A Course in Basic Scientific English

TEACHER'S BOOK

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Longman

TEACHER'S NOTES

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Introduction

PURPOSE AND SCOPE OF THE COURSE

Purpose

The purpose of this course, as its title indicates, is to teach students of scientific subjects (including medicine, engineering and agriculture) the basic language of scientific English. This basic language is made up of sentence patterns, structural (functional) words and non-structural vocabulary which are common to all scientific disciplines and form the essential framework upon which the special vocabulary of each discipline is superimposed. Once this basic language has been mastered—together with the principal word-building devices (prefixes and suffixes) also presented in this book—the acquisition of these special vocabularies presents very little difficulty, since they are mainly *international* words and therefore very similar to those already used in the student's own language.

Nature of the linguistic material presented

The material incorporated in the course has been selected, for the most part on a frequency basis, from the scrutiny of more than three million words of modern scientific English of both American and British origin.[1] This sample covered ten broad areas of science and technology (physics, chemistry, biology, geology and geomorphology, medicine, engineering, sociology, economics, psychology and agriculture) and represented the types of literature likely to be consulted by students or graduates of science—university textbooks, professional papers and articles, scientific dictionaries and semi-popularizations. While the principal criteria for the inclusion of items were frequency and range, a certain amount of material was selected for other reasons, e.g. because of their usefulness as describers or definers, because they were members of a group or set, or because, though not unduly frequent, they were essential or non-substitutable (as is the case with the Present Continuous tense, for example).[2]

Grading and flexibility

Although it is assumed that students using this course have already received a certain amount of training in English at school or in a language institute, the material included has, in its presentation, been graded in length and complexity. Hence the most frequently used and simple structures have been introduced first, the whole of the corresponding Unit being written as far as possible exclusively in terms of the structure being presented (thus, for example, all the verbs appearing in Unit 1 are in the Present Simple Tense, which is the main structure in this unit). The length of the reading passages—and therefore of the amount of material they contain—increases progressively, from about 450 words in the early units to nearly three times

[1] It should be stated that, as far as scientific English is concerned, no significant difference was found between these two varieties of English. The few minor points of variance occurring in the course itself are explained.

[2] Further details are given in *English Language Teaching*, Vol. XXI, No. 3.

this length in later ones. There is a fair amount of repetition of phrasing within each individual unit and this repetition is carried over to the exercise sections of the following unit or two, so that revision of the immediately preceding work goes on all the time. The special Revision Units (Nos. 5 and 10, revising the material presented in Units 1–4 and 6–9 respectively, and the General Revision Units Nos. 11 and 12, reviewing the principal elements of the course as a whole) will, it is hoped, constitute a valuable aid in this very necessary task of consolidation.

Since individual students and even whole classes of students may show a good deal of variation with regard to the knowledge of English they bring to the course or the speed with which they work, an effort has been made to make the course flexible enough to cover these contingencies. This has been done by giving a wide choice of exercises in the Word Study and Structure Study sections, by incorporating additional suggestions for exercises in the Teacher's Notes, by including a Discussion and Criticism section designed to give students the opportunity to produce continuous English based on the contents of the reading passages, and by adding a Supplement of extracts from the original literature of modern science.

The oral approach

The approach used throughout the book is essentially an oral one, in view of the fact that: (a) oral repetition (in context) is the most effective way of fixing material, even for purely recognition purposes; (b) much more work can be accomplished orally than in written form, over a given period; (c) oral work adds variety and interest to the lessons. As many teachers will be aware, there are also two additional factors operating in various parts of the world which lend urgency to this emphasis upon oral work —firstly, the number of English-speaking specialists visiting non-English-speaking countries to give lecture-cycles or direct seminars is increasing rapidly, and the widespread failure of students or local specialists to understand oral scientific English, and be able to communicate themselves, is robbing these countries of much of the value which would otherwise be gained from these visits; secondly, in spite of the growing number of scholarships and fellowships to English-speaking countries, many first-rate science students are failing to obtain them because of their lack of knowledge of the language. This again is a serious loss of human resources.

Further aims of the course

In addition to the purely language-teaching aims outlined above, the course is designed to stimulate critical thought and foster the habits of clear exposition and the impartial examination of evidence; at the same time an attempt has been made to encourage students to take an active interest in their own discipline and its relationships with other sciences and with society as a whole. Thus it is hoped that it will serve a broadly educational purpose as well as its specific linguistic one.

