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ABSTRACT

This compilation summarizes the papers presented by a number of Australian educators at a conference that produced guidelines for the planning of the Australian Science Education Project. A full set of the original papers is available as ED 040 863. The topics considered in the papers summarized are: the general objectives of the project; the kinds of desirable learning outcomes; the type of instructional materials to be provided, including questions of sequencing and flexibility; the use to be made of previously published materials; problems of integration of the materials into the curricular programs of the several Australian states; and suggestions for evaluation, teacher education, and educational research. An evaluation of the conference is appended, together with a list of the participants. (AL)

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THE NATURE OF THE PROJECT

This document has been prepared by the Executive of the Australian Science Education Project.
It is intended to give information on the establishment of the Australian Science Education Project and a summary of the important considerations discussed at the Guidelines Conference held in January, 1970, to help establish priorities and direction for the Project.

THE ESTABLISHMENT OF THE PROJECT

The Australian Science Education Project is the first national curriculum Project to be established in Australia under joint Government sponsorship. The Commonwealth and all States are participating, and it is expected to operate over five years with a total budget of $1.2 million.

Commonwealth participation follows an undertaking given some time ago that the Commonwealth would consider requests for direct support for curriculum development proposals put forward by the States, provided they were sponsored by more than one State.

The Project is intended to provide learning materials suitable for use by students and guidance for teachers in science courses in Grades 7 to 10, that is, the first four grades of secondary school. Provision is to be made for individual differences. Any decision to use the materials—or an appropriate selection from them according to local need—will rest with the States, the schools and, finally, the teachers. It is expected, however, that the educational value of the materials will be sufficiently high to ensure their widespread use. Materials are to be tried out in schools progressively as they are produced.

THE MANAGEMENT OF THE PROJECT

The Project is administered by a Committee of Management consisting of representatives from each of the Australian States and the Commonwealth. This Committee has asked the Australian Council for Educational Research to manage the Project during its five years of operation and Dr Wm C. Radford ACER's representative on the Committee of Management. The Chairman of the Committee is Mr A. O. McPherson, Superintendent of Secondary Education in the South Australian Education Department. The Deputy Chairman is Mr T. J. Ford, Acting Assistant Director of Secondary Education in Victoria. Mr A. P. Anderson, Assistant Secretary (Planning and Development Branch) Department of Education and Science, represents the Commonwealth. Other members of the Committee are Mr G. W. Robins, Inspector of Schools, Queensland Education Department; Mr H. K. Carey, Inspector of Schools, New South Wales Education Department; Dr R. L. Vickery, Superintendent of Science Education, Western Australian Education Department; and Mr J. G. Scott, Superintendent of High School Science, Tasmanian Education Department.

THE PURPOSES OF THE PROJECT

The Commonwealth and the States of Australia have determined that the purposes of the Australian Science Education Project are:

1 to develop instructional materials in science for use by teachers and pupils in Grades 7-10 in Australian schools,
2 to carry out such evaluation of current practices in a cross-section of Australian schools as is necessary to ensure that Project materials are tried in a variety of situations where the characteristics of the school, teachers, and students have been adequately described,
3 to produce suitable evaluative and descriptive instruments designed for use with Project materials,
4 to develop a model of a teacher education program for the implementation of Project materials in schools, and implement it in conjunction with teacher education authorities throughout Australia, and

5 to establish a specialist resource service for the developers of Project materials, for trial teachers in schools, and for other teachers interested in Project materials but who may not be using them in the trial situation.

and that outstanding priority is accorded by all States to purpose No. 1, the other four purposes to be fulfilled only in relation to the materials that are being developed.

These purposes were determined at a meeting of the Committee of Management on November 21, 1969. It was at this meeting that the Project was named the Australian Science Education Project.

ADVISORY COMMITTEES

State Advisory Committees have been established in each State to monitor the work of the Project as it applies in the various States. The Convenors of these State Committees are Mr G. W. Robins (Queesland); Dr R. L. Vickery (Western Australia); Mr H. K. Carey (New South Wales); Mr D. W. Neale, Inspector of Schools; Victorian Education Department;
Mr J. M. Mayfield, Inspector of Schools, South Australian Education Department; and Mr. S. F. Eldridge, Deputy Headmaster, Hobart Matriculation College, Tasmania.
A Central Advisory Committee consisting of representatives from State Advisory Committees, and a psychologist, a science educator, a sociologist, a professional scientist, with other members co-opted from time to time, has been established to ensure the validity of materials produced.

PROJECT ORGANIZATION

The Project is administered by a Director, who is the Executive Officer of the Committee of Management. The professional responsibilities of the Project have been divided into two broad areas, those of Development and Service. Each of these branches is headed by an Assistant Director. The Director and the two Assistant Directors form the Executive of the Project.

☐ The development Branch is responsible for the development of the learning materials to be tried out in classrooms. There are four Area Specialists with expertise in the major science disciplines who are to be responsible, with the Assistant Director, for the planning in this area. This group, along with up to twelve Materials Development Officers, will develop materials for trial form.

☐ The Service Branch is responsible for servicing the Project and facilitating the effective development of learning materials. Area Specialists have been (or will be) appointed to take charge of teacher education, evaluation, and the technical production of materials. This group, with the Assistant Director, will be responsible for planning Service activities. A team of Research Officers and Production Assistants is to be appointed to implement these plans.

☐ Project Personnel

The Project Director is Mr H. O. Howard, Wing-Commander Howard, originally a science teacher in NSW, has had wide experience in syllabus construction and related activities of teacher aid preparation and testing techniques in the RAAF, where he was a Staff Officer Ground Training, at Headquarters, Support Command.
The Assistant Director (Development) is Mr L. G. Dale, formerly Executive Director of the JSSP Project who has been seconded from the Victorian Education Department.
The Assistant Director (Service) is Dr G. A. Ramsey, formerly a Research Associate with the ERIC Center for Science Education at The Ohio State University, who has been seconded from the South Australian Education Department.
Area Specialists in the Development Branch are Mr Laurie Howell from Western Australia, Mr Brian Jarman from New South Wales and

Dr Jackie Lang and
Mr Ron Shepherd from Victoria. On the Service Branch only the Area Specialist Evaluation has been appointed. Mr Ken Moritz from the Australian Council for Educational Research has been appointed to this position. The Area Specialists for Production and Teacher Education will be appointed shortly. A total professional staff of more than thirty members is planned.

ASEP OPERATIONS PRIOR TO THE GUIDELINES CONFERENCE

The first appointment to ASEP staff, that of Assistant Director, Development, was made on July 1 1969. The Director, and Assistant Director, Service, started duty on October 1, 1969. The period from October until the Guidelines Conference was occupied in setting up administrative machinery for the Project, and some preliminary planning. These plans were presented at the Guidelines Conference.

The Area Specialists appointed took up full time duty with the Project at the time of the Guidelines Conference. For this reason, all the preliminary plans presented at the Conference were developed by the Executive alone, and were necessarily tentative.

Three former members of the JSSP Project were appointed to ASEP. These members were involved initially in the final proof reading of JSSP materials, some JSSP in-service education, and research to provide background information for ASEP. Work included outlining the aims and approaches of overseas projects, a study of Australian science syllabuses, setting up a resource centre, and administrative planning for the Guidelines Conference.

Post Conference operations will be detailed in the first Project Newsletter, and in Science Teachers' Journ

THE GUIDELINES CONFERENCE

This summary of the Guidelines Conference held at Monash University during the week of January 18—23, 1970, has been prepared by the Project Executive to permit a wider dissemination of Conference proceedings. Complete sets of Conference documents are held in major libraries in Australia and are available on inter-library loan. Significant papers presented at the Conference will be published in Science Teachers' Journals in Australia.

The Guidelines Conference for the Australian Science Education Project was set up to give an opportunity for wide ranging discussion among Project staff, Project advisers, and a divergent group of professionals interested in curriculum development. The Conference was held early in the Project's existence, before any firm plans for development had been decided.

To stimulate discussion, the three members of the Project Executive outlined possible aims of the Project, and indicated some of the directions the materials development, teacher education, services, and evaluation aspects might take. The papers of the Executive had not been discussed outside the Executive, nor even with the planning group of seven Area Specialists, most of whom took up duty with the Project at the time of the Conference.

THE PURPOSES OF THE CONFERENCE

The Conference had three explicit purposes:

1 For the Executive of the Project to present proposals and suggest courses of action. These proposals formed a basis for discussion among participants.
2 For the Conference participants to discuss the possible roles of the States and State bodies in the Project.
3 For the Conference participants to formulate guidelines and recommendations to help the Project determine its course of action.

THE PLAN OF ACTIVITIES

To facilitate the achievement of these purposes, the following general sequence for each day's activities was used.

1 A member of the Project Executive presented a 'possible action' paper.
2 A person outside the Project presented a paper in a similar area of concern, while bringing a wider perspective to the topic.
3 A small group discussion of the morning topic, based on prepared questions, was held each afternoon.
4 Written recommendations on the questions posed were made by each group.
5 A plenary session of the whole Conference was held where differences among groups were resolved and a statement on the issue prepared.

The final day of the Conference was spent in putting the outcomes of each day's deliberations together into one document which expressed a consensus of Conference participants, and gave some broad guideline statements for the Project staff.

The general plan of Conference topics may be seen in the following model:

DAY 1
General Survey of Trends and issues in Australian Education.....
Wm C. Radford

DAY 2
Curriculum Development in other Places.....
P. J. Fensham

DAY 2
The Purposes and Aims of ASEP.....
H. O. Howard

DAY 3
Learning Experiences to be Provided by ASEP.....
L. G. Dale

DAY 3
Learning and Instruction.....
M. L. Turner

DAY 4
Evaluation, Services and Teacher Education to be Provided by ASEP.....
G. A. Ramsey

DAY 4
Evaluation — Wider Perspectives.....
L. Blazely

DAY 5
The States and ASEP
Convenors of SAC's

DAY 5
Conference Outcomes Statement

CONFERENCE OPENING—DAY 1

The Conference was opened by the Hon Nigel Bowen, QC, MP, Minister for Education and Science. Mr Bowen described the Conefrence as a "significant event in the history of Australian Education" because it was the first occasion on which all States and the Commonwealth had come together to sponsor curriculum development. He also hoped that the Project would be "the fore-runner of more such Projects to improve the quality of education, both secondary and primary."

In his speech, Mr Bowen commented on some important educational trends. He mentioned increasing expenditure, increasing student enrolments and retention, and the widening range of student ability present in secondary schools, as changing educational inputs. He also

summarized some of the changing approaches to instruction that have become apparent in recent years, viz:

1 Memorization of facts giving way to understanding of concepts, relationships, and functions.
2 Replacement of mass instruction by individual learning.
3 Changing role of the teacher from dominant actor to guide.
4 Changing emphasis from expecting the child to be passive to encouraging active participation.
5 Extension beyond intellectual development to the conscious formation of attitudes.

He outlined some of the advantages of a large scale Project of this nature.

1 The problems of curriculum design are too great to be solved by a small group of teachers to the best advantage.
2 The sum of knowledge is expand rapidly and it is difficult for teachers to remain at the forefront of their field.
3 A team of experts can bring special knowledge to bear on specific problems; for example, mentally handicapped and socially deprived.
4 A wide range of individual differences in students can be provided for.
5 The nation's resources can be brought to bear on a problem common to all the States.
6 There are economies of effort and cost.
7 A greater range and higher level of expertise become available and hence a higher quality product should be produced.
8 The development of the curriculum can be carried through all stages as a full-time endeavour.

None of these advantages is intended to deny the rights and responsibilities of individual teachers, who should be prepared "to innovate in their own fields to meet the particular problems they are confronting." He made a strong point that he was not "advocating a return to the centrally determined prescribed syllabus. On the contrary, it is incumbent on those working on large scale curriculum projects to provide a wide range of individual differences to take account of the desirability of some diversity."

Mr Bowen made some points relevant to the kind of course that should be developed in schools. These points are quoted from his address:

The first relates to relavence. I suggest that it is of the first importance that what is taught in any course and indeed in school generally should be demonstratively relevant to the students' own life, both in the future and in the here and now, and students will reject quite rightly that which they regard as irrelevant. I think it was George Bernard Shaw who said that his education was only interrupted by his schooling.

My second point is that all elements of schooling and hence this particular project must be concerned to create and maintain in the child a sense of curiosity and wonder in the world around him, such that he will strive for its preservation and betterment.

Thirdly, I believe that the school should encourage the child to involve himself in society and to feel a concern for his fellowmen, even if this falls short of going into politics.

Fourthly, the child should derive from his school experiences a respect for himself, born of the knowledge that he has a worthwhile part both in the school and in the adult world which he will shortly join.

