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ABSTRACT

This report describes the proceedings of a conference held for the purpose of improving the understanding and communication between science teachers and school counselors. Included in the report are the abstracts of the three keynote addresses which dealt with women in science, career guidance programs and projections concerning science careers. Following the speech abstracts are detailed reports of the study groups which were concerned with some of the following topics: what a national project should do to improve communication and exchange of assistance among scientists, science teachers, and counselors; what modifications or innovations should occur within the school community to promote constructive communication and mutual awareness among counselors, science teachers, and parents; and what can be done to facilitate participation in science by women and by ethnic and racial minorities at all levels of interest. Also included is a list of all conference participants. (BR)

Report of a

CONFERENCE ON CAREER EXPLORATION

Sponsored by

American Association for the Advancement of Science

and

American School Counselor Association

at

University of Maryland

January 27 and 28, 1974

Report prepared by

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1974

Report of a

CONFERENCE ON CAREER EXPLORATION

CONTENTS

Introduction

In American education quality and competence in the various and separate areas of responsibility should guarantee high quality services and programs for students, but it is not always so. A case in point is science education and student counseling. A concern about the lack of understanding and communication between science teachers and school counselors led the AAAS Commission on Science Education and the American School Counselor Association to cosponsor a Conference on Career Exploration, held at the University of Maryland, January 27 and 28, 1974. A planning committee representing the conference sponsors chose as the conference purposes:

1. To try out a way to improve communication among scientists, science teachers, and school counselors, and their professional organizations.

2. To identify the needs of counselors for information about science education and science opportunities in counseling students and planning programs for and with them.

3. To identify the needs of scientists and science teachers in counseling students and planning programs for and with them and to assist them in understanding the role of counselors and ways of working with them.

4. To identify means of eliminating or at least decreasing sex and minority stereotypes with respect to science.

5. To work toward the development of a national cooperative project of the ASCA and the Commission which would have as its purpose the improvement of school science education through better communication and cooperation among school personnel and with college personnel in related fields.

It was agreed from the beginning that the conference was equally concerned with all students, that first attention would be given to science and counseling in secondary schools but participants should include representatives from the elementary and college levels, and that science would be used in the broadest sense to include the natural and social sciences, mathematics, and science-related vocational education.

Those who came to the conference were from Delaware, the District of Columbia, Maryland, North Carolina, Pennsylvania, and Virginia. Each participant paid his own expenses unless his school or college was able to help. Conference participants included representatives from elementary schools, junior and senior high schools, colleges, and universities. Present were counselors (20), natural scientists (5), social scientists (3), and teachers of natural science (17), social science (4), mathematics (3), and science-related vocational education (8). State department of

education personnel (4), school and college administrators (5), professional organization staff members (11), students (6), and parents (3) all added to the breadth and liveliness of the discussions.

Although not explicitly stated, it was the hope of the conference planners that the conference would contribute to a broader interpretation of science curriculum and science counseling, usually concerned only with the natural sciences and not including mathematics and the social sciences. The sharp compartmentalization of these areas in secondary schools can no longer meet the needs of the future. Whether or not the conference made this more clear is uncertain. Only slight attention was given to this issue among the numerous recommendations. Students, especially, must be encouraged to view social scientists as scientists and social science and mathematics courses as science courses.

Three principal addresses and a panel presentation by six students made up the more formal part of the program. Abstracts of the three papers are presented in the next section of this report.

Most of the time of the conference was given to the deliberations of eight study groups, working in pairs on sets of questions prepared in advance. The recommendations of these groups are presented following the abstracts of the three addresses.

Finally, the closing general session made it clear that the conferees wanted and expected AAAS and ASCA to give careful attention to all of the recommendations of the study groups. Through their organizations and members and the opportunities they have to work with national, state, and local groups, the conferees want each recommendation to be appropriately addressed to the agency or person who is in a position to do most about it.

Thelma T. Daley, career education specialist, Board of Education, Baltimore County, wrote after the conference: "I was deeply impressed with the joint efforts of AAAS and ASCA in sponsoring the conference . . . From my perspective, I viewed many plus factors and could visualize many pertinent, long-range developments resulting as an outgrowth of such cooperative efforts." Mrs. Daley, who has been nominated for president of the American Personnel and Guidance Association, parent organization of ASCA, is in a position to see that the good from the conference is not lost. The same is true of the other educational leaders who worked with her at the conference.

Members of the Planning Committee

For ASCA:

Betty Knox, ASCA president-elect, Garner High School, Raleigh, North Carolina
Marilyn Gannon, ASCA administrative assistant, Washington, D. C.
Walter M. Kearney, Mt. Pleasant High School, Wilmington, Delaware

Clarence Musgrave, director of pupil personnel services, Public Schools, Lexington, Kentucky

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ABSTRACTS OF KEYNOTE ADDRESSES

Science, Women and Futures

Dr. Elise Boulding
Professor of Sociology
University of Colorado

Our social experience is all of the past, yet we must live all of our lives in the future. This means that counselors, of all people, need to be trained futurists. Yet they, like the rest of us, tend to respond in their professional roles on the basis of their own images of reality, generated by the past.