SUGGESTIONS FOR USING THE COURSE

Sharing the scientific point of view

In teaching scientific English two quite separate factors are involved: English and science. It is therefore important for teachers using this book to acquire a sympathetic insight into the scientific point of view. The books listed under the heading of *General Science* and *Experimental Methods* in the Library Suggestions below—particularly those by Pyke, Beveridge, Conant and Cannon—will be found helpful for this purpose. They should in any case make themselves familiar with one or two of the basic textbooks of the discipline followed by their own students, so as to be able to apply the principles developed in the course to the particular circumstances of the students in each case, as suggested in the Teacher's Notes and elsewhere. Close contact should also be maintained with the specialist teachers, who can readily clear up any factual difficulties and provide the students with information they need for dealing with the Criticism and Discussion sections of the units and the Assignments section of the supplementary readings.

Editing the course to suit the teacher's own requirements

Bearing in mind the factors mentioned in the paragraph *Grading and flexibility* above, the teacher should go over the course beforehand and adapt it for use in his own special circumstances. It is probably better to do this bit by bit, rather than attempt to edit the whole thing all at once, since it may be difficult to estimate the students' rate of progress in advance.

Dealing with each Unit

The Reading Passage: It will probably be found that the most effective procedure—under the conditions in which the course will generally be given—is first of all to give a summary in the vernacular, so that the students can quickly understand the ideas which are being dealt with. The teacher should then read the passage clearly, but not too slowly, in English, after which he should answer questions arising out of the language. Finally, the students should read the passage for themselves, either aloud or silently, before the Comprehension section is tackled.

Comprehension Section: The questions given may be expanded or added to by the teacher, as required; they may also be asked in a different numerical order to that in which they are listed, especially in the later stages. The answers should, of course, be given orally, and the rest of the class should criticize, and try to improve upon, the replies given.

Word Study Section: It should be noted that all the words given in the word-building exercises are to be found in the Basic Dictionary, to which the students should be constantly referred for their meaning. All examples arising out of such exercises should be used in illustrative sentences, first by the teacher himself and at a later stage by the students. Similarly, the prefixes and suffixes dealt with in each unit should be applied to examples taken from the specialized vocabulary of the students' own discipline. The meanings of these word-forming devices should be

emphasized (see Appendix A) and any vernacular equivalents pointed out. All this work should be mainly oral, though care should be taken that the students can recognize the written forms.

Structure Study Section: The above principles apply equally to this section. Comparison with parallel structures in the vernacular should be made wherever possible, and full use should be made of the substitution tables provided (see below).

Discussion and Criticism Section: Although it is fully realized that at the beginning, at least, most of the students will not have the adequate language equipment to do this work entirely in English, *it is of the utmost importance to encourage them to want to express themselves in English, and to give them an opportunity of doing so.* This may be better done by grouping the students into teams of three or four, distributing the more advanced students equally among them. Adequate time must be allowed for the preparation of replies, during which the teacher should move from group to group helping where necessary and writing key words and phrases on the board for the benefit of the class as a whole. The free flow of exposition or argument should never be held up because of language difficulties—the speaker should be allowed to carry on in the vernacular, and another student or the teacher can paraphrase in English as soon as he has finished. Similarly, a fairly wide tolerance should be allowed in the matter of pronunciation, etc.: this can be improved gradually during the development of the course, especially when dealing with the exercises.[1]

From the very nature of this section, it is not intended that all the students should tackle all the questions: the topics given merely offer a variety of choices which the teacher may adapt to his students' own particular interests and abilities. In the same way, once this limitation has been made it is not as a general rule advisable to get all the class working on the same question—different groups should choose different questions, though the answers should in each case be submitted to the criticism of the rest of the class.

The teacher must at all times be prepared to stimulate discussion by judicious suggestions, so that he should be careful to inform himself about the issues involved before this part of the unit is dealt with: the short bibliographies (mainly of inexpensive paperbacks) given at the end of the units will be found useful here; other points requiring factual knowledge are explained briefly in the corresponding Teacher's Notes. Some of

[1] In deciding the standard of pronunciation to be aimed at, it should be remembered that the student's most urgent need is *to be able to communicate with an expert in his own field of study.* Such a person has naturally a much greater capacity to *guess* at what the student wants to say than the average layman, since he knows the context of the communication intimately; hence the standard of pronunciation acceptable is likely to be less exacting than that required, say, for local oral examinations.

the questions may require certain simple auxiliary equipment (see, e.g. Units 2 and 6) which need to be prepared beforehand.