Above all I believe the schools must aim to develop in the individual child the ability to cope with life through providing the opportunity to plan the use of his time and to select activities. It is no good having a secondary school system that produces students who, when they go on to the university—a very narrow section of the world—find themselves completely unable to cope with it. Still less, to produce people who come out from schools or universities to a world which is materially very different and presents many more opportunities than the world did say fifty years ago, and find themselves unable to cope with it—going either into a mental home or to alcohol or drugs. There is a lack, I

think, at the present time of relating the education sufficiently to the ability to cope with the modern world as we have made it today.

TRENDS AND ISSUES IN AUSTRALIAN EDUCATION —DAY 1

Dr Wm C. Radford, Director of the Australian Council for Educational Research presented the keynote address to the Conference. His paper expanded on some of the major trends and issues apparent in Australian education. He provided a list of trends and issues which acted as a general background to Conference deliberations. These are set out as general trends, and trends related to students, teachers, curriculum, methods, system and school.

☐ General

1 Questioning the role of the school as a social and educational institution.
2 Greater public and political interest in and concern with education.
3 Mounting volume of professional technical, and popular publications about education.
4 Interest in administrative theory and practice. Apparent conflicts between "economics of scale" and need for autonomy for professional groups.
5 Relationship between educational effort and social and economic development.
6 Interest in general purposes of education and the tension between various outlooks: e.g. "social demand" versus "manpower."

☐ Students

1 Extension of period of schooling—compulsory and voluntary
   (a) Changing characteristics of the upper secondary school population.
   (b) Changing motives for desiring further education.
2 Different experiences outside school because of mass media and other technological changes.
3 Greater complexity in the society they face and therefore more need for guidance and more concern with strength and independence of judgment.
4 Different aspirations and expectations in terms of material things, responsibilities, participation etc.

☐ Teachers

1 Longer period of training for primary teachers, and a different kind of training. Effect on children from primary school.
2 Different kinds of training in education for secondary teachers of traditional subjects, and a greater variety of types of training amongst teachers in secondary schools.
3 Higher percentage of young teachers.
4 Shortage of specialist teachers in subject fields—such as graduates in Science, Mathematics, English.
5 Teachers' concern about their role and effectiveness. Unrest about this, and lines of action proposed.
6 Desire for greater independence and autonomy.
7 Growth of professional feeling. Rise in importance of subject associations.
8 Ancillary staff. Idea of a hierarchy of teachers in a school based on prior training and special skill.

☐ Curriculum

1 Change in Primary School e.g. Science, Maths.
2 Concern about subject separation and presence or lack of boundaries; and therefore moves for new curricula.
3 'Relevance' of subjects, and of content, under question. Relevance for what is *not* clear.
4 Objectives of whole curriculum and its parts are under review and assessment of achievement related to those objectives.
5 Schools are seeking and being given more freedom in choosing curriculum, subjects, syllabuses, and courses.
6 Alternative curricula and courses are being provided to suit both interests and assessed ability.

7 General education rather than specialist preparation appears to be popular with teachers, but the community is unsure about it.

☐ Methods

1 More attention to individual differences but uncertainty about how to deal with them.
2 More pupil activity and independent study.
3 More classroom discussion and inter-pupil self help schemes.
4 Relation of method to architecture of buildings and the planning of accommodation. libraries, laboratories, stores, equipment itself, movement space.
5 Specialist versus General Teaching including Team Teaching.
6 Evaluation of achievement and relation to methods used with individual children.

☐ System and School

1 More autonomy for principal and staff.
2 Decentralization.
3 Removal of external examinations and of frequent assessment.
4 Development of in-service education.
5 Personnel relations being studied more closely, and role and expeditiousness of communication given more attention.
6 New methods of curriculum innovation.
7 Improved facilities and data for planning, including research.
8 Diversity in tertiary institutions and questioning both of the mode of preparation for them and the nature of their own offerings. Greater attention to transition period and its problems.
9 Centralizing versus decentralizing tendencies.
10 Use of technology such as ETV, programmed instruction, and computers in instruction.

Dr Radford in his conclusion, summarized some of the pressing concerns facing education, and which in turn should be taken into account by the Project in its programs.

"The informed and participatir citizen is receiving more and more a broad general education to equip him to help to formulate or to understand or to evaluate policies and practices in the society of which he is an active part. In addition to general qualities such as ability to assess and interpret evidence which science is attempting. to develop, specific knowledge is being given of the key concepts of science of which the applications are affecting the routines and organization of our personal and social lives

More education is being sought by more people both for the better qualificatons needed for an increasing range of professional, technical and service jobs, and for the qualifications expected for many of the jobs which in earlier years were adequately haidled by those with less education, and for their general education. There is growing doubt about whether courses of study of the traditional kind are necessary even for preparatory studies for those proceeding to further education, and growing certainty that they are not the best for the general education required by the increasing numbers staying on to complete secondary education but without specific further study in mind.

The firs. three or four years of secondary education are no longer seen as necessarily preparatory for the last two, but are setting the fashion for more and more studies of a general nature in the last two years. The principle of greatest benefit for the greatest number is, as the percentage of a generation completing secondary education increases in size, leading to a re-appraisal of the nature and purpose of the curriculum of those final years.

Scientists are no longer content to be neutral on social issues arising from their work and the increased knowledge it brings. Teaching about the s[illegible] consequences of applications of [illegible] becoming as important as tea[illegible] and about its applications. And approaching social problems with the procedures which have added to knowledge in inanimate or non-human nature is being advocated by more of the latter

kind of scientist. The inclusion of those aspects of social science which procedures acceptable as leading to permanent additions to knowledge, as a part of the study we call science is likely to be an issue of considerable moment in the not too distant future.

Concern with the deficiencies of the underprivileged, awareness of the smaller gap between the educated adolescent and the adult of less education and somewhat wider experience, lifelong education, and public concern with the kind of person 'put out' by the education system are all trends containing issues which concern experiences in science.

Greater freedom is being given to individual schools and teachers in choice of courses and approaches. The extent to which this is compatible with equality of opportunity for all pupils is an unresolved issue. So too is the extent to which the individual teacher can express an idiosyncratic viewpoint except within a general framework of consensus. The prospective teacher under tutelage needs induction into a very complex set of skills in both understanding and action. Methodology in presentation is no longer enough. Individual child needs, applications of science, and the social consequences of such applications must now concern every teacher, and therefore play a part in his preparation, just as does an understanding of the relation of studies in science to other school activities.

May I conclude on this note. Not all subjects are international as I believe science is or can be. The languages of science and mathematics are universal. Just as there is no such thing as regional science or a regional mathematics, there is no such thing as a national science and national mathematics. It is a personal view that probably only through such studies, with due stress placed on the lack of national boundaries in them, will the deep conviction that mankind is one, govern policies and practices in all human affairs. Then, perhaps, we will learn to live and work together without regard to national boundaries, as we will, I hope, work in this week-long meeting without regard to regional ones."

THE PURPOSES OF THE AUSTRALIAN SCIENCE EDUCATION PROJECT—DAY 2

The Director of the Australian Science Education Project, Mr H. O. Howard, outlined the purposes of the Project as determined by the Committee of Management, and gave the Executive's rationale for Proj development. An abridged form of the Project's rationale, as presented at the Conference is given.

The Executive believes it has a charter to explore the possible contributions that science education at this level can make to any total curriculum, and to define what these contributions might be. By describing possible outcomes of learning experiences in science, and by structuring these experiences in a meaningful way, it can help teachers and schools decide which learning experiences best fit the curricular demands of their particular school. in this way, ASEP materials need not prescribe what should be done but, rather, describe what could be done. They will offer choices from which teachers may select, and to guide those teachers who may require it, sequences of experiences will be outlined from which a science course, in the usual sense, could be arranged.

Science now has a unique obligation to mankind arising from the fact that it is the basis of technology and is therefore responsible for having provided the opportunities for the generation of social issues such as pollution and the road toll. Science education must, on behalf of science, accept an obligation to make its contribution towards resolving such issues. Science education can make a special contribution through the development of an inquisitive attitude, a respect for evidence, and a rational process of decision-making.

☐ Science in the Junior Secondary Curriculum

All students in Grades 7-10 should study some science. Science is worth studying because it forms an

important part of our cultural heritage, because it provides a substantial body of knowledge relevant to life in modern times, because children get enjoyment out of science learning experiences relevant to them and for the special way the methods of science can be used to describe and understand the environment. Exploring the environment is an important part of each individual's development, and that if this exploration can be directed in a scientific way, the individual will achieve an important set of reference points for looking at the world.

Phenomena presented within the immediate experience of the child are the ones that are likely to be most meaningful. Children learn about the world in a number of different ways. They can learn individually as they observe and operate on the learning experiences provided by describing, classifying, experimenting, hypothesizing, testing; that is, by gaining experiences with the processes scientists use, in situations which are relevant, and preferably, simple.

Children can learn in group situations, that other people do not always see the same phenomena as they do, that their hypotheses may be accepted or rejected by others, and that a "right way" may emerge which will be the best scientific answer at that stage of the group's knowledge. They can also learn that science does not provide absolute answers to or complete explanations of phenomena, and while the facts on which science is based may be constant, conclusions drawn from or explanations of the facts are necessarily tentative.

They can learn science from the descriptions and explanations of others—from books, newspapers, scientists in the field, and in many other ways, second hand. They can learn to be critical of second hand experiences, and learn to accept them fo. what they are. They can learn to make simple checks on the veracity of second hand descriptions, and hence learn the importance of accurate reporting.

☐ The Science to be Learned

Children can learn:

1 The skills of science required for adequate investigation of their environment.
2 The small number of "big ideas" which act as integrative bonds, transcending subject boundaries.
3 To develop models and theories to describe and explain their environment.
4 That models and theories are not rigid and fixed, and are not accurate descriptions but rater adequate representations of the real world.
5 That man is a very special animal who can modify his environment, extend his senses, and apply value judgements to his actions.
6 That science is only one way of looking at the world, and has links with social science, art, music, etc.
7 That science has a history, and has an important role in shaping society.

Learning experiences can be structured to develop these understandings and promote scientific literacy in junior high school students.

☐ The Students

The materials developed by the Project should centre around the child and his development. The materials should promote the mental development of the child by facilitating the transition in Piagetian terms, from the concrete operations stage to the formal stage of mental operation.

They should cater for individual differences in students, and help them gain a set of cognitive skills, attitudes, and values which will form a basis for the child's future decision making. Values like honesty, idea sharing, faith in intellect, and positive attitudes toward science and scientists can be encouraged, along with the development of scientific understanding.

An important part of a child's development in Grades 7—10 is social, and the child is seeking independence and yet seeking to establish his relationship with other people. Science materials can be developed to further both individual and social development.

☐ The Aim of the Project

(It is interesting to compare this aim with the one that emerged in the Conference Guidelines.)

The fundamental aim of the Project is to *provide science-linked experiences which help the child to develop intellectually, to grow in his understanding of his environment, and to increase his ability to cope with any new environment as an autonomous, self-directed individual.* We use the word "environment" in its broadest sense. It includes the internal (biological, psychological) as well as the external (physical, technological, biological, social, etc.). The criteria for selection of any aspect of this total environment for particular study at any given time will centre on its immediacy and relevance to the child's stage of development.

Science experiences sould be designed to make him a more autonomous, self-sufficient, and inquiring individual. To do this, three stages of development of children are proposed for which Project material will be prepared.

Stage 1 should be concerned primarily with working in concrete situations; investigating and developing skills in the processes of science—in describing, classifying, experimenting, and perhaps making models of a large number of carefully selected environmental situations. Explanations of environmental situations should be given only where they arise naturally and spontaneously from the presented situation, and, then, should be consistent with the experience of the children.

Stage 2 should provide more structured experiences. Themes based on scientific ideas and relevant to children can be introduced. The learning of science by secondary methods—i.e. from the experiences of others, becomes increasingly important. The children are more capable of seeing 'order,' a structured 'whole,' and of grasping more abstract ideas.

Stage 3 A third stage is proposed, which may be appropriate to about 20 per cent of pupils. The materials developed to cater for this stage will require greater facility with abstract thought. The materials would require more sophisticated measurement techniques, and would lead to the understanding of higher level abstract ideas and theoretical models which directly relate to the various disciplines. The materials would not be designed specifically for those students wishing to proceed to further studies, but could well serve as a background for this. They are also to be designed to cater for other students with future interests outside science.

Most of the Project's developmental effort will be in Stages 1 and 2 with the extent of the requirements for Stage 3 materials arising after extensive trial of materials developed for Stages 1 and 2.

Different children (and different teachers) become interested in different things. The prediction of the direction of development of an interest is almost impossible. However, when the first signs of an interest in a particular area of learning manifest themselves, it is important that direction be given to help students (and teachers) further this interest. Materials will be developed such that children and teachers can follow up on aspects of interest to them.