We will be concerned with three such sets of images:

1) Science. Consists of white-coated men in laboratories dealing with hard, present realities.

2) Women and Minority Groups. First, Women, "Housewives." A 1971 study shows that 66 percent of American men still think that housewife is the most desirable role for women. Second, Minorities, "Limited capabilities." Both the educational and employment sector of our society is still geared to this perspective.

3) The Future. It will be like the past. Everybody knows that.

Our task is to reconstruct these images. Science needs to be seen as a process of making new mappings of physical and psycho-social realities; also of development of indicators that will tell us whether things are more or less, up or down, better or worse. The old division between physical and social scientists is no longer relevant--both infer processes from related phenomena they can observe--chemical compared with social bonding, for example. New ways of mapping reality imply development of creative imagination. We must move away from exclusive training in verbal-analytic thinking, teach science students to think with color and shapes and sound, by analogy, and in poetry. Each of the modes of perception opens up new dimensions of the phenomenon under study. This kind of approach will also more effectively recruit today's humanistically oriented students into science.

The image of women needs to conform to the reality. From 1900 to 1970, we have gone from 20 to 40 percent of all women active in the labor force. By age group the women between 45 and 54 have gone from 14 percent in the 1900 labor force to 50 percent in the 1970 labor force—this in spite of every handicap of social and family opposition, declining domestic help, rising standards of home maintenance which "labor-saving" devices do not compensate for, also declining facilities for child care. They are increasingly in demand with every decade, representing cheap, highly skilled labor with less turnover and absenteeism than men. The picture is the same for minority groups. The old images persist as socialization and structural constraints mutually reinforce each other to keep women and minorities out of responsible and well-paid positions and keep them believing that they are not good enough

for these positions. Counselors have an important role to play in breaking this vicious cycle.

The image of the future is the hardest nut to crack. People have a general preference for continuing present practices.. A recent study of school enrollments and attitudes of school administrators toward planning indicates that they were not aware of declines that had already begun, did not believe they would happen, and were not planning for them. Another recent study of high school counselors' attitudes toward encouraging able Chicano students to enter college showed that even when they were shown performance records of Chicano students in college, which indicated in some cases higher grade point averages for the Chicano than the Anglo graduates of the counselor's own high school, the counselors still could not accept the fact that Chicanos could "make it" in college and refused to plan counseling help toward that end. The most dramatic example of our unwillingness to believe that the future could be different from the past is, of course, the energy crisis, which could easily have been planned for back in the thirties, when trends first became clear. Exercises in imagining alternative futures are perhaps the most important activity for all of us to undertake, as a matter of professional retraining. Reading good science fiction like Frank Herbert's Dune (not space opera!) helps.

The process of attracting women and minorities to science in the future involves more than reconstructing our images of science, women, and minorities. It means some significant changes in our concepts of the nature of the good life, both on the social and the individual level. As the concept of the good life changes, so will our concept of the good professional, the good scientist. Men as well as women will benefit from criteria of excellence which include quality of "performance" in family life, "performance" in the community, and time for a critique of ends. Human nurturance will enter increasingly into our concepts of performance, in the laboratory as much as anywhere else.

Counselors need resources in order to work effectively with these new concepts. Visiting women and minority professionals who can act as role models, brought in to talk with high school students, is one important resource. Literature is another resource. A bibliography on the participation of women in scientific and professional life, and on the problems that women face as they enter careers, is appended. Their participation is more varied than you might think! The counselor of the future will not only work with an expanded repertoire of knowledge about existing social and economic roles for women and minorities, they will be prepared to help them with role creation, job invention. The notion of finding slots in existing systems is almost obsolete given our rapid rate of multiplication of work roles in this century.

That which we envision becomes the possible.

Appendix A

Books for Counselors on Women's Careers in Science

Astin, Helen S., Nancy Suniewick, and Susan Dweck. Women: A Bibliography on Education and Careers, 1971. Human Service Press or contact: National Organization of Women (local chapters).

Edisen, A. E. Uskali. Women in Science, Report to the 1970 Conference of Professional and Academic Women. Professional Women's Caucus, June, 1970. Washington, D. C.

Kahne, H. "Women in the Professions: Career Considerations and Job Placement Techniques." Journal of Economic Issues, September, 1971. Vol. 5, No. 3.

National Education Association. Sex Role Stereotypes: Report of a Conference. Washington, D. C., National Education Association.

Rossi, Alice A. "Women in Science, Why So Few?" Science, 1965. 148 (No. 3674), 1196-1202.