Finally, no opportunity should be lost of developing in the students the qualities of objectivity, relevance, and the capacity to weigh evidence and separate the important from the unimportant.

Substitution Tables

Function: The main function of substitution table technique is that of a habit-former, and its effectiveness depends entirely upon the number of times the student repeats the passage aloud. Since the various elements of each pattern dealt with are fixed in their correct order, the student cannot make a mistake; nevertheless, the system of interchangeable words and phrases (arranged in columns) enables him to construct dozens—or even hundreds—of different sentences, all of them correct, sensible and exhibiting the same structure. This constant but variable reiteration thus impresses the relevant patterns firmly upon his mind and tongue.

How to use the tables: Although one of the main virtues of the tables is that they enable students to get extra practice in an essential skill in out-of-class hours, the teacher may also use them in class. As a general rule, however, he should not spend more than about 15 minutes on them every second or third class-period. An effective procedure to use is as follows: after demonstrating their ordinary use by getting some of the students to construct sentences individually, the teacher should show the class how the same tables may be adapted for Oral Substitution Pattern Practice; thus, (taking for example the table for the Simple Present tense given in Unit 1), one of the students may read a sentence from the table, e.g.

Student A: 'A scientist often uses mathematics in his work.'

(The teacher then suggests a word—the stimulus or prompt—taken from one of the columns, and a different student has to repeat the first sentence given, but substituting the prompt for the corresponding item in the original.)

Teacher: Investigator.

Student B: An *investigator* often uses mathematics in his work.

Teacher: Statistical methods.

Student C: An investigator often uses *statistical methods* in his work.

Teacher: Need.

Student D: An investigator often *needS* statistical methods in his work.

And so on.

This technique has the great advantage of speed and a certain sort of realism, since the students are not reading but listening, and their responses to the oral prompt can be made progressively more rapid by judiciously speeding up the prompt itself.

To begin with, the items changed should all belong to the same category (i.e. come from the same column in the table);

thus after *investigator* in the example above, the next prompt would be *technologist*. Later, the prompts can be taken from different categories, as in the second and third prompts above.

As soon as these ways of using the substitution tables have been mastered by the students, the teacher should get them to work in pairs, all at the same time, so as to multiply the amount of practice obtained. This will create a fair amount of noise unless the students are careful to lower their voices. The teacher walks around the class controlling pronunciation.

At the same time as the *mechanism* of each structure is thus being absorbed, the teacher should be careful to impress the corresponding *meaning* on the students. To facilitate this, the tables used in this book incorporate, wherever possible, phrases which are associated with, or which may remind the students of, the typical use(s) of the structure—e.g. the inclusion of *time* words and phrases in the tables for the main tenses, etc.

Revision Units

Before dealing with these units in full, the teacher may use the reading passage as a Reproduction exercise. In this case, the students put their books away; the teacher reads the passage twice at normal speaking speed, while the students take whatever notes they like (usually in teams) and then have to reproduce the passage as accurately as possible. This exercise can also be used as a test, if required. Note that these units are readily adapted for use as the basis for periodical achievement tests, since they consist almost exclusively of material which has been presented in the immediately preceding units.

Basic Dictionary and Appendices

An initial task of the teacher should be to go through the Basic Dictionary with the students, adding the pronunciation (in any convenient notation) and/or the vernacular equivalent in the space provided immediately to the left of each entry. The vernacular equivalent, if given, must be very carefully selected so as to convey the exact idea in each case; the help of the specialist teachers will no doubt be required here. A similar procedure should be followed with Appendix A (Prefixes and Suffixes). Both dictionary and appendices lend themselves easily to simple competitive games on the lines of the one suggested in the Teacher's Notes to Unit 12: these should be freely employed in the beginning stages in order to familiarize the students more quickly with the resources of this material.

Students' books

Care should be taken that the students do not write the answers to the exercises in the textbook itself—an exercise book should be kept for this purpose. Unless textbooks are kept clean, they become useless for revision purposes.

Tape-recordings

If a tape-recorder or language laboratory is available the reading passages may be recorded, by different voices if possible and with an interpolated commentary in the vernacular if necessary, in order to give the students extra listening practice outside classroom hours. Alternatively, such recordings may be used in

class hours by the more backward students while the teacher is doing further work, e.g. the exercises, with the rest. Some of the more advanced students can later be detached from the main class, when it is tackling the Discussion and Criticism section with the teacher, in order to go over the exercises with the backward group: in this way the latter will not fall too far behind the rest of the class. (Care of backward students is essential, since they may include persons who are brilliant in their special field of study.) The substitution tables may also be taped in the form of oral substitution pattern-practices, thus giving the students the opportunity to speak as well as to listen.