☐ The Role of the Teacher and Teacher Education

The most important variable in the classroom is the teacher. The development of science materials cannot occur in isolation, and must parallel the education of teachers to use the materials. Indeed the executive sees classroom teachers as having a vital and active role in all aspects of the Project. Not only will they try out materials developed by the Project, they will also suggest materials to be developed. They will try out different structured sequences to establish different pathways, or alternative ways of using materials that are developed.

The amount of imposed structure required by a teacher can be decided by the teacher and the materials can serve a dual function of being highly structured for those that require it, yet allowing flexibility for

those teachers who wish to develop their own program. Such flexibility is essential if the materials developed by the Project are to have wide acceptance in Australian schools.

The success of the Project will depend as much on the quality and extent of the teacher education program to be provided as it does on the quality of materials that are produced and one of the major criteria for determining the success of the Project will be to determine the success of the teacher education program for changing teachers so that they can use the new materials.

☐ Summary

The executive intends that materials should be prepared in accordance with a master plan, and first tried in a small number of readily accessible schools. Evaluation will be concurrent. After revision, the materials will be tried again in a larger sample of schools where evaluation will again be made. The results of evaluation will determine the final form of the materials.

The executive intends that services to teachers should include training for those to be involved in trial situations, and in this matter we shall look to the State Advisory Committees for assistance; the provision of a resource centre; and the preparation of a model of a teacher training program, appropriate to Project materials, for use in pre- and in-service teacher training activities. The planned operations room at the Project headquarters will be available to visitors who will always be welcomed. It is intended that close liaison with teachers will be established and maintained. We want their ideas. We need their advice about what we are doing.

Our belief that all students in Grades 7-10 should learn some science spurs us on to an effort to determine what this science should be. There is no perfect approach. There are millions of patterns possible. We can only do our best. There will be criticism of our efforts. We expect criticism but hope it will be constructive. The degree of our success will hinge on the co-operation of everyone involved in the task.

IMPLICATIONS FROM OTHER CURRICULUM DEVELOPMENT PROJECTS FOR CURRICULUM DEVELOPMENT IN AUSTRALIA —DAY 2

This paper was presented by Professor P. J. Fensam to give a second point of reference for the day's discussions on the purposes and aims of the ASEP Project, and the relative weights and emphases to be placed on the many things that could be done.

The ASEP Project was described as a third generation project, taking "strength and guidance from what has gone before, rather than duplicating with Australian dollars what has been done elsewhere . . ." The small amount of 'hard data' on the success of earlier projects was pointed out, showing the small amount of effort that has traditionally gone into evaluating a program.

The Project was expected to provide a significant dialogue in the field of ideas on science education, and the philisophy of the Project as much as the materials themselves, was described as giving point and purpose to teacher education.

Professor Fensham mentioned horizontal and vertical implications from other curriculum projects: *horizontal*: greater degree of integration of science disciplines greater outreach from science to other activities, greater concern for motivating the people involved. *vertical*: science education begins much earlier in the education of the child.

He also suggested that the curriculum, or "structured set of learning outcomes" should be separated from the instruction, which is the means "whereby the child or the teacher—child relation seeks to obtain these outcomes for the curriculum,' and the project should produce both a curriculum, and parallel sets of learning materials.

☐ Implications for the Project from Present Trends

The following is a summary of the implications, as given by Professor Fensham:

1 Failure to involve enough classroom teachers in the process

of development in other projects suggests that this Project should establish machinery to ensure their involvement in all aspects of the program.

2 Teacher resources are inadequate throughout Australia at lower secondary levels and the Project should work from this assumption.

3 Australia has limited resources and experience to draw on, and flexible arrangements to provide for the maximum use of this include consultancy, sub-contracting, and short term and long term involvement.

4 The Project should be consonant with the directions of education in general. Science is a social process, and can make a real contribution to the development of the child as a social being.

5 Education should provide some compensatory features to overcome the differential extra-school environment and experience of the children.

THE KINDS OF MATERIALS THAT COULD BE DEVELOPED BY ASEP—DAY 3

The Assistant Director Development for the Australian Science Education Project, Mr L. G. Dale, discussed some of the materials that could be developed to foster the aims of the Australian Science Education Project, and gave some indication of possibilities to be pursued, based on the rationale and philosophy presented on the previous day.

A number of proposals was made about materials. It was stated that the materials should:

* be concerned mainly with the current development of children who will not continue with the formal study of science
* relate directly to the child's present environment as far as possible, including its physical biological, and social aspects
* be consistent with the structure of scientific knowledge and contain aspects devoted specifically to extension of this knowledge treating science as an integrated subject
* follow an inquiry approach and develop competency in scientific inquiry
* require and depend upon student activity.
* aim at developing positive student attitudes
* include essential reference materials
* contain portions for individual student progress
* provide both structured and open-ended exercises
* contain portions for enrichment and extension
* include tests and other assessment instruments
* include adequate guidance for teachers
* cater for three main levels of reading ability
* be organized according to three stages of child development, corresponding approximately to Piaget's concrete and formal stages and the transition between them
* for the first trial, be produced in small related but physically discrete portions
* for the first trial, be structured in "units" of work, each covering a specific topic, with each unit as independent as possible from other units.

From an expansion of these points made in the paper, a series of recommendations were presented to the Conference for consideration. Each recommendation represented an issue upon which opinions differ, and about which little hard data exists. On some of the recommendations, agreement was reached without difficulty. On others, two points of view were catered for by compromise, which may lead to the production of materials following the alternate views. The extent to which alternate materials can be produced will depend largely on the Project's resources, and decisions will often have to be made in favour of one direction at the expense of another. Whether such choices are the 'right' ones, may become clear after the trial of materials.

Mr Dale made the following recommendations to the Conference:—

1 *Where practicable, the Project should make available materials that are best suited to achieving the learning task desired, but should take into account what is already available and the cost of production and/or supply to schools of any new items concerned. Where possible, use should be made of the materials already in or available to schools.*

2 *Materials should be produced for three stages of development in children, based on ability to handle abstract ideas with the limited use of concrete "props".*

3 *As far as possible, materials produced should be related to and adaptable to the student's environment. Teachers should be given assistance to enable them to make maximum use of the school environment.*

4 *As far as is practicable, materials provided should be such that teachers can use them according to their own particular skills and preferences and to the advantage of the students concerned.*

5 *It should be assumed that the bulk of the equipment required will be available in the schools. Most of the activity exercises included in the materials should require the use of simple, readily available equipment.*

6 *In development of the materials it should be assumed that students will be taught in rooms in which individual activity can be undertaken.*

7 *Audio-visual materials should be produced to supplement the learning materials. Where these are made an essential part of the materials, due account should be taken of the problems of availability of appropriate equipment and classroom facilities.*

8 *Reference reading materials that are considered to be highly desirable for all students should be produced as part of the Project materials and in a form that can be made readily available to all students. Existing reference materials should be screened and appropriate information on them should be provided in the Project materials.*

9 *In the materials an inquiry approach should be used predominantly.*

10 *Materials developed should be based on student experience in carrying out laboratory experiments and investigations. Provision should be made for active student participation in most phases of classroom work at most times. Experiences incorporated should add to the intellectual and social development of the child and lead to understanding consistent with that development.*

11 *All materials produced should contain portions for enrichment and extension. Some materials should be designed to facilitate individual progress.*

12 *Positive attitudes to science and to the learning situation should be encouraged by incorporating in the instructional materials student participation in problem solving, opportunity for students to follow their own ideas and interests, aspects of direct and immediate concern to students, variety in types of presentation of materials, and by making the materials interesting and attractive to both students and teachers.*

13 *Materials should provide a minimum basic guide for teachers who are well qualified and experienced. Supplementary information on the science involved should be available for teachers who lack knowledge of that area of science. Supplementary information on laboratory techniques should be available for teachers who lack experience in the school laboratory. Characteristics of all materials in terms of the outcomes to be expected from their use should be described.*

14 *Both structured and open-ended materials should be developed. The former should be used mainly where rapid learning of certain content or skills is required, the latter mainly where outcomes of autonomy and initiative are desired.*

15 *The materials should provide mainly for the science education of children who do not continue with the study of science beyond Grade 10. Any aspects considered to be of sufficient importance to be studied by all children should be covered no later than the end of Grade 9. Sequences among the materials should be kept to a minimum to give teachers maximum freedom of choice.*

16 *Materials should be produced for three main levels of reading ability. Reading Grades 6-7, 8-9 and 10-11 with some supplementary materials at Grades 4-5 and 12-13 levels. Usually any one portion of materials should be written at one reading level only, but several reading levels could be represented in a set of materials.*

17 *Materials for a given topic of study should include portions that can be used by students working independently of the teacher, but the responsibility of organising the over-all work on that topic will be the teacher's.*

18 *The materials available should include tests and other assessment instruments for use by teachers and students.*

19 *The subject matter of the materials should be concerned with attitudes of students, manipulation of equipment and materials, science content, environmental applications of science and the extension of knowledge, including the use of science processes. All materials should be concerned with the extension of knowledge and the development of desirable attitudes and should be consistent with the structure of scientific knowledge, but materials concerned with aspects of science not of immediate relevance to the environment should be limited to use in Grades 9 and 10 and comprise less than 20% of the total materials developed.*

20 *The materials produced for the first trial should be in small, discrete, but related portions that offer a variety of possibilities for combination. During the trials, ways of combining the various portions should be investigated.*

21 *The materials produced for the first trial should be in form of units, with broad structure and characteristics as described above.*

22 *Sequences of units in which certain units are pre-requisite to others should be kept as short and as few in number as possible. Desirable and possible sequences of units to achieve specified outcomes should be stated for the guidance of teachers.*

It should be remembered that these were recommendations to the Guidelines Conference. They do not necessarily represent pesent Project policy.

LEARNING AND INSTRUCTION — DAY 3

Dr M. L. Turner explored instruction in a wider sense, by examining two existing classification systems for the kinds of pupil outcomes and the kinds of learning experiences. The two systems contrasted had been developed by McLeish[1] and Gagne[2].

The summaries of the McLeish and Gagne positions are taken from Dr Turner's paper.

☐ McLEISH

McLeish starts from the relatively popular position that teaching is a process concerned with facilitating learning and increasing its effectiveness and that learning can be regarded as both a more or less enduring change in behaviour and an increase in understanding. He then suggests five broad categories of learning.

In respect of the functions of the teacher and the commitment of the learner they range from the impersonal to the personal.

The five categories are ***OBJECTIVE INFORMATION, TECHNICAL SKILL, SOCIAL COMPETENCE, PERSONAL ACCEPTABILITY,*** *and* ***SELF-INSIGHT.***

He also describes a relatively large number of different modes of teaching. These are ***LECTURE, STEP-BY-STEP LECTURE—DISCUSSION, DEMONSTRATION, CONTROLLED DISCUSSION*** *("Socratic" method),* ***LIBRARY TECHNIQUE, GROUP TUTORIAL, SEMINAR, CRITIQUES,***

INDIVIDUAL TUTORIAL, EXPERIMENTAL LABORATORY, PROJECT, CASE DISCUSSION, FREE GROUP DISCUSSION, ROLE-PLAY, SIMULATION EXERCISE, PROGRAMMED MATERIAL, COMPUTER-ASSISTED INSTRUCTION, ANALOGUE METHOD, COUNSELLING, SYNECTICS, THE SYNDICATE METHOD, SUPERVISED READING and specially selected or prepared FILMS, RADIO and TV PROGRAMMES, AUDIO-TAPE RECORDINGS

McLeish then suggests that some methods are more appropriate than others for learning in each of the five areas he proposes, and further suggests that this is because of the different roles played and activities engaged in by teacher and learner in the various method situations.

[1] *McLeish, John, "The Objectives and Methods of Higher Education" Cambridge Institute of Education. 1968. (Mimeo)*

[2] *Gagne, Robert M., "The Conditions of Learning" Holt, Rinehart, Winston, Inc., 1965.*

☐ GAGNE

The point of view which Gagne expands in his book can be given in his own summary:

> *"There are as many varieties of learning as there are distinguishable conditions for learning. These varieties may be differentiated by means of descriptions of the factors that comprise the learning conditions in each case. In searching for and identifying these, one must look, first, at the capabilities internal to the learner, and, second, at the stimulus situation outside the learner. Each type of learning starts from a different "point" of internal capability, and is likely to demand a different external situation in order to take place effectively. The useful prototypes of learning are those delineated by these descriptions of learning conditions."*

While the book does not totally avoid issues of motivation, persuasion, and the learning of attitudes and values, it explicitly sets out to consider learning of those skills and knowledges that have typically formed the content of school curricula.

Gagne recognises eight types of learning, while acknowledging that there may be more. His eight types are SIGNAL LEARNING, STIMULUS-RESPONSE LEARNING, CHAINING, VERBAL ASSOCIATION, MUTIPLE DISCRIMINATION, CONCEPT LEARNING, PRINCIPLE LEARNING, and PROBLEM SOLVING.