Vatzell, M., and W. Byham. Women in the Work Force. Division of Personnel Psychology of the New York Psychological Association. Behavioral Publications, Inc., 1972.

The Career Guidance Program: The Counselor and Teacher as Facilitators

Ms. Thelma Lennon
State Department of Education
North Carolina

For education the lesson is clear: its prime objective must be to increase the individual's "cope-ability"—the speed and economy with which he can adapt to continual change. And the faster the rate of change, the more attention must be devoted to discerning the pattern of future events.

It is no longer sufficient for students to understand the past. It is not even enough for them to understand the present, for the here-and-now environment will soon vanish. Students must learn to anticipate the directions and rate of change. They must, to put it technically, learn to make repeated, probabilistic, increasingly long-range assumptions about the future. And so must teachers, counselors, school administrators—all education personnel.

"If God had known what schools were going to be like he would have made children different." Since apparently God didn't know what schools were going to be like, educators and parents for two centuries have been trying to make children different to fit the schools. More than fifty years ago they began to employ counselors to help them in this process. Such a process might be called "homesteading the status quo."

It has been only recently that the concept of making schools different to fit children has been given much attention.

-If present schooling is irrelevant as Marshall McLuhan says
-If it educates for obsolescence as John Gardner says
-If it is based on fear as John Holt says
-If it induces alienation as Paul Goodman says
-If it fails to promote significant learning as Carl Rogers says
-If it punishes creativity and independence as Edgar Friedenberg says
-If it teachers children they are failures as William Glasser says
-If it kills motivation as Charles Silberman says

—then schools need to be changed.

And, as anyone knows who is alive and living today, the greatest spokesmen for this point of view are the students. At the turn of the century, education was designed to provide an action oriented, practical society with an intellectually rich environment. However, profound changes have occurred in our society since then. Changes such as longer periods of formal education, the emergence of large and complex occupational and industrial structures and increasing urbanization have created special problems for all people—but particularly for youth. These changes and others have tended to wall off youth from purposeful, practical and responsible participation in the world outside the school. As a result, they lack experience, knowledge and under-

standing to respond to these changes. It is the responsibility of all educational personnel to meet the career development needs of youth. This will require that career guidance be approached in a manner commensurate with other major educational goals. Many youth develop a sense of career awareness only when they are faced suddenly with the prospect of choosing an educational program or an occupational option. Too frequently, they are unaware of critical career information and they lack adequate career linked values and attitudes for dealing effectively with the career tasks they must face.

As with other normal aspects of human development, career development is not totally dependent upon external forces or programs. Rather, it reflects a personal growth pattern that, in some respects, differs for each individual. It is the commonality of developmental occurrences, coupled with observed and experienced individual variations, that allows us to speak knowledgeably about normal developmental patterns and sequences in careers.

There are certain basic principles regarding human development that apply whether one speaks about physical, emotional, intellectual, social, or career development. At least seven genotypic developmental dimensions identified from existing empirical and theoretical work hold implications for the design and implementation of programs for career development.

1. Development occurs over the lifetime of an individual.
2. Individual development is influenced by both heredity and environment.
3. Development is a continuous process.
4. Although development is continuous, certain aspects are preeminent at various periods in the life span.
5. Individual development involves a progressive differentiation and integration of the person's self and his perceived world.
6. While common developmental stages can be observed and described during childhood and adult life, individual differences in progressing through these stages can be expected.
7. Excessive deprivation with respect to any single fact of human development can retard optimal development of other facets.

In facilitating career development, educators should not attempt to impose any particular set of work values on all. Yet education must provide each student with the opportunity to develop a comprehensive set of personal values upon which he can rely when making career plans and decisions.

One may view "career" from several perspectives. In general, the term is defined differently depending on whether one seeks to relate it to institutions, organizations, and occupations, or whether he intends to relate it to persons. At one extreme, there is one that equates career and occupation, including the advances one makes in his occupation. At the other extreme, there is the view that career denotes a general life pattern which includes virtually all of one's activities. Some writers would delimit this latter interpretation by suggesting the major life domains which engage the individual in multiple roles, for example, worker, family member, community

participant, and leisure-time participant.

In a Position Paper on Career Development* the term "career" is defined as a time-extended working-out of a purposeful life pattern through work undertaken by the indivudual. Career can easily be differentiated from the term "career development," which refers to the total constellation of psychological, sociological, educational, physical, economic, and chance factors that combine to shape the career of any given individual.

Today there are many social factors which converge to stimulate an interest in the career development needs of persons of all ages. Some of these are:

1. A growing complexity in the occupational and organizational structure of society which makes it difficult to assimilate and organize the data necessary to formulate one's career.

2. An ever rapid technological change demanding human adaptability and responsiveness to new responsibilities.

3. An increasing national concern with the need to develop all human talent, including the talents of women and including the talents of minorities.