Supplement of extracts from scientific literature

This should not normally be used until all the units have been dealt with and hence the basic language of science thoroughly mastered. Suggestions for using these extracts are given in the introductory note to the supplement itself.

The English of the laboratory

At least one class should be held in the laboratory, workshop, clinic or museum used by the students during the technical part of their studies, so as to enable them to become familiar with the English of their professional research environment.

Extensive reading programme

To complement the course, teachers may require the students to read one or more books in English on their special field of study. Apart from any English-language textbooks prescribed for the specialist part of the curriculum, the inexpensive books listed in the appropriate section of the Library Suggestions below may be used for this purpose. The programme should be controlled two or three times during the period the course lasts.

Contents

Unit 1

Word Study

1 *Suffixes and Prefixes.* (i) Parallel mechanisms in the students' own language should be pointed out.

(ii) The words given in the examples and exercises should be used by the teacher in illustrative contexts to fix their meaning. More advanced students may be encouraged to use them in similar sentences of their own.

(iii) The teacher may point out other suffixes occurring in the passage, e.g. *-ment* (forming nouns from verbs)—gover*nment* (l. 15) from *to govern*, stat*ement* (l. 37) from *to state*; *-al* (forming adjectives from nouns—logic*al* (l. 28) from *logic*, sceptic*al* (l. 34) from *sceptic*, critic*al* (l. 39) from *critic*; *-ly* (forming adverbs from adjectives)—usu*ally* (l. 20) from *usual*, objectiv*ely* (l. 37) from *objective*. (See also Word Study sections for Units 2, 4 and 6 respectively.)

2 *e.g.* (l. 31), *etc.* (l. 31). Other common abbreviations met with in scientific literature such as *i.e.*, *cf.*, *op. cit.*, *id.*, *Ch.*, *para.*, *N°* (*No.*) or # may be introduced here and their meaning explained by means of Appendix C.

3 *first* (l. 6), *last* (l. 43). The teacher should revise the ordinal numbers *first*, *second*, *third*, *fourth*, *fifth*, etc. and give the corresponding abbreviations (*1st*, *2nd*, *3rd*, *4th* . . .). Cardinal numbers may also need to be revised.

Structure Study

1 *Simple Present Tense.* This tense and its passive (see Structure Study section for Unit 2) is one of the commonest tense-structures used in scientific English. In addition to the exercises in this section, the following are suggested as additional drill:

(a) Ask questions (i) about everyday life and (ii) if possible, about the specific science(s) studied by the class, to which the students give full answers. The frequency adverbs (*usually*, *sometimes*, *often*, *always*, *never*, etc.) with their special position immediately before the main verb may conveniently be drilled in this context: e.g. (everyday life): 'Do you usually sit in the same seat in the classroom?' *Ans:* 'Yes, I usually sit . . .' or 'No, I don't usually sit . . .' 'Do you often go to the cinema?' 'Do we sometimes have a holiday?' 'Do your classmates generally arrive at the same time?'; (special sciences): 'Do you generally read textbooks in English or—(the vernacular)?' 'Do you often conduct experiments?' 'Do your fellow-students sometimes cut (stain, mount, etc.) sections?' (biology). 'Do you and your classmates frequently assemble (take to bits) magnets (working models)?' (engineering). 'Do you ever analyse the contents of different newspapers?' (journalism), etc. Further illustrations of these frequency words in scientific contexts can be found in Part II (General) of the Basic Dictionary.

(b) Get the students to ask each other similar questions, helping them if they do not know the appropriate vocabulary in English.

(c) The substitution tables attached to this section should be used for further oral drill of this tense and also for oral substitution pattern practices in accordance with the techniques outlined on p. viii of the Introduction under *Substitution Tables*.

(d) To add variety to this part of the drill, a competition may be started by splitting the class up into two teams: A and B. A member of team A makes an incomplete sentence by reading the first two (or three in the case of table C) columns of the table and chooses a member of team B to complete it within five seconds. The process is then reversed and a member of team B provides the incomplete sentence and chooses someone from A to complete it.

2 *however* (l. 5), *furthermore* (l. 39). These are examples of a class of word or phrase which is frequently used in scientific literature; their function is to connect together the various parts of a complex statement and at the same time to introduce qualifications or modifications into its total meaning—hence in this book they are called 'modifying connectives'. The teacher could introduce some synonymous expressions here, e.g. *nevertheless*, *but* (for *however*), and *moreover* and *in addition* (for *furthermore*). See also the Basic Dictionary, Part II, under *Modifying Connectives*.