Each type of learning is characterised by two sets of conditions, those within the learner, essentially prerequisite learned capabilities, and those of the learning situation. Gagne argues that for seven of the eight types there is conclusive evidence to support the proposition that there is an invariant order in which the types of learning are linked by this prerequisite relationship. Thus, he claims — PROBLEM SOLVING requires as prerequisites PRINCIPLES which require as prerequisites CONCEPTS which reuire as prerequisites MULTIPLE DISCRIMINATIONS which require as prerequisites VERBAL ASSOCIATIONS or other CHAINS which require as prerequisites STIMULUS-RESPONSE CONNECTIONS.

The two sets of conditions for each learning type, taken jointly, imply the characteristics (elements and sequence) of the instructional events necessary for learning to occur.

Perhaps the strongest implication of Gagne's position for curriculum development and teaching, more generally is that it is invalid, usually if not always, to use a single instructional method to teach what are the more familiar topics or units of work of traditional curricula. What is required is a task analysis.

Not infrequently it is possible to identify the learnings that are seen as the most desirable and important intended consequences of teaching the the unit. And again, not infrequently, it is found that these learnings are high-order principles. It may then be possible to determine in turn the subordinate principles, concepts multiple discriminations and so on upon which these higher-order principles are derivative. If any, or all

of these subordinate learnings are missing in the student they must be learned if the final intended learnings are to be achieved. And each such learning has its own set of distinctive necessary conditions. Thus, for Gagne, the effective curriculum unit is that devoted to the acquisition of a particular learning be it a high-order principle, concept, multiple discrimination, and so on.

☐ ADVANTAGES AND DISADVANTAGES OF SUCH SYSTEMS

In his paper, Dr Turner pointed out the merits of these systems which can bring to mind learned outcomes or learning experiences which would otherwise be forgotten. In general, the advantages of the systems were drawn by inference from an elaboration of their disadvantages:

1 *Too ready an adoption of any one system may lead to the omission of important categories of otherwise desired learning experiences and outcomes.*
2 *The curriculum worker (or the teacher) may misinterpret the system.*
3 *The systems are never comprehensive enough for all the decisions and operations of the curriculum worker or the teacher (for example, neither system outlined mentions attention or motivation).*
4 *Systems say nothing about the level of practical demands they are likely to make for their implementation in a practical system (e.g. cost or logistic implications).*
5 *The systems are discipline neutral.*
6 *The systems have generalised categories, and do not give keys for particular learned outcomes.*

It was pointed out that the systems represent the consensus of other people's thought, intuition, experience and research, and if this experience and research has validity, the greater the advantages are likely to be. Also empirical validation of the systems is not possible yet because few, if any, curricula have adopted exclusively any one of the systems.

Dr Turner, in his concluding remarks, gives some directions to the curriculum developer.

It seems inevitable to me that some clarification, derivation, and selection of objectives of a curriculum must be accomplished before any serious attention can be given to consideration of other matters including that of the clarification, derivation, and selection of learning experiences calculated to bring these objectives to fruition.

I am by no means convinced, even if the same set of objectives is eventually selected for all children, that these objectives will be achieved uniformly or will necessarily be best approximated by a common set of learning experiences. The basis for this position derives essentially from my consideration of the problem of individual differences in learning.

Completely common objectives and completely common learning experiences constitute a closed system with control effectively vested in the materials conveying the learning experiences.

I am willing to accept that at senior secondary levels and higher and in the present state of our society that more systematic disciplined scientific studies are demanded. Given that it can be said that the senior student retains some measure of control through choosing to study a particular science or sciences or not, the curricula of these sciences at these levels must, I believe, be relatively closed systems—that is, with relatively fixed objectives and relatively uniform sets of learning experiences. (This is not to say that the objectives and learning experiences prevalent today at senior levels are not open to criticism.)

In science education at the junior secondary level and certainly at the primary level, I am much more inclined to think that a more open system is desirable, with at least some choice in the range of objectives and the level of achievement acquired in their pursuit and considerably more choice in the means of pursuing these objectives.

If this is accepted, it would seem a wise strategy for ASEP to produce materials embodying these choices. One essential feature of the materials should be that they, together with other experience, provide learning experiences for the teacher so that the

teacher understands the basis of the pupil's learning. If the teacher so learns, he will have earned the right or confirmed the right to even greater freedom of choice and independent and responsible teaching.

EVALUATION, TEACHER EDUCATION, AND SERVICE POSSIBILITIES FOR ASEP — DAY 4

The Assistant Director (Service) for the Australian Science Education Project, Dr G. A. Ramsey, presented the final position paper of the Project executive. The broad areas of services, teacher education and evaluation were discussed. The following is a summary of the paper.

The Service branch of the Project exists to facilitate the Development branch in developing instructional materials in science for use by teachers and pupils in Grades 7-10 in Australian schools. To foster this, the Service branch will evaluate current practices, develop suitable evaluative instruments, develop a teacher education program, and establish a teacher resource service.

The aim of ASEP, as seen by the Service branch, is to '*bring about a change in the science education of students in Grades 7-10 in Australian schools*'. The changes expected are to be improvements in present materials and practices. The functions of the Service branch in bringing about change are to

1 *produce in a technical sense, the materials for change;*
2 *stimulate the change process among teachers;*
3 *monitor and describe the change process;*
4 *evaluate changes produced.*

The service function of the Project and the Development function are closely interlocking endeavours, with the one providing feedback and control for the other.

☐ EVALUATION

There are three basic evaluation tasks proposed for the ASEP program:

1 *Formative* — concerned with the improvement of the materials being developed. In this phase, the parts of the total program being developed are tried out in schools, instruments are developed to test whether the expected gains are being made, and improvements in the design of materials are suggested. The evaluator and the materials developer work closely together in this phase. The evaluator can help the materials developer translate his objectives into a testable form, or help with the restructuring of learning experiences shown to be unsuccessful in the trial stage. Project staff will be involved mainly in this area.
2 *Summative* — concerned with appraising the total package produced. This may be done by comparing the total package developed by one Project with that developed by another on a number of criteria, or by appraising how closely the total package comes to fulfilling stated aims. Much of this evaluation should be done outside the Project.
3 *Basic Research*. The Project could provide the opportunity for people both inside and outside it to do research on various aspects of instruction, reading level, sequencing of concepts, etc.

☐ INFORMATION TO BE GATHERED:

Data should be gathered so that judgements may be made about

1 the conditions prior to the trial of materials — e.g. the entry behaviours of teachers and students.
2 the conditions after the materials have been used — e.g. the exit behaviours of teachers and students.
3 the dynamic processes occurring in the classroom, where the teacher works with his students using some instructional method.

Judgements to be made about the total programme include

1 whether the program is consistent with science as it is known to professional scientists,
2 whether the content (concepts and process skills) is useful for interpreting the natural environment,
3 whether the sequence of instruction is such that the child's learning and retention is at a maximum at every level of development.

The validity of the materials must be checked in at least three areas:

1 Content validity — is the content consistent with expert scientific

thought?
2 Pedagogical validity — are the materials teachable?
3 Social and philosophical validity — is the philosophy of the program borne out by the materials developed and the philosophy of the teachers using them?

☐ ACHIEVEMENT TESTS

These should be devised from clear descriptions of desired learner behaviours expressed as objectives. These objectives should be written for at least two levels; one directed to the teacher, the other to students.
Two kinds of tests should be developed:
1 Those to determine whether students have attained the 'lesser learnings' which it is expected all students should attain (e.g. 90% of students achieving 90% of expected outcomes may be an acceptable criterion.)
2 Those to determine whether the 'greater learnings' expected to result (e.g. higher cognitive outcomes, attitudes change, etc.) are achieved.

Tests will be developed along with the learning materials and will be checked for level of difficulty, reading level, State bias, etc.

☐ OTHER INSTRUMENTS

It is hoped to develop a number of instruments which will help make evaluative decisions on teaching methods, school facilities, etc. Questionnaires, check lists, structured observation procedures and recorded interview techniques might be developed.

The evaluation program should consider all components of the instructional process and not concentrate only on the student.
The co-operation of research branches of education departments, universities, and teachers' colleges is to be sought.

☐ THE TEACHER EDUCATION PROGRAM

Some premises on which the teacher education program could be based were outlined. These are summarised as:
1 the most important variable in the classroom is the teacher;
2 teachers can be helped to increase their knowledge of teaching and their understanding of Project philosophy and aims;
3 teachers know how to teach better than they do. The program can improve both knowledge and ability to narrow the gap;
4 the success of Project materials in the classroom depends as much on the teacher education program as it does on the materials developed;
5 the best way to help teachers use the materials creatively in the classroom is through first-hand experience with them, helped by other teachers who have used them, and through being involved wherever possible in the development process.

The program will aim to help teachers understand Project aims and objectives, and become experienced with the teaching methods suggested. It also hopes to maintain in teachers the fidelity of these aims, objectives, and methods over an extended period.

The teacher education program has a responsibility in at least five areas:
1 teachers for initial trials;
2 a wider sample of teachers for a second trial;
3 teachers in the field for the use of published materials;
4 trainee teachers in colleges and universities to use the materials;
5 up-grading teachers in the field who are using the materials.

The major areas of ASEP effort will be in areas 1 and 2.

☐ THE TRIAL OF MATERIALS

The Project will allow two trials, with a rewrite after each trial. There will be no massive summative evaluation at the pre-publication stage.

☐ POINTS RELATED TO THE FIRST TRIAL:
1 *should be small so that the developers of the materials, the evaluators, and the teachers can all feel part of the same team, i.e. become committed;*
2 *gross errors and inconsistencies are being sought;*
3 *information gained will form the basis for teacher direction in the second trial;*
4 *close co-operation between trial teachers and developers will have to be maintained;*
5 *trial teachers will gain first-hand experience with materials by attending regular fortnightly*

sessions at ASEP headquarters;

6 *ten individual set of trial materials could be made available to each State for comment, but the organisation of any trials in the States should be done by State Advisory Committees;*

7 *the Project will maintain liaison with Trials co-ordinators in those States conducting them.*

Second Trial details have not been established, but the different segments of the work, such as materials for slow learners, stage 1 materials, etc. will have to be tried out extensively in various States. It is hoped that each State can have a specific interest in some aspect of the Project where it feels that a major contribution could be made.

☐ A RESOURCE SERVICE FOR TEACHERS

A number of possibilities which could be considered were outlined. These are listed:

1 To develop a series of booklets which contain rewrites in simple terms of recent scientific advances described in scientific journals or the Press.

2 To establish liaison with schools across the country to take data on weather conditions, hours of sunlight, etc. — or other points of common interest.

3 To act as a source of information on science, providing answers to queries from teachers and students.

4 To experiment with activities suggested by teachers, and release them in a form useful to other teachers, for example, science journals.

5 To act as a resource centre for audio-visual aids of all kinds, and maintain catalogues of existing published materials which may be useful as teacher resources.

6 To set up an advisory service branch for businesses and large firms producing materials for use in schools.

7 To work closely with the ABC in the development of radio and television programs that help foster the aims of the Project.

☐ SUMMARY

The following statements are from the summing up given at the end of the paper.

"The cost of service comes high, and it will be up to this Conference to help us establish priorities among the service, teacher education, and evaluation possibilities proposed. Various estimates have been made up to a quarter of a project's resources should be spent on evaluation, and another quarter on teacher education and services. Few precedents exist except that it is generally agreed that what has usually been spent in these areas has been too low. The other problem is that one cannot separately cost evaluation, development, teacher education, services and production of materials. These are all highly related endeavours, yet decisions among them will have to be made.

The ASEP Project is completely Project budgeted, a very rare procedure in Australian education. For this reason educators are likely to over-estimate what can be accomplished with $1.2 million over four and a half years. It is, after all, about the salary bill for a medium sized high school over the same period.

The cost of developing one item in a test is estimated in Australia at about $30 per item, and can be as high as $250 per item in America. The cost of printing and distributing materials is also high, so we do not want to produce more material than is needed to get all the positive feed-back we can use. We are anticipating extensive help from the States in the area of in-service education, and perhaps research. Indeed, the Project could not operate effectively without this help. We are also anticipating some co-operation with the ABC in developing programs and we will be dependent on outside organisations for help in evaluation and teacher education.

We look on the ASEP Project as being a truly national enterprise, designed to improve science education in the whole of Australia. It is a national educational experiment, and as with all experiments, there is an element of risk. We have to be as prepared for failure as success — to admit to failure where it occurs, not change our criteria to make a failure seem like success, and to learn from our successes so that curriculum

development in many other areas will be advanced by the results of our efforts."

