cost category classification indicated by the placement of the cost entries, on the right of the chart on p. 11, under the respective headings "H", "M", "L", and "F".

The principal task posed for Group A in Questionnaire 3 was to allocate a fictitious 5-year budget of 10 billion dollars among the proposed innovations. (For "essentially free" items, they were merely asked to indicate whether they did or did not favor their adoption.)

A similar task was later given to Group C during the conference at Lake Arrowhead, although the procedure used in this case was slightly different. The conferees were

(continued on p. 21)

CHART OF PROPOSED EDUCATIONAL INNOVATIONS



LIST OF PROPOSED EDUCATIONAL INNOVATIONS

INCREASE IN STUDENT PARTICIPATION

A1. Facilitate low-interest private loans to individual students through underwriting by government or private industry.
(The cost of administration and defaults is estimated to be 10% of total loans.)*

A2. Subsidize industry for retraining unemployed workers.

A3. Institute work-study programs whereby, as the length of the work week declines for many workers, education is substituted and basic pay level is maintained.
(The annual cost per worker of compensating him for one hour's wage loss per week and paying for his instruction during that period is estimated to be $225.)

A4. Encourage life-long education by granting educational leaves to all persons shown to be of sufficient promise.
(The 5-year cost of compensating and educating 50,000 persons per year is estimated at $2 billion.)

A5. Encourage the use of private "educational brokers" to match up students seeking colleges and colleges seeking students.

A6. Start public school earlier than the current 5-year-old entrance age.
(Assuming the annual cost per kindergarten pupil (half-day) to be $300, the 5-year cost of this item is estimated at $4.5 billion per additional year of schooling.)

A7. Provide better mechanisms to allow dropouts to continue schooling whenever and at whatever pace they desire.

EXPLORATORY WORK

Educational R & D

B1. Set up a comprehensive research program to test a variety of student/teaching assistant/professor relationships, and test various divisions of work between lecturing, tutoring, presentation of examples and illustrative material, problem solving, reading of student papers, etc.

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*These parenthetical pieces of information were supplied to the respondents in Questionnaire 3.

B2. Experiment with cooperative team competition in achievement, to supplement individual competition for grades.

B3. Set up a comprehensive research program to test a variety of grading systems at school and college levels, possibly including performance in educational games as a rating device.

B4. Experiment with the application of teaching machines to group instruction, in addition to individual instruction.

B5. Make inexpensive reproductive processes for printed material and videotape available for student use.

B6. Provide for a continuing evaluation program of innovations in techniques, curricula, administration, and organization.

B7. Devote more research time and effort to the development of measures of teaching ability.

B8. Set up a comprehensive research program to locate undesirable barriers to the introduction of innovations, and to determine the change agents that might contribute to their removal.

B9. Conduct research on basic concepts and attitudes that students are inadvertently learning.

B10. Make a systematic comparison of current educational practices and suggested innovations with those found in other countries (e.g., northern Europe, USSR).

Model Facilities

C1. Set up one or more model high schools, using innovations that are accepted by an interdisciplinary group created for that purpose.

C2. Set up one or more model college campuses, using innovations that are accepted by an interdisciplinary group created for that purpose.

C3. Use the experimental facilities now being set up not only to test innovative ideas but also as showcases for demonstrating successful new techniques.

C4. Establish model community coordinating agencies for education.

(The total annual capital and operating expenditures in 1960 were approximately 4 and 18 billion dollars respectively. Halving the individual capacity (and thus doubling the number) of new school facilities is likely to increase costs by at least 25%.)

D12. Devise an organizational structure for schools and universities which will allow qualified students to enter university up to two years earlier.

Internal Administration of Schools

E1. Exploit more fully the unusual opportunity for innovation during summer and evening courses.

E2. Lighten the teachers' load by introducing more nonprofessional aides to assist teachers in noninstructional tasks.
(The total number of elementary and secondary school teachers is currently about 1.6 million.)

E3. In colleges and universities, make the number of courses a student is entitled to carry a function of grade points and units earned in the preceding year.

E4. In order to reduce undue emphasis on grades, eliminate the practice of allowing prospective employers of students access to student records.

E5. Award Bachelors and advanced degrees on the basis of research output and examination, allowing unit requirements to be waived.

Professional Staff

Staff Training

F1. Place greater stress in teacher education curricula on logic.

F2. In teacher education, de-emphasize educational theory, and emphasize familiarity with subject matter.

F3. Provide courses specifically in visual and oral classroom presentation for college teachers.

F4. Encourage more young people to attempt to become teachers by a massive advertising campaign.

F5. Include more psychology in the training of teachers, particularly the psychology of anti-social behavior.

F6. Use teaching assistants as faculty interns, as a means of promoting college teaching ability.