4. An ardent search for values which will give meaning to life.

5. The need for specialized training to obtain entry jobs.

6. The apparent disenchantment expressed by students who have difficulty relating their education to their lives.

Each one of these forces impinges on the individual in ways that make achieving self-fulfillment more difficult.

A career guidance program assists the individual to assimilate and integrate knowledge, experience, and appreciations related to the following career development elements:

1. Self-understanding which includes the relationship to one's individual characteristics, perceptions, and the relationships to others and his environments.

2. Understandings of the work society and those factors that affect its constant change, including worker attitudes and discipline.

3. Awareness of the part leisure time might play in one's life.

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*American Vocational Association. Position Paper on Career Development. Washington, DC: AVA, 1510 H Street, N.W. 20005. August, 1973. 20 pages.

4. Understanding of the necessity for and the multitude of factors to consider in career planning.

5. Understanding of the information and skills necessary to achieve self-fulfillment in one's work and leisure.

What then are the roles of counselors and teachers who serve as facilitators in career guidance programs?

In the position paper referred to on page 11, the responsibilities of guidance specialists are outlined as follows:

Program Leadership and Coordination

1. Coordinating the career guidance program.

2. Providing staff with the understandings necessary to assist each student to obtain a full competency-based learning experience.

3. Coordinating the acquisition and utilization of appropriate occupational, educational and labor market information.

4. Helping staff understand the process of human growth and development and assess needs of specific individuals.

5. Helping staff plan for sequential student learning experiences in career development.

6. Coordinating the development and use of a comprehensive cumulative pupil data system that can be readily utilized by all students.

7. Identifying and coordinating the use of school and community resources needed to facilitate career guidance.

8. Coordinating the evaluation of students' learning experiences and utilizing the resultant data in counseling with them, in consulting with the instructional staff and parents, and in modifying the curriculum.

9. Coordinating a job placement program for the school and providing for job adjustment counseling.

10. Providing individual and group counseling and guidance so that students will be stimulated to continually and systematically interrelate and expand their experiences, knowledges, understandings, skills, and appreciations as they grow and develop throughout life.

The academic teacher also has a vital set of responsibilities in career guidance. These responsibilities require understandings and competencies to assure his ability to:

1. Provide for easy transition of students from home to school, from one school environment to the next, and from school to further education or employment.

2. Provide students with curriculum and related learning experiences to insure the development of basic concepts of work and the importance of those who perform work.

3. Provide group guidance experiences, with appropriate aid from the guidance specialists and vocational educators to regularly demonstrate the relationship between learning and job requirements.

4. Help parents understand and encourage the career development process as it relates to their children.

5. Provide opportunities within the curriculum for students to have decision-making experiences related to educational and vocational planning.

6. Assist the student in synthesizing his accumulated career development experiences to prepare him for his ongoing educational transitions.

7. Provide career exploratory experiences to help students gain an understanding of worker characteristics and work requirements.

8. Provide experiences to help students increase their depth of understanding of personal capabilities, interests and possible limitations.

9. Provide for career preparation experiences sufficient to enable the individual to acquire skills necessary for entering and remaining in the world of work at a level appropriate to capabilities and expectations.

10. Provide, as an extension of the in-school learning experience, opportunities for the individual to experience work first-hand in a non-threatening environment.

While counseling and placement activities remain an integral part of the career guidance program, the curriculum is seen as the heart of the delivery system. The program must utilize the world of business and industry and the community to help the individual see that what he may be studying has relevance to his own projected life needs.

Predictions and Projections

Dr. Robert E. Henze
Director, Membership Division
American Chemical Society

Career exploration, in the guidance sense, concerns the future—a month ahead, a year ahead, or many years ahead. We are concerned with our own future, our nation's future, and most specifically with the future of those to whom our guidance is directed. Our aim is to present to students outlines of various alternative courses of action which we hope will help them in their preparation for and attainment of satisfying and productive careers. This is a most difficult assignment requiring an assessment of the future in regard to supply/demand considerations as well as in terms of the character and content of future jobs.

In the development of our view of the future we combine hopes and guesses, extrapolations, surveys, and models. Each of these approaches has some validity but none is absolute. Hopes and guesses involve our basic faith in the future. Straight line extrapolations assume the future will be like the past. Non-linear extrapolations require the application of educated guesses based on recent facts. Surveys give us the consensus views of others. Although survey results may be statistically sound and give us a feeling of confidence, they are based on the hopes, guesses, and extrapolations of individual survey respondents. Projects based on models can be good or bad depending on the factors used in building the model and how well you agree with the assumptions used.

In spite of the difficulties and uncertainties associated with them, predictions and projections do exist and are continuously being made by many groups. They are useful in orienting our thinking and in planning, but they must always be recognized for what they are—predictions and projections and not actual fact. They are especially needed to prevent us from emphasizing too strongly conditions of the present, especially to students who will not be entering the job market until some years in the future.