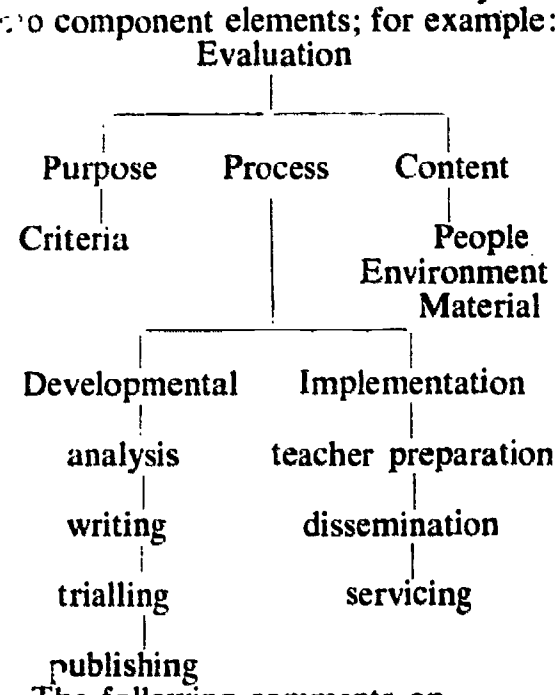
EVALUATION — PERSPECTIVES AND POSSIBILITIES — DAY 4

Mr Lloyd Blazely presented the counterpoint paper for the day. He dealt specifically with some broader problems of evaluation. He identified two major problems:

1 the word 'evaluation' does not have a common interpretation among educators, and is too general to be used effectively to communicate precise ideas, and
2 the published literature on evaluation, though considerable, is not of high quality. Documents either refer to tests and testing, or are vague and contain trivial generalisations.

It was suggested that a major prerequisite for evaluation is a logical framework which will structure the evaluation program. Such a model provides an opportunity to generate hypotheses which can in turn be tested and used to increase learning theory.

It was suggested that a '*systems analysis*' of evaluation would divide it into purpose, process, and content, and each of these could be analysed into component elements; for example:



The following comments on evaluation are taken from Mr Blazely's paper:

One can evaluate anything about the school's curriculum: its objectives, its scope, the quality of personnel in charge of it, the capacities of students the relevance, sequencing and relative importance of various materials, the degree to which objectives are implemented, the cost of curriculum materials, the relevance of a given learning theory to the curriculum, and so on.

The evaluation process as it refers to these may be more or less systematic and may be based on evidence of varying degrees of comprehensiveness and objectivity. In one sense any decision to act in a certain way arises from an evaluation even though this may not be at a conscious level. For example, in preparing materials it may not occur to the writer that some students are boys and others, girls. He will unconsciously assume that the material is relevant to both and will be tacitly continuing a traditional practice without having data on which to base a decision.

Evaluation may also represent a fairly systematic description with some weighing of evidence from one or more sources.

In the extreme it will describe a process which includes a careful gathering of evidence on the attainment of some end, a forming of judgements on the basis of that evidence and a weighing of evidence against certain criteria.

Any evaluation must involve an element of human judgement. A computer, for instance, cannot point out a decision unless the limits or cut-off points which the evaluator is willing to accept, have been programmed into it. The person or group making the evaluative decisions may also be categorised. The teacher, the central administration, the curriculum developer, and the independent investigator will all make judgements about aspects of any new curriculum program. Most of the judgement will not, or only partially, overlap, but nevertheless it may become crucial that resulting decisions are not in conflict and are not logically inconsistent. There is no point in having a set of carefully produced curriculum materials if the central administration decides that it is too costly to subsidise in schools.

Mr Blazely used the terms reflective, formative, and summative as important stages in the process.

He suggests that

Reflective evaluation requires judgements about the relevance of the purpose, aims and objectives of the curriculum considered in terms of the supra-systems (over structure) of education and of society.

Formative evaluation relates to trialling of materials as they are developed.

Summative evaluation appraises a product already on the market.

He believed that the Project should provide a detailed specification of objectives, and then all evaluation will come back in the end to criteria arising from the objectives. Hence, given an acceptable statement of objectives, and given that adequate reflective evaluation had gone on, the Project will be principally concerned with formative evaluation. Some points were made about the Project's formative evaluation:

1 those aspects of the Project to which most effort will be directed must be delineated,
2 results of evaluation must be obtained in time to influence the development of the materials,
3 certain problems of technique and strategy must be solved,
4 consideration must be given to deciding who should undertake the evaluation.

It was suggested that formal techniques need to be adopted to assess the effectiveness of a widespread teacher education program, and to get adequate feedback from teachers. Also,

1 some training must be given so that teachers make appropriate observations, and
2 teachers must be confident that the feedback is read by evaluators.

The following is the summary comment made by Mr. Blazely at the end of his paper:

"1 *We need, in education, a language which would allow us to communicate fully an idea in a paragraph instead of in a chapter.*
2 *We need a comprehensive coding of the field of curriculum research and evaluation.*
3 *We need a greater background of consistent research findings to guide the development and evaluation of the curriculum.*
4 *Evaluation activities can be coded in a variety of ways.*
5 *A curriculum development program is concerned initially with reflective evaluation.*
6 *Formative evaluation will help to guide and direct the actual production of curriculum materials.*
7 *Formative evaluation involves decisions about what to evaluate, who undertakes the evaluation, how the evaluation fits into the production process and the selection or development of the appropriate techniques for obtaining the data on which evaluation can be based.*
8 *Summative evaluation does not assume a major role in the curiculum production process but a project should take steps to see that summative evaluation of their product is undertaken in order to facilitate minor revision and the eventual development of the 'next generation' curriculum."*

THE AUSTRALIAN SCIENCE EDUCATION PROJECT, THE STATES AND NATION — DAY 5

This was the day allotted in which the State representatives were given an opportunity to speak on the Project to the full Conference, and to relate it to curriculum developments in the various States. Three of the States had prepared position papers on various matters, and these were circulated prior to the day's activities. The most extensive paper came from Western Australia, while briefer statements were put forward by Victoria and South Australia.

One of the features of the Conference was the number of spontaneous expressions of opinion on various aspects of the Conference discussions which were circulated for comment by participants. A list of these papers is given:

Bennett D. M. and Turner M.L. *"A comment on some basic issues."* The basic issues discussed related to compensatory education.

Johnson, B. *The Objectives of the "Web of Life."*

Maclay, R. *The aims of the selection of science content for Grades 7-10.*

Rechter, B. *Comment on the Bennett-Turner paper.*

Shepherd, R. *Some views on the Aims.*
Wilson, N. *Some suggested amendments to the Aims.* Criteria for the selection of social and psychological material for science learnings.
Wilkinson, R. H. *"What are the criteria for selection of science linked experiences?"*

It was against this background of opinion, coupled with the daily syndicate sessions and plenary session reports, that the Chairmen of the Advisory Committees in each of the States and Mr Rechter, who presented a national perspective for the Project, addressed the Conference.

THE AUSTRALIAN SCIENCE EDUCATION PROJECT AND THE STATES — DAY 5

Key comments made by each of the Chairmen of the State Advisory Committees have been selected from their speeches and reproduced with only minor editing.

☐ VICTORIA — Mr DON NEALE

"How do we view JSSP?[1] Well, we do see JSSP as one useful item amongst others which are already available and which can constitute, firstly, valuable interim material and subsequently, one of the alternative materials available to those which will be developed by ASEP.

We believe that ASEP should quite actively encourage the development of alternative materials by other bodies as a part of a policy of covering a wide variety of approaches which we feel is essential for the success of this scheme. I think we are all agreed at this Conference that ASEP should encourage a high level of initiative on the part of both pupil and teachers and we hope that these will extend to extra classroom activities which will grow in turn into leisure interests associated with science.

We believe that ASEP should play a full part in organising inter-State co-operation in the sharing of resources such as audio-visual aids. I think that too many of us are quite ignorant of what is available and what has been developed in other States. We hope, too, that their work will be the establishment of co-operation in regional consultation and material centres.

We, in Victoria, are very keen that the Project succeeds in producing not an Australian science course, but a range of resources to nourish a rich variety of science experiences for Australian children.

☐ WESTERN AUSTRALIA — Dr ROBERT VICKERY

First, I would like to recapitulate to say that the situation at the moment in Western Australia is one of fairly general dissatisfaction with the curriculum materials that exist and the syllabus that they service, and as a consequence for this and for other, I hope, more altruistic reasons, there is a very strong commitment in Western Australia to the ASEP Project.

I think that the case that has been represented at this Conference by many speakers for the inclusion of such things as personal development, the development of special skills of sociability and the relevance of the child's experience and his immediate environment to the curriculum, these arguments presented have been very persuasive and I think that when these views are represented to the State Committee in Western Australia, they will find a very large measure of sympathy. I think you will gather from the document the Western Australian group have produced, that the viewpoint expressed by that committee strongly favours the type of course that is structured and follows a story-line. I am certain, after having listened to the representations of various speakers at this Conference, that the committee will rather readily accept that some less structured approach is inevitable to allow flexibility of choice within and among the States. However, I think the position apparently existing between a structured sequence which can lead to hierarchical learning and an unstructured array which allows for unrestricted selection is a matter which should be viewed with a fair amount of concern. The priorities of objectives for ASEP which appear to be emerging from this Conference have,

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[1] *JSSP — The Junior Secondary Science Project out of which the ASEP Project grew.*

I think, a somewhat disturbing resemblance to the Science for Life sorts of programs that were common in the UK and US about 20 years ago

Despite a conviction that personal and social development are important, I believe that we should not lose sight of the fact that science is a structured body of knowledge which should be learned in a structured way. I think that it is vital that we reach some compromise between flexibility and rigid sequence, a compromise that will allow an acceptable freedom of choice while at the same time allowing for the development of the hierarchical and structured development of important scientific concepts.

I think that the objectives of ASEP which have emerged over the last couple of days include objectives which are not included in the content of objectives and instructional procedures of any of the projects with which I am familiar, and this I think should lead to a conclusion that we are not considering merely a two-year extension of JSSP or a two-year extension of any other sequence of materials that might be available, but we are considering a four-year ASEP Project.

One matter which is of peculiar State significance relates to point of entry into the program. In three States the Grade 7 students are in primary schools, and in three States the Grade 7 students are in secondary schools and the conditions of staff and facilities and equipment between primary schools is now, and clearly will remain, very different from the comparable conditions in secondary schools. We would be very anxious that our Grade 8 students do Grade 8 material and that the Grade 9 students do the material considered appropriate for Grade 9 students and so on. This has some implications. It carries the implication that the Grade 7 materials must be such that they either can be done in a primary school situation with the much more limited facilities and staff and resources available there or, alternatively, that the outcomes of Grade 7 which are assumed to begin Grade 8 are such that they can be met by some brief crash program at the beginning of the Grade 8 sequence, or some other compromise, but this does remain a point of difficulty for the immediate introduction of ASEP materials into States where the Grade 7 students are still in primary school.

We believe that ASEP should be regarded as a four-year entity. The entry into Grade 8 and the streaming of students represent peculiar problems to the West and the nature of the materials will be significant in terms of the degree to which these can be met.

☐ QUEENSLAND —
Mr GEORGE ROBINS

The syllabus committee very shortly in Queensland will have to settle down and think about what they are going to do to this science syllabus, irrespective of whether there is a junior examination there or not.

It would be ideal if we had the ASEP materials on hand. We could build a course around it, the time factor will not allow it, but if we could have some idea as to which way or in which direction this ASEP Project was heading regarding the development of materials, then it would be a big help to us when we come to revise the existing syllabus.

Although we have a five-year (three-two) secondary stage in Queensland, I don't think that the Project should be tied down to developing materials for any one particular State. If they develop it for four years then we can quite easily choose what we feel is good from the materials that they have produced. A fresh start should be made in developing the materials for these four years in ASEP. This Project is a nation-wide one, it has broad objectives and it is going to cater for a wider population. But if in the planning of the Project they find that some of the existing JSSP materials fit very nicely into what they think should be developed, well and good.

The first task of ASEP as soon as this Conference is over, will be to settle down and devise an overall plan for four years. When this is done, Queensland would like to have a look at it, to see how it will fit in and be in a position to make recommendations.

Queensland would be very happy to take part in trials and these should

not be confined to Victoria. I feel that it would be perhaps a bit of a let-down if we had to sit back and wait for say 12 months, two years, or whatever, before we get cracking with the Project.

Queensland came into this Project because it felt that it was a very important breakthrough in that it was a National program for the improvement of science and I can assure you that you will get all the support that you ask from Queensland, in developing these new materials.