Discussion and Criticism

It is very important to stimulate students to want to talk in English, imperfect though this may often be, and this may often be better done by forming them into teams of three or four for these discussion sections. Full use should be made of any more advanced English-speakers there may be in the class.

Adequate time must be allowed for the preparation of replies, during which the teacher should move from place to place and from team to team helping where necessary, and writing key words and phrases on the board.

The free flow of argument should never be held up because of language difficulties—the speaker should be allowed to carry on in his vernacular, and another student or the teacher can attempt an English version as soon as the speaker has finished.

Students must criticize each other's arguments mercilessly!

Unit 2

(Note: the first 5–10 minutes should be allotted to revising Unit 1)

The Reading Passage

1 In dealing with this passage it is important for the teacher:

(a) to write on the blackboard actual examples of numbers, fractions, decimals, and the various operations;

(b) to say them in English, so as to accustom the students to the oral forms and their variants, e.g. $\frac{3}{5}$ (three-fifths); $\frac{19}{48}$ (nineteen *over* forty-eight); 1506·034 (one thousand five hundred (and) six *point* nought three four); 4 : 12 (four *is to* twelve; a ratio of 4 to twelve), etc. It is important to give the oral variants for the operations, e.g. 9 × 6 (nine *times* six; nine *by* six; nine six*es*); 22 ÷ 7 (twenty-two *divided by* seven; seven(s) *into* twenty-two), also the fractions *a half*, *third* and *quarter*;

(c) to point out any differences in the written signs in English and the vernacular, e.g. in some countries the division sign is :, which is the English ratio sign; decimals may be separated from whole numbers by a comma, instead of a dot as in English, etc;

(d) to give the *plus* and *minus* signs and their oral forms, and any other mathematical sign which the students should ask for.

2 In order to test the students' understanding of the spoken language of arithmetic, the following puzzle should be given orally:

Think of a number. Add 6 to it. Multiply by 2. Take away 8. Divide by 2. Take away the number you first thought of. Square the result. Multiply by a quarter (or divide by 4). Take the cube root. (The answer is always 1).

Similar puzzles can be found in Adler's *Magic House of Numbers* (Signet Books) and other popular books on mathematics. The teacher could ask the students to make up their own.

Word Study

WORD-BUILDING

1 The teacher should remember that all words used in these exercises are to be found in the Basic Dictionary, to which the students should be referred for their meanings.

As in Unit 1, the teacher should:

(a) illustrate the meanings of the words formed in the exercises by using them in sentences with the Simple Present Tense, or get the more advanced students to do so;
(b) point out any parallels which may exist in the students' own language.

2 At the end of the exercises the teacher should test assimilation by means of a simple oral quiz, giving a vernacular word and asking for the English equivalent.

3 Students, or groups of students, should be encouraged to make up another exercise similar to the Revision Exercise for exchanging with their companions. If a continuous passage is

felt to be too difficult at this stage, they should be allowed to form disconnected sentences only.

4 The teacher may usefully apply the prefixes and suffixes dealt with to the formation of words directly related to the students' own speciality, e.g. vibrate, vib*ration* (physics and engineering); congest, congest*ion* (medicine); saturate, satur*ation* (chemistry), etc.

Structure Study

1 The Passive is very frequent in scientific English, and care must be taken to ensure that it is thoroughly mastered. This is particularly important in cases where this structure is lacking in the students' own language, or where it is frequently replaced by other mechanisms (e.g. the Reflexive); in the latter circumstance, the teacher should make full use of comparison with the vernacular.

2 Ask questions about the students' own speciality (thus reviewing the vocabulary used in the similar exercise for the previous Unit—see Teacher's Notes for Unit 1—Structure Study section, 1), in such a way that the student has to reply in the Present Tense Passive, e.g. Q. 'What happens to specimens in a laboratory?' A. 'Specimens in a laboratory are studied (dissected, mounted, stained, etc.).' Q. 'How are working models used?' A. 'Working models are assembled (taken to bits, modified, etc.).'

Discussion and Criticism

1 Ideas for stimulating discussion and helping the students should be prepared in advance. This may be particularly necessary for questions 1, 3, 5, 6 and 7.

2 Question 5 needs a supply of newspapers and periodicals (some could be in English), which should be brought to class at the appropriate time. Alternatively, before the unit is dealt with, the teacher may cut out some good examples and make a file of them to be given out to the class later.