Considerations of the length of our academic pipeline brings out a number of interesting observations relative to career exploration from the students' standpoint. Elementary school graduates in 1974 will not graduate from high school until 1977, from college until 1981, and from graduate school with a Ph.D. until 1986. Their entry into the nation's work force will not occur until shortly after each of these dates.

Looking at this from another direction, one can say that all high school graduates through the year 1992, all B.A/B.S. graduates through 1996, and all Ph.D. graduates through 2001 are now born. It should be immediately evident that career information provided to students needs to be properly tailored to fit the position of students in the pipeline. The further away students are from entering the job market, the more we need to guard against too strongly stressing current employment opportunities and even current

job content in our career guidance discussion with them. We simply don't know for certain what the employment situation will be in 1980, and less so for 1990 and the year 2000.

In my view, what this means for career guidance and career planning is the need for flexibility. We need to maintain flexibility in our educational programs and to encourage flexibility in students' attitudes regarding their career expectations. We need to broaden our own views of career opportunities in science and engineering, not only in terms of the immediate future but for the long term. This is no simple task. It could best be accomplished through increased communication between counselors, science teachers, scientists and engineers, and students at all levels.

REPORTS OF THE STUDY GROUPS

National Action

What should a national project do to improve communication and exchange of assistance among scientists, science teachers, and counselors?

Two of the study groups were asked to advise the sponsoring groups on what a national project should do to improve communication and exchange of assistance among scientists, science teachers, and counselors. Their recommendations and those of other groups for continuing cooperative action of ASCA and AAAS were:

1. Sponsor conferences of this nature in each major region of the United States. These conferences should include teams from the same school, consisting of counselors, teachers, students and parents.

2. Publish a joint newsletter to inform their organizations and members about new developments in science and science-related careers. NSF and other government agencies should assist by providing information.

3. Prepare a brochure giving illustrations of model counselor-teacher cooperation. These models should address themselves to the restrictions, needs, and successes of such cooperation.

4. Promote continued communication between pupil personnel services and school curriculum services in each school.

5. Seek funding for the development of five regionally sponsored workshops to aid science teachers and counselors in the early identification and development of youth with science potential.

6. Work actively toward creating workshops which will strive toward cultivating a level of positive awareness on behalf of counselors, teachers, and administrators to dispel myths which commonly have plagued women and ethnic minority students.

7. Develop and seek funding for summer workshops for parents of minority youth with special incentives for parents.

8. Consider the development on a local level of a pilot model of how counselors and teachers can be brought together in a cooperative working relationship.

9. Investigate the preparation of science materials for inclusion as a part of career education.

10. Investigate the new science curriculum programs of the past 15 years in an attempt to determine their effect on a student's choice of career.

11. Develop a set of guidelines to be disseminated to NIE and publishing companies outlining general criteria on science careers, especially in their relationship to girls and minority groups.

Other promising suggestions from the groups were:

- Counselors as well as science teachers should have channels of communication established with scientists.

- Teams made up of social science and natural science teachers, with the assistance of counselors, could successfully set up modules that could be used as models for any program.

- Counselors must have more information on science. Perhaps mass media programs (slides, kits, cassettes, slide tapes) on science could be made available to counselors to disseminate scientific knowledge. (Dr. Robert Henze of the American Chemical Society offered to assist AAAS in this endeavor.)

- In advising students, both counselors and teachers should not tie science solely to careers. Science should be related to avocations, hobbies, general interests, citizens' responsibilities, in efforts to arouse and maintain students' interest in and curiosity about science. Establishment of a clearinghouse of information for student research and investigation could help keep curious students from becoming discouraged. In many states community colleges can serve as science education resource centers.

One group listed what they believed teachers and counselors could do cooperatively, including:

- improve the dissemination of information about jobs in science

- sponsor Career Fairs and Career Creation Competition

- invite women scientists to talk to students

- develop basic books on career guidance

- promote TV career programs and programs on which a scientist speaks

- encourage independent study programs

- promote the preparation and use of filmstrips and cassettes on careers and on science

- encourage teacher evaluation by students

- maintain make-up facilities for students who have been absent or changed schools

- assist in creating a proper image of a scientist
- bring the natural and social sciences more closely together
- make use of aptitude testing
- encourage the teaching of biology, chemistry and physics simultaneously as in European schools

This group also identified facilities of ASCA and of AAAS that could assist in meeting the needs identified by the conference, including their publications, their officers and boards, their conventions and their local groups.

In planning a national project, a three-page listing of agencies and activities concerned with science counseling was prepared by one of the groups as a call for careful and adequate background planning, to insure broad participation, and to show the many resources that could be available to assist in a national effort. First listed were students of all ages and categories, counselors, science teachers and the general population. Special attention was called to services of state departments of education, which, of course, vary from state to state. As many as 18 local and community resources were identified; and nationally, professional organizations, government, unions, business, commercial publishers, media, and organizations such as the Sierra Club.