□ NEW SOUTH WALES — Mr HOWARD CAREY

THE NATURE OF NSW COURSES

In the school curriculum, secondary school, there is a compulsory core of science for all pupils in Forms 1 to 4, Grades 7 to 10. There exists four syllabuses intended for the varying needs and abilities of these students. There is an ordinary level syllabus for the great majority, there is an advanced level syllabus which consists of the ordinary level syllabus, but with some extensions. There is a modified level syllabus which is precisely that, a modification, a simpler and contracted version of the ordinary level syllabus, so you can see these three syllabuses are fairly closely related in content and approach; and there is an activity syllabus for the slow-learning group. This syllabus too, is basic and similar to the other three. Syllabuses have been compiled by syllabus committees consisting almost entirely in many cases of practising teachers, and they have been compiled on behalf of the Secondary School Board.

Stress is placed in the syllabuses on presenting the course content as science, that is, integrated, and not as separate disciplines; on the existence of big ideas in science, on the view that science is both a body of knowledge and a method of inquiry, on the importance of science as a human activity, on the need for pupil activity in learning science, and on the professional freedom of the teacher to organise the course content as he sees appropriate, and to add to this where the interests of either the pupils or the teacher make it worth while to do so. So while there are syllabuses, they are not necessarily restrictive.

RELATION OF SYLLABUSES TO ASEP

The spirit of our courses in NSW is very much in accord with the ASEP rationale, and the items presented show nothing with which we would argue or disagree. The objectives are also very much in accord with those set out in the WA paper, and the aims of science education given in the Tasmanian document. It seems we are all in accord with the sorts of things we think should go on in science teaching and the sorts of outcomes we would hope for as a result.

WHAT SHOULD WE GAIN FROM ASEP?

In case you may think that this is a mundane way of looking at things, let us just be quite clear that the States are making a financial investment in this and they do hope to get something back which will be useful. What we hope for in New South Wales in practical terms first of all, is material; material which will enable the achievement of our syllabus aims to be reached much more effectively. We would like a reasonable proportion of that material to be consistent with our own syllabus content. We would hope that it would bring about an increase of pupil involvement and activity in learning science. We hope that it will also bring about an increase in the pupils' and the teachers' interest in and enthusiasm for science, and we would hope that the materials are sufficiently flexible in format to allow teachers to use them as and when they deem to be appropriate.

In other words, we are not looking for a highly structured sequence of units or materials through which there is only one way. We do want to leave the teachers a fair degree of freedom in deciding whether or not they wish to use some or all of the material, and to the extent to use it when they deem it to be appropriate.

□ SOUTH AUSTRALIA — Mr JOHN MAYFIELD

We in South Australia did not sit down and write a position paper as other States may have done. We did consider the State position, but we felt that we should approach this Conference without a list of clearly-stated and perhaps limiting

demands. But one of the outcomes of this Conference, we felt, had to be for our purposes a very clear statement of the intent of the Project. Shortly after the conclusion of this Conference, as a result of the editing of the Conference materials, South Australia would like to see a clear statement of the intent of the Project in relation to aims, purposes, teacher and student outcomes, and objectives.

From a State point of view, we do want to be kept informed in South Australia. We must not be allowed to get the feeling that we are not needed or not in the picture as far as this Project is concerned.

We were concerned, at one stage, that there were dangers that the Project being established in Victoria, being so good within itself, could become insular, could begin to feel no need to go outside of its own resources and that could lead to a feeling in our State that we were not being involved. We want to be involved, even if we are not involved in trials quite as much as, say, Victorian schools are, in sustained and purposeful activity of some kind.

I might suggest that perhaps a Newsletter, possibly tapes, could frequently flow and be the agent for an information flow from the Project to the States.

STATE IMPLICATIONS

1 *GRADE 7 - GRADE 8: To look for the solution of the Grade 7 - Grade 8 problem by producing materials for use in our Grade 7 will not be a satisfactory solution.*

2 *PERIOD ALLOTMENT: We do have differences in the number of periods allotted to various groups of students doing science. This, I think, will provide a problem for the Project to accommodate. The trend in our State is that junior science is not receiving as much time allotment as it once did; it has come down in one of our groups from 10 periods a week to a realistic 8 periods a week. The Project should take into account the trend in period allotment, assess this for us, and make some suggestions about it. We would like to hear what a considered opinion of period allotment in junior science is.*

3 *GROUPING: We have a three-track system which is an identifiable part of our school organisation, and we would like to see the materials accommodate this kind of grouping. We are not asking the Project to design its material about three kinds of students. We are only asking for accommodation, and I suppose that means we are asking for flexibility.*

4 *BLURRING OF SUBJECT BOUNDARIES: There is a trend toward this, and when I say "blurring of subject boundaries" I am not talking about integration within science itself, but rather find meeting points of science with other subjects on the junior secondary curriculum. We would like the Project to continue to regard science as a part of general education at junior secondary level.*

5 *TEACHER EDUCATION: Teacher education is vital to the success of the Project, and we hope this leads to a new look at teacher education, and produce a very effective program. The trials are very important in this regard and I am pleased that South Australia is going to be involved in these trials.*

6 *SLOW LEARNERS: The provision of materials for this group has become unattractive for the usual people who produce materials, for all sorts of unhappy reasons, and I would just like to underline very lightly the fact that ASEP's existence has made this provision of materials, the servicing for these people, even more difficult.*

Knowing that we cannot wait for the normal event of the Project to produce materials for these people, knowing that these people do exist, and that they have been herded together in some schools in South Australia, we have to do something about it. We have to produce materials, or at least initiate their development. I would ask you as a Conference, to consider what your reaction would be to a proposal from South Australia that we negotiate with ASEP for the development of materials in this area.

After this Conference and after further discussion in South Australia to define our position a little bit more clearly, we will be making an

approach to ASEP for assistance for the development in South Australia of materials for these "2" track slow-learner people. I think the important thing is that this will make some demand on the Project's resources. It may also contribute to the Project in some ways because, obviously, whatever we did produce would go into the fund of their experience or their resources.

☐ TASMANIA

Mr SYD ELDRIDGE

THE SCHOOLS BOARD

The Schools Board at present is a certification body mainly. It no longer has control over what goes on in the schools, as it has in the past. It has control over the certificate at the end of four years and also at the end of five and six years of secondary schooling. The university accepts or rejects that certificate for matriculation purposes, but the university is no longer the certification authority at the matriculation level either. The Schools Board Certificate is issued after four years and another one, a Higher School Certificate, after five or six years. This give it a certain advantage in that the whole thing is handled by one body.

We have the other advantage in change-over in the last year or two, in that since the Schools Board is concerned only with the final certificate, there is a lot more freedom and autonomy within the schools, particularly for the first four years. A NEW SYLLABUS. A new syllabus is in the process of being written. We are firm on the fact that it is a syllabus that is being produced, and not a course of study.

The syllabus is being put out by the Schools Board, at the request of the Education Department. The Schools Board, for Certification purposes at the end of Grade 10, will accept any reasonable course, and offer a certificate for attainment in the course.

To produce the syllabus the Schools Board has pulled in a group of people, mainly practising science teachers, who are closely related to the school situation. The syllabus is very open.

We are looking at major areas, that is classification, structure, energy, equilibrium change and we are attempting to structure it in that way, keeping man and the environment as a central feature.

Now, what we want of the Project, is material that we can use within that very general area. We are not demanding anything specific, or any specific sequences, and I think the situation is flexible enough to accept anything that might be put forward in the spirit that we have been talking of this week. Our schools have an autonomy which is genuine down to the individual school level.

☐ SUMMARISED BELOW ARE SOME POINTS MADE BY MR ELDRIDGE IN HIS SPEECH.

SOME REQUIREMENTS OF THE PROJECT

1 Materials to be used in schools.
2 Communication between the Project and our State.
3 A statement of Conference outcomes and a plan of Project intentions.
4 A running commentary on progress.
5 Become a clearing house for curriculum information.

SOME PROBLEMS TO BE OVERCOME

1 'Setting' students — students within a given school and given year may all be doing science at the same time.
2 Tasmania is committed to an emphasis on 'man as a part of the environment' in its syllabus.
3 Poor supply of qualified science teachers makes complex laboratory work difficult. The Project should keep this in mind before any complicated, complex sets of apparatus are designed.
4 Catering for the slow learner.

IMPLICATIONS TO THE NATION — DAY 5

In this paper, presented by Mr B Rechter, a counterpoint to the opinions of the chairmen of the State Advisory Committees was presented and some implications which follow from the fact that the Project is a national, Australia-wide co-operation effort, were drawn.

☐ THE US PATTERN OF CURRICULUM DEVELOPMENT

The pattern of US development has, in general, been one of private-group initiative, funded either by a Federal Agency or by a private foundation.

Most important, despite occasional government funding, the project organisations which were established had no direct or indirect responsibility to any State-wide or local educational institutions.

The materials produced had to compete against those existing already. Usually they were handed to a commercial firm for publication, which advertised the virtues of the materials as widely as possible.

The result was a very uneven development of the use of the new materials. Some, like CBA, had limited and even localised success, others spread more widely throughout the country. The US man in the BSCS office with its little flags showing areas of activity, had some very bald patches, notably in the Southern States.

While the training and indoctrination of teachers in the use of new resources tended to be based on relatively limited budgets (by American standards at least), the form it took was based on enthusiastic volunteers representing a thin sampling of teachers from the vast numbers of school systems. This made it difficult to introduce the courses in many areas with experienced teachers. Romey, on his visit last year, indicated the dissatisfaction of the ESCP with such a haphazard approach to teacher education and indicated an approach which involved a kind of exhaustive and mass teacher training program for all teachers in a particular system who will teach the course, so that a whole school area might begin to use the materials of the particular project.

☐ *THE AUSTRALIAN PATTERN*

When we turn to Australia it is rather difficult to speak of a pattern emerging from examples of a number of different projects comparable in size, expertise and sophistication, to the American ones to which I have referred. To date the only comparable example we have in this country is ASEP itself. Nevertheless, it is perhaps worth analysing some of its features and their implications.

Compared with American projects, this is a national one in a peculiar sense. Primarily, it is funded by the National government and this funding has been augmented by all the State governments. Secondly, the States and the Commonwealth are linked in a joint venture. Furthermore, the independent and catholic schools are linked with the government schools by means of the Boards of Studies and Examinations in all States. The consequence of all this is that the Project is deeply embedded in the whole structure of the Australian school system.

If the Australian structure is to be, for whatever reasons, the model for future developments, we need to be critically aware, both of the possible constraints this might impose and of the very solid advantages it might confer. We need to look at these constraints and advantages in-so-far as they operate on the development of the Project materials, on the incorporation of the materials into the classroom learning situations and not least on the preparation of teachers to handle the new materials.

☐ *DEVELOPMENT OF MATERIALS. In every State system of education, radical changes in courses of study and examinations are in progress or will be in progress in the next few years. A possible constraint might therefore arise if, in the area of science such changes result in a firming of positions resulting in an attitude to ASEP of selecting from the ASEP materials what is congruent with the fixed requirements and neglecting the rest.*

One can accept the belief that each State, as a result of a specific history and tradition, may feel that it has particular and specific needs in science education which must be catered for. Given such a situation it seems to me imperative that those responsible for secondary science education in each State system see the next few years as a period of intense and co-operative effort with the Australian Science Education Project, to formulate new courses of study, not by fitting ASEP products to previously fixed patterns, but by a progressive process of change based on the very fact that a major national effort is underway.

This is far from being a plea for a uniform Australia-wide course of science study. I would not like to bite the hand that bites us, but I believe that the only references to

standardisation and uniformity relating to the Project date back to the very beginnings of the approaches to the Federal Government and were made with only a naive appreciation of their educational implications.

What is needed is probably not even State-wide fixed courses in which every classroom goes through the same process. But that is not the issue at the moment, although hopefully, the officers of the Project might be able, in the co-operative process which I've described, to persuade course constructors of the importance of variety and attention to individual differences. My reaction to the intention at least of the views expressed on this matter by State representatives at this Conference, is one of great optimism.

☐ *THE INTRODUCTION OF MATERIALS IN SCHOOLS*

There are a number of implications if these materials are to be introduced rapidly and effectively into schools. This is looking rather far ahead, but if we start concerning ourselves with the problem now we may be able to achieve our objectives. Each State has its own traditions and procedures on the provision of materials for schools and classrooms, though one common element in the government sector at least is a scarcity of resources which shows no sign of abating in the next 10 years. In particular, can we ensure, if the materials are as good as we believe they will be, and in the light of our discussion on Tuesday of compensating for socio-economic deprivation, that all children will have access to them?

It is my opinion that we should begin to make clear that only by massive Federal financial assistance based on co-operation with the State departments of education, can a situation be produced which will ensure that ASEP materials will reach all the schools in this country. Commonwealth involvement in secondary education will increase in this decade.

If we accept that all Australian children in the junior secondary years should study science and in a meaningful way we should not, as science educators and teachers, regard the issue as closed when the $1.9 million is spent, and the material is published. We have an equal responsibility to work for its effective availability to all children in secondary classes.