Professional Careers

F7. Institute open-market competition in the teacher and research labor markets by appropriate variation in remunerations.
(The total number of teachers is currently about 2 million. The average public school teacher's salary is about $6000, the average college teacher's salary is about $7500.)

F8. Award increases in a State's educational index (see D8) by raising the fraction of federal aid going to teachers' and school administrators' salaries.

F9. Let salary levels for grade school teachers depend more heavily on teaching effectiveness, assuming the latter can be scaled.

F10. Establish separate promotional systems for research and teaching, and give college professors the option of percent participation in each activity up to 100 percent.

F11. Raise teacher salaries substantially across-the-board.
(To raise current teachers' salaries by 10% over 5 years would cost about $6 billion.)

F12. Seriously consider student evaluation of professors as a criterion for teacher selection and promotion.

F13. Raise teaching incentives by national contests, prizes and awards of lucrative sabbaticals.
(Sabbaticals at full pay for 1% of all teachers during each of 5 years would cost $600 million.)

F14. Erase distinctions in professional preparation, remuneration, and prestige between high school and college teachers, raising the level of the former.
(The cost of raising all high school teachers' salaries for 5 years to those of college teachers amounts to about $5 billion.)

Staff Utilization

F15. Introduce a system of teaching by organized teams of subject-matter specialists at the high school and college levels.

F16. Extend subject specialization for teachers down to the primary school level, on the assumption that specialization would lighten the burden of class preparation, provide better teaching, and motivate teachers to keep up with their field in terms of content and teaching methods.

F17. Provide more individual and small-group learning situations to promote a closer personal relationship between student and professor.
(Increasing college faculties by 10% would cost at least $1 billion.)

F18. Introduce a system of exchanges of professionals between industry, government, schools and universities.

Costly New Equipment

G1. Produce a library of great teachers on film.

G2. Have films, tapes, and records available on an individual basis as we now use books.
(A program which would provide one complete set of audiovisual equipment per 20 students would cost upward of $1 billion.)

G3. Automate and computerize libraries so as to make them adequate information centers for research work.
(Costs for this open-ended item depend heavily on the manner in which a system of such libraries is introduced on a nation-wide basis. The subpanel which allocated this item to the high-cost category estimated that no worthwhile nation-wide implementation could be seriously considered for less than 100 million dollars.)

Reorganization of Instruction and Programs

Organization of Instruction

H1. Abolish rigid segregation by grade levels in primary schools and replace it with more flexible grouping.

H2. Without giving up grade level distinctions in secondary school altogether, introduce enough flexibility into the schools to make allowances for differences in learning speed and in curriculum selection.

H3. Introduce the occasional teaching of certain subjects by older children into the regular grade school curriculum.

H4. Replace or augment the present system of performance grading in primary schools with a specific list of skills, attitudes, and knowledge of each student; rate students by observing and estimating their performance,—minimizing the role of competitive exams.

H5. Replace or augment the present system of performance grading in secondary schools with a specific list of skills, attitudes, and knowledge expected of each student; rate students by observing and estimating their performance,—minimizing the role of competitive exams.

H6. Replace or augment the present system of performance grading in colleges and universities with a specific list of skills, attitudes, and knowledge expected of each student; rate students by observing and estimating their performance, —minimizing the role of competitive exams.

H7. In assigning term grades in primary and secondary school, give greater weight to more recent performances(instead of averaging over the entire term), providing that competence with respect to the earlier work is reflected in the recent work.

H8. Replace grading "on the curve" with grading based on standards set by the State or by the particular school system.

H9. Shift much of the necessary information acquisition (including the learning of languages) to lower grades, even kindergarten.

H10. Expand programs such as the UCLA tutorial project, in which volunteer students instruct underprivileged children.

H11. Offer college credits for work, study, and travel overseas (e.g., in connection with the Peace Corps).

Methods of Instruction

H12. Introduce many interdisciplinary seminars at the undergraduate college level, and even the high school level.

H13. Introduce programmed instruction (automated or not) gradually at all levels wherever appropriate.

H14. Develop and introduce simulation and, in particular, gaming techniques for use as teaching devices.

H15. Develop psychological experiments for use as teaching devices.

H16. Increase the use of interdisciplinary problem-solving courses (e.g., planning a town, terminating a strike, conducting international negotiations, deciding on a bill before a legislature, selecting a career and mate) at the elementary and secondary levels, emphasizing relevance to adult life.

Curriculum

H17. Attempt to use benefit-cost criteria as a factor in curriculum construction, where benefits and costs include community effects, cultural implications, and political and economic factors.

H18. Put greater emphasis on the "discovery" approach to teaching, on students' learning how to think, and how to learn, rather than on the mere acquisition of information.

H19. Experiment with the introduction of courses in self-knowledge and sensitivity training at the college freshman and possibly even at grade school levels. Try psychodrama and other psychotherapeutic techniques.

H20. Increase special programs for both rapid and slow learners at all grades.