Restrictions on a national project were listed. These included cost, communication, time, aptitude, evaluation, lack of job information, and difficulty of predicting the future.

Better Communication Within the School Community

> What modifications or innovations should occur within the school community to promote constructive communication and mutual awareness among counselors, science teachers, and parents?

This question was discussed by two study groups, each of which identified constraints to cooperative relationships. Some of these constraints are:

- there is a lack of understanding of the role of the counselor since many teachers consider counselors to be non-teaching professional personnel and are critical of them as a part of this group, and counselors are far removed physically from where teachers spend their days;
- there is disagreement about where the blame should be placed when students fail; mandated programs often do not fit student needs as the counselor sees them; parents stop coming to school after eighth grade; experienced personnel resist suggestions for change from newer personnel;
- there is a lack of up-to-date reliable career information for both teachers and counselors, and innovative activities at school arouse parent concern.

Although these constraints were recognized, there was consensus that counselors, teachers, and parents are equally interested in student welfare and performance. Conference participants entered the discussions with good will and determination not only to remove constraints but to develop new relationships that could greatly enhance student benefits. To achieve these goals, many recommendations for action were formulated.

One group started its deliberations by listing these goals:

- To take a forward-looking view toward future actions in the natural and social sciences, mathematics, counseling and related vocational education.
- To seek ways to promote awareness and communication among scientists, teachers, counselors, and parents.
- To identify the needs of counselors in fulfilling guidance functions in the science fields.
- To identify the needs of scientists and teachers in fulfilling guidance functions in the science fields.

Recommendations

1. A statement of the definition of the counselor's role should be shared and accepted by teachers and administrators and the same statement or another especially prepared for students and parents should be distributed to them.

2. The teacher and the counselor must assume mutual responsibility for the student, with teachers encouraging students to avail themselves of counselor assistance and counselors urging students to talk about their problems and ambitions with teachers. At the same time, the responsibility that the student has for his own actions must be stressed by teachers and counselors.

3. More options in science must be made available to students. Ways have to be found to persuade students of the values of courses which educators consider important, when the student is "turned off" and considers the work "not relevant."

4. In order to accommodate students of all aptitudes and interests, a citizens advisory group, a science advisory group, or a special committee of the state academy of science might be utilized. A multi-media approach for students of low reading levels can be used effectively. Providing information on technical and professional career opportunities can be helpful to students and teachers alike.

5. Marketable skills should include not only the immediate job skills but also the communication skills of thinking, writing, and reading.

6. A narrow interpretation of career education is not conducive to a sound curriculum. Counseling is directed to the total person, and hence career counseling is only a part of counseling.

7. Maximum parent involvement should be sought in the development of career education programs.

8. Peer counseling training programs should be utilized as innovative programs. There is also a need for the development of parent counseling programs.

9. Setting operational priorities for school and student must be a joint endeavor of administrators, teachers, and counselors.

10. Staff development workshops and/or projects on the future should be held for all professionals, teachers, and counselors. When possible parents and students should be invited. These projects should include such things as:

    a) Film like "Future Shock"

b) Techniques in communication

c) Human development

d) Parent and teacher effectiveness

e) Decision-making skills

f) Value clarification

However, emphasis should be placed on today—we must first deal with the importance of the present.

11. Scientists can contribute to the student-teacher-counselor relationship by securing speakers from scientific societies and offering to school personnel package programs prepared by the societies. Student invitations to speakers and student planning for use of materials can provide an important motivation.

12. Counselors and teachers need time and funds to visit promising situations and share worthwhile experiences with each other.

In addition to recommendations, illustrations of ways that have been successful in some situations to stimulate good relationships were given. These included:

- Dispersal counseling model, where counseling services are moved to the proximity of teachers and students and rotated from one location to another.
- Assignment of students to counselor-teacher advisory groups, with special periods allowed during the school year for students to consult with their group.
- Career education programs, including Career Education Days, which bring counselors, teachers, and parents together. Parents could be brought in as resources according to their occupational and professional backgrounds.
- Counselors assuming teaching responsibilities—for a specific purpose and limited time. These experiences have had a positive response from teacher colleagues and students.
- Counselors being assigned the role of career specialists, conducting workshops for teachers, other counselors and members of the administrative staff.
- Class nights and back-to-school nights attractive to parents.
- A small-group approach to parent involvement.
- Initiation of effective communication among teachers, parents, students

and counselors by:

- Encouraging and using parent input.
- Encouraging parent coffees in the home with counselors and science teachers.
- Encouraging the departments to invite counselors to their meetings.
- Inviting counselors as well as science teachers to review the philosophy of a new program.
- Informing students of their choices. Example: One science teacher went into each of the eighth grades to explain the five science offerings in the ninth grade.
- Utilizing the mass media more effectively. Example: Initiate spot announcements about careers on TV. Have TV talk shows when parents can call with quesitons about careers.
- Lobbying at the state level for better science programs.