☐ *TEACHER EDUCATION. The third issue is that of teacher training. Our own experience with the introduction of the Web of Life course PSSC, and the NSW Wyndham Science course, has strongly re-inforced the views we have heard from the USA and the UK on the primacy of teacher preparation in making a success of new courses. The opinion is unanimous that both in the course of production of the materials, and later, this is an area of vital importance.*

Obviously we can rely on the co-operation and support of teacher training institutions, faculties of education, departments of education and science teachers' associations in this problem.

Yet again however, it will be impossible for those agencies to provide sufficient resources from their normal funds for such activities to be effective, particularly if we follow the desired model of ensuring exhaustive (and exhausting) induction of teachers in various regions rather than a piecemeal selective approach. The Commonwealth has been very careful in its entry into teacher training for evident reasons, but only Commonwealth funds, liberally disbursed, can meet the needs, and such funds will not be forthcoming unless there is an informal climate of opinion in Australia that they are needed to complete the task just begun.

The national implications of this first small step are firstly a far greater level of detailed co-operation by science educators and science teachers than hitherto. Secondly, I cannot see any alternative to a greater involvement by the Commonwealth Government in secondary education in the 1970's if the initial spending is not to be frittered away. There are many possible models for such involvement, but we have the responsibility to test this one out, and see that it works.

THE FINAL DAY — DAY 6

During the morning of the final day of the Conference, working groups of participants took the documents from the plenary sessions of earlier days,

and produced summary statements on the aims of the Project, the materials to be developed, the services and evaluation to be provided, and the roles of the States. These statements were then ratified again in plenary session, by the whole Conference. The document which resulted has been entitled *"Outcomes of the ASEP Guidelines Conference"* and is reproduced in its entirety. It represents a consensus of the opinions of Conference members on various aspects of the Project.

☐ OUTCOMES OF THE ASEP GUIDELINES CONFERENCE

AIMS. The major aim of ASEP is to design science experiences, which contribute to the personal and social development of the child.

In particular, the Project should aim to develop:

* *a balance between independence and interdependence in problem solving situations;*
* *a commitment to enquiry as one mode of operation in life situations;*
* *a willingness to adapt, to be flexible in new situations;*
* *a concern with the social consequences of science and technology;*
* *the child's creativity; and*
* *an understanding of man's physical and biological environment.*

THE FOLLOWING GUIDELINES FOR THE ACHIEVEMENT OF THESE AIMS ARE SUGGESTED.

1 The materials must cater for individual differences among students.

2 The students' immediate environment and interest should be important considerations guiding the types of materials selected and the methodology employed. For some learning experiences the immediate interests and familiar environment of the students are appropriate starting points for certain topics. For other learning experiences the materials should stem from the creation of a novel and relevant environment and the stimulation of new interests in the students.

3 The Project should be concerned with helping students to take their place in society and preparing them to make a responsible contribution to the society in which they will be adults.

4 Science can be described as both a structured and evolving body of knowledge and an array of skills by which information is generated, interpreted, and applied. Some coherence is necessary in the selection and development of science experiences. Yet no one organisational thread need predominate.

Among the possibilities are

(a) modes of enquiry. e.g. use of a control in experiments;
(b) themes e g. population control;
(c) conceptual schemes e.g. particulate nature of matter;
(d) overriding concepts e.g. dynamic equilibrium;
(e) historical approach to a topic e.g. electricity.

All these are important, but the balance among them and their relationship to the other major considerations of personal and social development and relevance to the students' familiar environment may change from stage to stage and may be different for students of different ability.

5 The further studies of students using the materials of the Project will, to some extent, be dependent on them and grow out of them — but should not dominate the design of the materials.

6 The materials should help pupils and teachers to initiate and develop their own enquiries, both individually and co-operatively.

MATERIALS

1 The Project should endeavour to ensure that all pupils. irrespective of their abilities at entry to the secondary school, are able to learn successfully. Therefore it is important that, as far as possible, allowance be made for individual differences. Differences that should be taken into account include those in reading ability, in ability to communicate both orally and in writing, in level of maturation, in development towards abstract thought, in interests and attitudes, and in motor skills.

2 The Project should recognise that pupils differ greatly in their range of past experiences and that therefore many different kinds of

learning experiences should be provided. Attention should be paid to the results of poor home and school background.

3 The design of the Project materials should be such as to accommodate differences in school organisation — for example, heterogeneous grouping and forms of streaming and tracking.

4 The Project should recognise the vital importance of the teacher and of his role in fostering maximum interaction between the child and the materials provided.

5 The materials should provide a maximum of support to those teachers who require or seek it while allowing as much freedom as possible for those who desire it. The recommended roles and tasks of the teacher in each part of the work should be clearly delineated.

6 The Conference approves in general the recommendations presented concerning the development of materials. In particular the developmental sequence (Stages 1, 2, 3) based on Piaget's concrete and formal stages is considered preferable to one based on grade levels. It should be a major feature of the rationale that the materials assist the pupils to make the transition between these stages.

7 An inquiry approach should predominate, the materials being so constructed that inquiry situations result in pupil activity, both individual and group.

8 The learning materials prepared by the Project should have a sound theoretical basis and relevant literature in the fields of psychology, sociology, and education should be adequately examined by the Project.

SERVICES

1 While recognising that the nature of the materials themselves will determine the actual weighting given to teacher education, evaluation, and other services, it is recommended that these areas be not underestimated. It is expected that a large part of the $1.2 million budget for the Project will be used on these services, yet other resources outside the Project do exist; for example, in-service education programs of State Education Departments. These other resources should be investigated for possible contributions to the Project in the initial planning stages.

2 A general outline of evaluation needs should be produced for information and for critical constructive comment. External evaluation of the Project should be encouraged, and linked where possible with the interests/needs of the Project.

3 Some of the evaluation instruments and procedures the Project will require do not exist at present. These should be produced as a result of Project activities and part of this will need to be done outside the Project.

4 The service aspects of the Project are seen as having both a short-term and a long-term function. The short-term service function should be seen as an intrinsic part of the development of the Project. The long-term function, for example, the setting-up of more permanent resource centres, should be kept in mind by the Project.

5 The Conference approves in general the recommendations presented on the service aspects of the Project. In particular, the suggestions for conducting trials of Project materials and the principle of localised trials in various part of Australia are endorsed. It suggests that the function of such trials is greater than to provide feedback on materials as it involves aspects such as teacher-education and State involvement.

ROLE OF THE STATES

1 Continuous exchange of relevant information should be maintained between ASEP and State Advisory Committees and other curriculum bodies. In particular, the outline plan for the development of materials by the Project should be made known to the States as soon as possible to enable syllabus committees to take Project developments into account.

2 State courses of study should not impose constraints on the Project's overall aims and objectives.

3 The entire program of ASEP materials should be planned and

developed as an entity. The existence of JSSP materials should impose no constraint on the Project.

4 To allow for different entry points into secondary school in terms of age and primary science background and for variations in time allotment to science in junior secondary grades, it is important that materials for these students show maximum flexibility, and should not be too closely identified with any particular grade.

5 It is anticipated that the aims of ASEP will usually be best achieved by materials originating within the Project; but existing curriculum materials should be carefully scrutinised, used as a source of information and ideas, and where appropriate, adapted or used to supplement ASEP materials.

6 There should be a free interchange of ideas and interaction between ASEP and other bodies or individuals engaged in related endeavours. From the beginning, ASEP should encourage teachers to report ideas and experiences and submit materials for development by, or in collaboration with, the Project. ASEP should also explore ways of involving teachers in the development of the materials.

7 ASEP should give due consideration to the importance of public relations both within the teaching profession and in the general community. Advantage should be taken of opportunities provided by interstate conferences, e.g. CONASTA, ANZAAS and other professional journals, e.g. Australian Science Teachers' Journal.

8 ASEP should bring to the notice of the Commonwealth and State Governments that the successful outcome of the Project will depend on the education of teachers in the use of the published materials and an the availability of the materials in schools.

SUMMING UP — CLOSING THE CONFERENCE

The week-long Conference was summarised by Mr Mark Bishop.

This address, coming as it did at the end of a most demanding week, was a stimulating and comprehensive summary of what occurred, given in Mark Bishop's own inimitable style. Much of the speech had direct reference to specific aspects of the Conference relevant only to participants. Educanto, communications, the Project's clients, the under-privileged, and teacher education, all received attention.

It is a pity that some of the sparkle from his ready wit and the personal touches in the presentation are lost in print. A few samples of his wit and insight are given.

ON COMMUNICATION

Certainly we ought not to waste time on semantics as so many told us; but equally we must take care to be understood, and unambiguously so, or we will be described in terms such as —

See the little phrases go
Watch their funny antics
The men who make them wiggle so
Are teachers of semantics.
The words go up —
the words go round
And make a great commotion
But all that lies behind the sound
Is Hebetude Boeotian.

We do have, as our American cousins say, a linguistics communications problem of a very real kind; for if we have been confused or just a little uncertain, how much more so will be our less interested colleagues and the laymen (and women) in the community.

I can visualise a restless science teacher wrestling before falling to sleep with the names of the Education reports and Science Curriculum Projects from which ASEP will be derived.

Oft in the stilly night
When the mind is fumbling fuzzily
I brood about how little I know
And know that little so muzzily
E're slumbers chains have bound me
I think it would suit me nicely
If I knew one-tenth of the little I know
But knew that tenth precisely.
And three A's S and three S - P's
And double S PC's and double S JPS
My mind is letter wracked and ill at ease
Gently my eyelids close
I'd rather be good than clever
I'd rather have my facts all wrong
Than have no facts whatever.

Observation number one then is — Communicate or perish.

□ ON THE PROJECT'S CLIENTS

Observation number two is — Know your Client — for just as a wise child knows its father . . . hence the origin of the clever little bastard — so too, I believe, a communicating Project is wise to know its client.

As a headmaster, as a parent, as a taxpayer, as a teacher, may I suggest, with all the humility associated with headmasters at the very least — the child (pupil) is not the Project's client — rather is he (she), to use one of the dehumanising engineering analogies we seem to use so easily, the raw material of the educative process. It is our business as educators to design experiences for him and to compulsorily expose him to them. Parents are clients of the Project, for they are, as a rule, unequal to the task of educating their children and being so, delegate their responsibility to schools. We ought to recognise this and in accepting the responsibility, exercise it wisely, being careful not to become like

The old woman with notions quite new
She never told children what they should do
But hoisted the cover right over her head
When people explained where her theories led.

We know what we mean, or do we, when we talk of a child centred curriculum and we have done well to guard against the dangers of letting the child choose.

There is nothing like instinct — fortunately.

□ ON THE UNDER-PRIVILEGED

It is vital, I agree, that the Project provide for differences in ability and for movement from one kind of material to another.

I have been moved by the concern for the disadvantaged and for the under-privileged child shown by more than one speaker.

I am perturbed that much less concern has been shown for the disadvantaged or under-privileged teacher.

Most of all, however, am I concerned that ASEP will discover too late what every member of the oldest profession in the world knows . . . it cannot be all things to all men. As we have talked about these matters touching on individual differences I have seen a danger that ASEP will/may prostitute its resources.

I suggest to you that under-privileged children exist in all our schools, and the correction and compensation for this lack of privilege is both costly and time-consuming, which makes its correction more costly.

□ ON TEACHER EDUCATION

I have mentioned earlier the under-privileged teacher. I see a very real need for the Project to concern itself with his relief for he will affect hundreds of children adversely day after day unless he becomes a BETTER teacher.

The disadvantaged teacher is at his worst not out of date or in an ill-equipped school. He may be. But he is more often characterised by never having seen himself as CO-OPERATING with his pupils, their parents and his colleagues, but rather as dominating, controlling, directing and at worst, I suggest, as manipulating them. He is unaware of Buber's I-thou relationships and possesses only I-them, I-it conceptions of his role. Such teachers are more numerous than we usually admit, and have small spirits. The problem for ASEP is not only to put good materials into their hands, but to try to enlarge their spirit as well. How can we persuade such teachers in Herbert's words that —

The man who looks on glass
On it may stay his eye
Or through it pass
And the Heavens espy.

A quote from the Wallace Worth Memorial Lecture by Lord James of Rusholme was given to illustrate his point:

> *"We need more and better teachers. The only solution I can really offer is as difficult to achieve as it is easy to state. We delude ourselves if we think that new techniques can ever be more than aids — necessary, valuable, but still aids. We delude ourselves if we believe that unlimited research in education will provide a series of simple answers for education in the new world, though*

some research is necessary. But in the last resort, if our education is to get better, as it must, it will get better because it is carried on by more educated, more sensitive, and more human people who are not afraid to emphasise the social and moral relevance of what they teach."