H21. Provide funds to school districts to pay for visits to theaters and concerts.

H22. Provide a means whereby working teachers will have a more decisive voice in the establishment of educational standards and curricula.

NEW INSTITUTIONAL ARRANGEMENTS

Adult Retraining

I1. Integrate college and even grade school programs with work apprenticeship where appropriate.

I2. Greatly increase programs in community institutions for mid-career re-education.
(Retraining 1% of the labor force annually over 5 years at a cost of $150 per person would cost about $500 million.)

I3. Supplement vocational training in schools with subsidized on-the-job industrial training programs.
(Subsidizing industry over 5 years by $100 per person to provide on-the-job training for 10% of all new workers would cost about $100 million.)

I4. Provide tax incentives for industrial investment in human resource development.
(Subsidizing industry over 5 years by $100 per person to provide on-the-job training for 10% of all new workers would cost about $100 million.)

Education in the Home

J1. Promote educational pay—TV by making payments tax—deductible.

J2. Promote educational TV by selectively subsidizing privately sponsored educational programs.

J3. Have government—sponsored educational TV programs on commercial stations.

J4. Set aside a fixed period of time each day, by legislation or by voluntary agreement among commercial stations, during which only educational TV programs may be presented.

J5. Tie in tape and film libraries to home telephone and TV sets.
(Allowing $500 per home, and 10% of all homes so equipped, this would cost about $3 billion.)

Education of Deprived Populace

K1. Introduce a Teacher Corps comprised of graduate students and qualified retired individuals to aid, and learn from, teachers in slum areas.
(A teacher corps of 20,000, paid an average of $2500 annually, not counting overhead, over 5 years would cost $250 million.)

K2. Institute a special mobile educational service, to meet requirements in areas where regular educational provisions are inadequate.

K3. Establish public boarding schools to reduce the effects of adverse home environments.
(The marginal 5—year cost per student is of the order of $10,000.)

(continued from p. 10)

in fact divided into two subgroups α and β, each of which was further subdivided into four subcommittees α_H, α_M, α_L, α_F and β_H, β_M, β_L, β_F who respectively had to allocate \$9 billion, \$900 million, \$90 million, and \$10 million to the high-cost, medium-cost, low-cost, and essentially free items (adding up to a total of \$10 billion for α as well as for β).

Instead of reporting the budget allocations arrived at by Groups A, α, and β in full detail*, it was thought to be more meaningful, for our present purpose, merely to give the flavor of these three sets of allocations, since they, as well as the cost estimates on which they were based, were after all derived in the explicit spirit of a pilot study. Using the rounded median responses** of the three groups concerned, we obtained the numbers (representing millions of dollars) inserted in the four right-hand columns of the chart on p. 11.

A few comments on these representative allocations may be indicated:

(i) The respondents selected, not a few, but a large number of the educational innovations listed for their consideration.

(ii) It was generally thought that teacher salaries ought to be raised substantially in order to improve the quality of education; hence that portion of the total budget which was not considered urgently needed elsewhere was summarily assigned to Item F11.

(iii) The two largest single amounts next to that allotted to F11, namely A4 and A6 (adding up to 1.65 billion dollars) went toward increasing student participation, either through educational leaves for adults or by sending children to public school prior to age 5.

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*These details are available, and will be included in the forthcoming book "Educational Innovations" edited by Werner Z. Hirsch.

**Slightly adjusted, to obtain the prescribed totals.

(iv) Large-scale support of exploratory work (educational R+D, and model facilities), perhaps because the items placed under these headings were not regarded as exorbitantly expensive, was generally favored.

(v) Costly new equipment (G1, 2, 3), while supported by 7% of the total budget, was not given nearly as large a share of the budget as it might have absorbed, possibly reflecting the opinion that more experimental work should precede large-scale adoption of new devices.

(vi) Virtually every item listed under "Reorganization of instruction and program" (H1-22) was approved, reflecting no doubt the general conviction (observed repeatedly elsewhere in the course of the study) that much could be gained within the present educational framework by merely restructuring the form and content of instruction.

(vii) Among the eight high-cost items that were rejected, the following five were rejected by each of the three groups:

D2: Subsidization of private schools
D11: Reversal of trend toward larger schools
F13: Motivation of teachers through sabbaticals
F14: Raising high-school teachers' pay and prestige
I3: Subsidization of on-the-job industrial training

In conclusion it should be pointed out that the primary purpose of the pilot studies reported here was to explore the potentialities of applying Delphi and simulation techniques to such problems as educational planning. Although we believe that the compilation of a large number of ideas for possible educational innovations has served a useful purpose, not too much weight should be given to substantive findings resulting from these pilot studies. Methodologically the endeavor was found very promising by the participants, who feel encouraged to apply the techniques used to similar problems in a more comprehensive manner in the future.