Science Curriculum

How can the science curriculum be made stimulating and challenging for students of all aptitudes and interests?

The two groups that considered this broad and continuing problem in science education had the most difficult question for short-period study that the conference assigned. They formulated interesting suggestions and recommendations on which the representatives of various segments of education had little difficulty in agreeing. There is a clear consensus that present science offerings are inadequate. Suggestions in answer to the broad question above included:

- provision of appropriate reading material geared to each student's reading level,
- individualized instruction with activities geared to the student's interests,
- opportunities for independent activities,
- relevant episodes from the history of science,
- mini-courses to supplement or replace present courses,
- interdisciplinary approaches bringing together the natural and social sciences, mathematics, and health education.

It was also agreed that the student's attitude toward science is a more important factor in his motivation than content or body of knowledge, and that the teacher is the most important factor of all in determining the student's interest.

These groups also formulated recommendations in response to the subquestions assigned to them.

What organizational and/or curriculum changes are needed so that students with promise for science are not excluded from science?

1. Equal attention should be given to all groups of students, college-bound or not.
2. There should be more electives, including more advanced courses

and senior-year courses for college credit and the student's attention should be called to evening courses at his or other schools.

3. Role-playing can contribute to better understanding of the abstract and to application of knowledge.

4. Educational and commerical TV should be more available in the classroom. Schools should have taping systems so that programs can be used at appropriate times. This will increase program flexibility.

5. Compartmentalization of courses should be avoided. There needs to be more integration. Teachers should work together to achieve this.

6. "Hands-on," open-ended experimental science is less apt to "turn-off" students especially at the elementary level.

7. A study should be made of how to improve science teacher preparation programs. There should be a broader humanities base for the science teacher. Teachers should learn how to recognize science potential and ability in the students.

Are new criteria needed to identify pupils with science potential?

Both groups said, "Yes," and made a number of recommendations.

1. Provide a variety of experiences to allow students to explore, express, and investigate scientific activities. Students' aptitudes, interests, and achievements can be observed and evaluated through such experiences.

2. Individualized instruction lends itself to identification.

3. Through science projects students' potential is likely to be recognized.

4. A student who is always doing things of a scientific nature, probably has potential for science.

5. Look for creativity, imagination, interest in science, and an inquisitive mind.

What should the curriculum be for the non-scientist?

1. The curriculum should be flexible and individualized. The students need to see the application of what they learn. Interdisciplinary activities in problem solving increase interest.

2. The curriculum should look to the future. An investigation of the past to determine how we arrived at today's situation can also be helpful.

3. The curriculum should emphasize processes (observing, classifying, interpreting data, and so on) and attitudes. Help the students learn how the scientist works and what he does. Teach the students how to use the processes a scientist uses in getting information he or she wants.

What role should counselors, teachers, scientists, and students play in proposing organizational and curricular changes and in developing alternatives?

1. All of these groups should be involved in a cooperative endeavor to improve organization and curriculum for learning.

2. In building science curriculum, there must be a concern for societal problems.

3. The role of the scientist is to suggest applications and vouch for the correctness of content.

4. Representatives of industry and government can assist with applications and illustrate the kinds of problems their staffs need to solve.

5. Work-study programs assist students in learning about career opportunities.

6. Both the counselors and teachers need to have first-hand knowledge of jobs and careers.

7. Stress the dignity of work.

8. Stress national ideals.

Women and Minorities in Science

> What can be done to facilitate participation in science by women and by ethnic and racial minorities at all levels of interest?

One of the two groups assigned to this question gave first attention to special needs of women and the other emphasized needs of minorities. In addition to the value of the two reports for these special groups, it is also interesting to compare the reports to see points of likeness and difference between what the conference participants considered to be the needs of women and minorities, the two major groups now inadequately represented in science careers.

Women

To help establish role models, the group suggested the following:

1. Counselors and teachers should have displays and other materials that show visibly the role of women in new careers in science.

2. Counselors and teachers should ask TV and radio stations to give slots on career opportunities for women. Information could be provided for the stations by local associations. This is important for reaching parents of young children.

3. Examine toys and science kits to see if both girls and boys are portrayed as "doing" science. Report findings widely.

4. Utilize rosters of women in science fields now being compiled by the Office of Opportunities in Science for Minorities and Women of AAAS to obtain role models of persons active now in non-stereotyped positions.

5. Encourage industries to provide messages to help break down sex stereotyping and demonstrate the applications of science via the mass media.

To help avoid stereotypes, the group recommended:

1. Examine science and mathematics instructional materials for evidence of sex stereotyping.

2. Examine certification and tenure requirements for teachers. Consider multi-faceted evaluation, with particular consideration to attitudes toward girls and their achievement. If science, mathematics, and technology teachers are trained to teach students, not just subject matter, girls will be less apt to be

discouraged.