Unit 3

The Reading Passage

1 The rough diagram of Torricelli's experiment given in the Discussion and Criticism section might be referred to *before* reading the passage. Similarly, it might be found helpful to draw a diagram of a simple vacuum pump connected to a column of water: the blackboard should if possible be prepared before the class begins.

2 Note that the measurements given in the text are in English feet, as engineers, in particular, should be introduced to the commonest English weights and measures. The corresponding abbreviations (ft. and ′) should be given. Students should be asked to convert these heights into metres and centimetres (see Appendix D).

Comprehension

No. 7: Students may need to have the terms B.C. and A.D. explained to them.

Word Study

The suffix *-ize* (*-ise*). As in previous units, the words formed should be used in meaningful contexts. Students should also be introduced to verbs occurring in their own speciality which use this suffix, e.g. *crystallize* (physics and chemistry); *polarize* (physics and engineering); *cauterize* (medicine), etc.

The prefix *pre-*, as in *predict* (l. 33) might be pointed out. Other common words with this prefix are: prevent, precede, prepare. Note that in specialized uses it often forms a hyphenated word, e.g. *pre*-natal (medicine); *pre*-cognitive (psychology); *pre*-stressed (engineering), etc.

Structure Study

1 Before beginning the exercises it is important that students should be able to recognize the main irregular verbs, and they should be given a little time to familiarize themselves with the list given in Appendix B. They should then be given a rapid quiz, and in continuation be asked to pick out the regular and the irregular verbs from the reading passage.

Additional oral exercise can be given if necessary, using the question-and-answer method, along the lines suggested in the Teacher's Notes for Unit 1. Special attention may be given here to the use of vocabulary from the students' own speciality.

2 The use of *would* (ll. 27, 30, 36, 38)—also *will*—as expressing the result of a condition, should be pointed out.

3 The use of comparatives (ll. 28 and 36) and their superlatives should be revised if necessary.

Discussion and Criticism

In describing the experiments, the emphasis should be on orderliness and clarity. The other students should criticize the speaker's explanations, and be encouraged to ask questions.

For Question 3, a quick look inside a nearby laboratory would be an obvious stimulus; otherwise, the actual objects themselves could be brought to the classroom, e.g. a thermometer, a balance, a microscope, a pendulum, a spectroscope, etc. In the last resort, rough drawings would be better than nothing.

Unit 4

The Reading Passage

1 Note that in this passage the practice is begun of giving, in brackets, some of the most frequently-used alternatives for certain key-words (e.g. ll. 6, 8, 16, etc.). Others which could usefully be brought to the attention of the students are:

l. 2: *pure science*—fundamental research, basic research;
applied science—technology, development;
l. 13: *fundamental particles*—elementary particles.

2 Note three examples of hyphenated words, i.e. two words combined to form one single one—ll. 33, 43 and 46.

Word Study

1 When they have completed the first exercise, the students should be encouraged to make up similar multiple-choice exercises for themselves (if necessary working in groups). They should then exchange the results and solve them orally; this could also be the basis for a competition between the two halves of the class.

2 *Word-building:* As in previous units, the newly-formed words should be used *orally* in complete sentences, either by the teacher or the more advanced students.

3 *More Modifying Connectives:*

l. 18 *on the other hand*
l. 35 *Conversely*

The difference should be pointed out: *on the other hand* introduces a difference; *Conversely* introduces not only a difference, but the reverse. (See Basic Dictionary, Part II.)

Structure Study

1 In view of the frequency of this structure in scientific English, and of its many different uses, every care should be taken to compare it with the corresponding structures in the students' own language. The teacher should bring further examples of its use taken from the standard textbooks of the faculty or school the students belong to, or get the students themselves to do so. These could be incorporated into substitution tables as outlined in the Introduction.

2 Exercises 1(b) and 2(b): Students, or groups of students, could prepare similar exercises, which should then be interchanged, as in the procedure outlined in the Word Study section above.

3 The teacher may prepare questions about the students' own discipline requiring an answer in the *-ing* form. Definitions are very useful here, e.g. (Engineering): 'What is a dynamometer?' *Ans:* 'A dynamometer is an instrument *measuring* force.' (Chemistry): 'What is a hydrocarbon?' *Ans:* 'A hydrocarbon is a substance *containing* only hydrogen and carbon,' etc. If this is too difficult, the teacher can simply give the definition, using a relative clause: the students then have to repeat the definition, substituting the relative with the appropriate *-ing* structure.