☐ SUMMARY

It has been an exciting week — taking part in the establishment of guidelines for the development and growth of the Project. For the first time in Australia the scientific method, of which Bacon spoke and about which scientists have known for a long time, has been recognised by the Government and will, in time, be by our people as the best way to generate more and better achievements and transformations in the teaching of science.

☐ CLOSING REMARKS

Some closing thoughts on the Project were given by the Director of the Australian Council for Educational Research, Dr Wm C. Radford. His remarks are quoted in full.

It seems a long time since Robert Wilkinson came to ACER in 1964 and asked if we could look after the preparation of educational materials to give substance to a new syllabus which the Universities and Schools Examination Board here had blessed, after a lot of hard work by a Standing Committee and a small primary grant from the Myer Foundation. We expected then to have up to six people for a few years for a four-year syllabus.

We finally had about that number, but only by the good graces of the Victorian Education Department, the sweating of blood and tears by Project staff in getting scant funds from industry and from foundations, and a quite considerable debit balance to ACER's account books on JSSP. But the near one score of units of materials available and the practical proof to Governments that this kind of full-time endeavour got different results was important.

It seems a long time, and it has at times been frustratingly slow time, since those of us who were then associated with JSSP took up the then Senator Gorton's promise, and ACER arranged a week-long meeting in Melbourne in 1967 to thrash out the details of a possible submission from South Australia, Tasmania, Victoria and ACER to the Commonwealth, had that submission approved by Ministers, and got it to the Commonwealth early in 1968.

It has seemed a longer time still since the Commonwealth's part-acceptance of that proposal (part — because we had anticipated complete financing by the Commonwealth) in August 1968, and financial and other negotiations have appeared to drag with leaden feet at times.

Yet I think few of us would have dared to think, in 1965, that in early 1970 there would have been a Conference of this kind with its purposes so clear and the collaboration of all possible partners so definite and so cheering. Our time perspectives need to be long ones, and our patience well nigh inexhaustible, but historically important events do eventuate given good will, people able and willing to take advantage of events when their promise is seen, and optimism. This has been one of those events, and it owes much to many people, not all of whom are present. Organisation is important, but intelligent collaboration is more important still. The Committee of Management and the Project staff, and ACER as the day to day manager, can see this Conference as a real converter on the power line of a highly significant Project in national educational planning. It has set precedents and standards, but only because of the willing co-operation of men and women of good will.

It has been the purpose of the Conference to "Let there be light" and I think it has been achieved. Thank you all.

EVALUATION REPORT

PRELIMINARY

This evaluation of the Guidelines Conference was prepared by ASEP staff and completed some two months after the Conference had been held.

On September 26, 1969, a proposal for a 'Planning Conference' for the newly-funded Junior Secondary Science Project (later to become the Australian Science Education Project) was submitted to a meeting of the Committee of Management.

Before the date of the Conference, the new Project had been established and its purposes determined, but no work other than very tentative planning had been done by the Project towards fulfilment of any of the stated purposes. Thus the Conference was held too late to enable it to influence any part of the initial setting-up of the Project, yet too early for the Project to have formulated firm plans which could have been evaluated by the Conference.

Circumstances largely determined the date of the Conference. As a result, guest participants and organizers had limited time in which to prepare for the Conference. The intervention of Christmas holidays during this period contributed to this problems and raised others.

A questionnaire designed to help ASEP staff to evaluate the Conference was distributed to each participant after the Conference. The information provided by the returns was most valuable to ASEP in the evaluation. However, the responsibility for comment in this document rests with the Project.

CONFERENCE PARTICIPANTS —ANALYSIS

Total number: 45 (39 men, 6 women)

☐ Distribution of participants on the basis of occupation

Science teachers	6
Headmasters or Deputy Headmasters	3
Professional Officers (including Inspectors) of State Education Departments	8
Lecturers at Teachers' Colleges	3
Members of University Education Faculties	4
Scientists at Universities	4
Staff of the Australian Council for Educational Research	6
Education Officer, Australian Broadcasting Commission	1
Staff of the Australian Science Education Project	10

☐ Comment on participants (other than ASEP staff) on the basis of State of residence:

New South Wales	6
Queensland	2
South Australia	5
Tasmania	4
Victoria	16
Western Australia	2

☐ Comment on participants

For the purposes for which the Conference was held, the number of participants seems to have been satisfactory. It is considered however that the addition of a small number of participants in the categories mentioned below would have been advantageous, without making the size of the Conference unwieldy.

Nearly all Conference participants were men. This in itself was not unsatisfactory except that there was inadequate representation of those particularly concerned with the education of girls. The inclusion of, for instance, a headmistress of a girls' school could have helped to remedy the situation.

A major deficiency in the composition of the Conference was the absence of overseas representatives. In particular, there was no representative from any overseas curriculum development project. Further, it seems that the Conference would have benefited by the addition of one or more local participants who had experience in curriculum development, either in Australia or overseas.

Other major deficiencies in the composition of the Conference were the absence of practitioners in psychology or sociology and the absence of scientists working outside the universities. The ranks of those with specialist knowledge of primary science and those with specialist knowledge of evaluation in education could have been strengthened.

CONFERENCE PROGRAM

☐ Daily routine

The general arrangement of presentation of papers, followed by discussion syndicates, then plenary sessions appears to have been a satisfactory procedure on the whole. The Conference however seems to have been overworked. The program allowed little time for informal discussion, for perusal of reference material, and in particular for reading and digesting the syndicate reports before the plenary sessions. The following represents an alternative timetable which overcomes these objections by having no formal Conference sessions in the evenings.

1 Plenary Session
2 Morning Tea
3 Paper I
4 Questions and Discussion
5 Lunch
6 Paper II
7 Questions and Discussion
8 Afternoon Tea
9 Syndicate Session
10 Dinner
11 Distribution of Syndicate Reports

Informal Activities

Informal activities could include such activities as voluntary attendance at the showing of a documentary film of interest or a visit to a school or other educational institution, as well as free time for reading and informal discussion. If desirable, part of one or two evenings could be used for additional general discussion in plenary session.

☐ Presentation of Conference papers

Before the Conference, synopses of Conference papers were circulated. During the Conference the general procedure was for the paper to be read, followed by distribution of copies of the paper during discussion

This procedure is open to serious criticism. The reading of a paper to an audience is an inefficient technique. Speaking to a previously-distributed paper is much to be preferred. The reading of some of the papers took too long, leaving inadequate time for questions and discussion. The papers should have been distributed to the participants for reading before the Conference.

The idea of distributing synopses of the papers prior to the Conference was good, but in some cases the synopses were not highly indicative of the contents of the papers.

The following alternative program overcomes the objections mentioned above, and appears to have several other advantages of considerable importance.

1 The full text of background papers is distributed before the Conference.
2 A list of important questions and problems which the Project considers need to be discussed is very carefully drawn up. Intending Conference participants (and others) are asked to supply questions which they consider need to be answered, and these are considered when the list of questions is being compiled.
3 Each day of the Conference speakers speak to those questions which are related to the subject-matter of the papers under discussion. There could be one or two speakers to each paper. Their task would be to analyze the problems, present possible solutions and their implications, and offer criticisms of them.
4 The Syndicates discuss the questions.
5 The Plenary Session discusses the result of the Syndicates' deliberations.

A variation of the above program would be for the papers themselves to be written around the problems. Whether this is preferable or not, the important point is that the problems and questions to be put forward for consideration by the Conference are of prime importance. Those which were actually set down for discussion at the Conference were often ill-defined and were not always the ones which should have had first priority.

☐ Areas covered by the Conference papers

The papers supplied valuable background material in most areas which needed to be covered; however, some important areas were not covered at all, or insufficient detail.

Many participants would have appreciated information concerning the background, aims, and objectives of other curriculum projects and generally of the process and problems of curriculum innovation. (It may well have been appropriate for this background information to be supplied before the Conference, without being formally dealt with as a paper during the Conference.

Other areas which merited attention are the criteria for selection of subject matter, the place of science in general studies courses, and some of the current issues in science education, e.g. process v. content, structured v. unstructured approach, acceleration v. enrichment, use of the powerful ideas of science.

☐ Syndicate sessions

The syndicate sessions operated well. The number of participants in each of the syndicate sessions was satisfactory, and participants were able to express themselves freely. The split-group procedure was effective, although some groups did not meet each other in syndicate session. The physical arrangement of the groups for discussion—around long tables—could have been improved.

The major deficiency in operation of the syndicate sessions was the unsatisfactory nature of the questions set down for discussion. Some questions were unsatisfactory because they did not deal with issues which are most crucial for the Project at this stage of its development. The wording of questions was too often open to conflicting interpretations.

The time allowed (about three hours) for syndicate discussions in the program was probably too much. It seems that highly-productive discussion could not continue much beyond about two hours. (In the timetable recommended previously—see 'Daily routine'—the syndicate sessions would, of necessity, have been reduced to about two hours' duration.) Greater care in the selection of questions could have resulted in a smaller number to be discussed.

☐ Plenary sessions

In bringing matters which had been debated in the syndicates before the whole assembly for discussion, the plenary sessions served a useful purpose. The ideas, opinions and viewpoints of individuals or groups could be matched against those of other individuals or groups, and it was during these sessions, more than at any other time, that it was possible to assess the general climate of opinion on the problems under discussion.

However in many respects the plenary sessions proved unsatisfactory. The argument often became diffuse and protracted; at times the sessions tended to become dominated by a few strong personalities; later items on the agenda often received a hurried passage due, in part at least, to exhaustion of the participants Again, the choice of questions for resolution mitigated against success.

Although the plenary session served the valuable purpose of pointing up differences between groups and individuals, its apparent role of attempting to obtain a consensus on all matters discussed was misconceived. (Further comment is made on this matter in Section 4 (a) 'Extent to which the main purposes of the Conference were achieved')

SERVICES AND FACILITIES

Generally, the services and facilities for participants during the Conference were good. During the course of the Conference however, some shortcomings became obvious.

At times, the typists had too much to do, both from the point of view of quantity of typing and of having other duties to perform, e.g. answering enquiries, taking telephone messages. There was a need for two typists and a receptionist during the day, and one typist and a receptionist during the evening. A stenographer for the plenary sessions would also have been desirable.

The typists and the duplicator (preferably a Gestetner) should have been situated away from the reception desk.

Some minor services, e.g. provision of change, postage stamps and matches could have been undertaken by the Project, but it would hardly

have been feasible for the Project to provide more extensive services. This deficiency could have been overcome by providing transport to and from a nearby shopping centre once or twice a day.

The duplicated output of papers at the conference lacked a systematic format, and the following is recommended. Each paper should

(i) have a standard heading
(ii) state the title of the paper
(iii) state the author or source
(iv) state the date and/or serial number
(v) have a sufficiently wide margin to permit subsequent filing and binding.

The number of papers required for distribution (after the Conference) to non-participants should have been estimated and included in the duplicated output.

GENERAL

☐ Extent to which the main purposes of the Conference were achieved

In trying to determine the extent to which the Conference achieved its main purposes (viz. to formulate guidelines and recommendations to help determine the direction of development and evaluation for a science education programme for grades 7-10, and to determine the roles of the States and State bodies in the Project) reference must be made to the outcomes of the Conference. These are listed in the document 'Outcomes of the ASEP Guidelines Conference' which contains a number of statements that were arrived at in plenary session. The statements purport to represent a consensus of the opinions of Conference members on the various questions discussed at the Conference.

Too much time was spent trying to get agreement on opposite viewpoints, and trying to reach consensus on the precise phrasing of statements at the plenary sessions. The emphasis at the Conference on trying to reach consensus on all matters was unfortunate. Although during the course of the Conference opinions were modified and standpoints were changed, many major differences of opinion amongst the participants were unresolved.

The stated outcomes of the Conference give a superficial appearance to the contrary. Many contentious issues were glossed over or concealed in the statements which are at times vague, ambiguous or platitudinous. This criticism of the outcomes document is mitigated however by the fact that members of ASEP staff were present throughout the Conference and due notice was taken by them of the variety of opinions expressed on contentious matters, particularly where the Conference divided into major groups. Although the document contains a number of ideas which appear to be highly significant for the Project it does not, for the most part, constitute a useful basis for action.

A conference such as the ASEP Conference cannot produce a true consensus statement, nor give detailed specifics for action. However it can

1 identify the problems or questions which have to be resolved
2 indicate how much support exists for each of the various known solutions or answers
3 approve initial procedures for the Executive
4 request that when the Project produces answers, these be circulated for criticism and comment.

SUMMARY

The Conference enabled opinions to be exchanged, and it enabled ASEP staff to obtain a feeling for this climate of opinions, in a way that would not otherwise have been possible. The Conference served a number of useful purposes, other than the stated ones, e.g. the mutual education of the participants, and the production of important initial contacts between guest participants and Project personnel. State representatives met and were introduced to ASEP, and a general feeling of commitment was engendered.

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