3. School administrators must raise the level of sensitivity of science teachers, counselors, and other professionals regarding the effects of their biases on women students by keeping them in stereotyped roles.

4. Reach teachers of all subjects to help them reduce their own sex-role biases which limit the options of girls.

The group considered science curricula and made the following suggestions:

1. Provide elementary school students with a broad-based science curriculum that will start building scientific literacy in the early years of school. Train elementary school teachers to stress active science experiences for all students.

2. Use science readers for teaching basic communication (and computation) skills. "Science reading" is reading!

3. Expand curriculum offerings in mathematics, science, and technology for all females (and minorities). If there are state restrictions that make it difficult to offer more science courses for the general students, particularly women, these should be removed.

4. Provide tools for making and building simple equipment in primary grades so girls and boys become familiar with and skilled in using tools.

5. Develop courses for small apparatus repair (electric irons, typewriters, etc.) for girls as well as boys.

The group suggested organization action as follows:

1. Urge AAAS and ASCA to endorse the equal rights amendment. AAAS and ASCA and their state and local affiliates should extend their human rights activities to focus upon the rights of women.

2. Professional associations should examine guidelines for purchase of instructional materials with federal monies to insure the elimination of sex and minority stereotyping; also state guidelines should be written to eliminate stereotyping.

3. Professional organizations should advise producers of instructional materials regarding the elimination of sexist bias.

4. Update, for future decision-making, the potential opportunities for women in nontraditional jobs. Counselors and teachers lack current information.

5. Special efforts are needed to reach the American Association of School Administrators, the National Association of Secondary School Principals, the National School Boards Association, the Elementary Principals Association, and Association for Supervision and Curriculum Development to be sure that these organizations, overwhelmingly male, be made cognizant of the consensus of women.

6. Communicate with state commissions on the status of women about developing cooperative school-based programs.

To improve the counseling of women on careers in science the group recommends:

1. Counseling of women on job opportunities is a continuing task, particularly for women re-entering the job market, to guide them to new career opportunities in science-related jobs.

2. Restructuring of the career days to include students, K-12, and also provide extensive role models in jobs on a non-stereotyped basis.

3. Compile local school system data regarding enrollments of girls in science, mathematics, and technology courses to identify needs for guiding girls into areas where they are under-represented.

Minorities

This group approached the topic with the understanding that the recommendations could have national implications and thus the recommendations were so directed. Three sub-topics were identified.

- Proposals to help the science teacher eliminate the myths and, hence, better understand the life styles and heritage of Chicanos, Puerto Ricans, Asians, Blacks, and Indians.

- Operating on the premise that career education is developmental and continuous, list ideas that will stimulate and identify early decisions, general motivation, knowledge, and awareness at the elementary and junior high school levels.

- Because ethnicity often dichotomizes the minority youth, identify ways to bridge the gap for the youth of an ethnic minority background between his learning world and his home, parents, and community.

The group offered the following recommendations for ASCA-AAAS cooperation:

1. Sponsor conferences like this one in each major region of the country.

2. Develop a set of guidelines to be disseminated to the National Institute of Education and publishing companies outlining general criteria to be considered in developing materials on science careers and their relationship to minority youth.

3. Establish a task force to investigate what has been developed in career opportunities for mass media by industry, educational organizations, and other concerned groups. The task force should involve parents, industry, concerned citizens, and representatives from all levels of education. The purpose will focus on the development of training models which will facilitate communication in educational settings among the science teacher, counselor, student, administration, and community.

4. Work actively toward creating workshops which will strive toward cultivating a level of positive awareness on behalf of counselors, teachers, and administrators to dispel myths which commonly have plagued ethnic minority students.

5. Develop and seek funding for summer workshops for parents of minority youth and offer special incentives to interest parents.

6. Develop and implement nontraditional methods of teaching science and new evaluative techniques.

7. Develop programs to train science teachers in counseling skills especially in the area of career counseling and the basic facets affecting minority youth.

8. Seek funding for the development of five regionally sponsored workshops to aid science teachers and counselors in the early identification and development of youth with science potential.

9. Interest others in cooperative conferences with other related groups composed of educational teams from all levels of education—K through adult—to suggest ways to improve education and communication among educators and parents.

10. Recommend that transportable exhibits be developed that will increase the awareness and motivational aspects of minority youth. (The development of these may be financed by industry.)

11. Incorporate environmental education into the existing curriculum, K-12.

12. Develop programs to highlight and cultivate the potential of minorities. Share skills with others so as to foster awareness, eliminate myths, and create a reality.

The group on minorities also formulated a number of recommendations on follow-up of cooperative action for ASCA and AAAS. These appear with the recommendations of the study groups on national action.

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