

# 科技英语的特点和应用

高级科技英语教材

## EST—FEATURES AND APPLICATION

AN EST COURSE FOR  
ADVANCED LEVEL



上海外语教育出版社

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**高级科技英语教程**

**Shanghai Foreign Language Education Press**

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**高级科技英语教程**

**戴炜华 陈文雄 编著**

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# 前 言

英语已公认是国际上主要的科技语言，全世界越来越多的科学家和技术人员需要阅读日益增多的以英语撰写的科技文章和教科书。因此，近十年来，EST（科技英语）这个术语已在有关英语教学的文献中频繁出现。表达科技概念、理论和事实的语言，并非与日常会话或文学语言截然不同。但是鉴于它在科学和技术中所起的作用，科技英语属于一种专用英语。

《科技英语的特点和应用》是综合性高级科技英语教程中的第一本，旨在帮助中上水平的理工科大学生的学习。这些学生已经基本掌握基础语法和大约三千个词汇，面临阅读专业性科技英语文章。

本书论述科技英语的概貌及其应用，对科技英语的一些基本要点作了清楚的说明，并配以详尽的例句。

第一章简述科技英语的基本概念，后六章逐一涉及科技英语的一些专题。众所周知，语言表达是一种只有反复实践才能完善的艺术。本书提供大量练习和一些范文。例句和练习中的句子并不十分复杂，对学生困难较小。但是，掌握一定词汇量的学生在阅读范文时可能仍有某些困难。为此，我们对一些词和短语作了英汉注释，以便学生更好地理解。范文是经过仔细挑选而汇集的，旨在巩固每一单元的讲解重点。这些范文应当快速阅读，并做练习以理解内容。当然，一篇文章不能包括该单元的全部讲解重点，而只能是其中一部分。希望较好地掌握科技英语知识的学生应当扎扎实实地做完本书的所有练习并阅读全部范文。学完全书，并广泛阅读专业性科技英语文献，学生定能有所裨益。

本书对于阅读英语科技文献仍有困难的工程师和技术人员也有所帮助。

本书的练习附有参考答案。不提供答案的练习可能有几种正确的回答。《科技英语的特点和应用练习答案》另成一册出版。

在编写本书时我们采用了不少科技原著（见参考文献）。范文以及几乎全部例句和练习中的句子选自并摘自这些原著。我们曾借鉴这些著作中的一些观点，在此谨向原作者表示感谢。

在编写过程中一些同行向我们热情提出建议并鼓励我们编写，对此我们谨致谢意。

上海机械学院副院长戴鸣钟教授和英国文化协会派遣来华任教的大卫·查普曼讲师十分耐心地审阅了全书。借此机会，我们对他们这种诚恳的帮助表示十分感谢。

我们也衷心感谢我院美国教师、计算机科学家劳伦斯·温雪普先生，他十分友好地在语言和技术方面帮助了我们，提高本书的质量。

编 者

一九八一年于上海

## Preface

English is now established as the main international language of science and technology, and a growing number of scientists and technicians all over the world are obliged to read an increasing proportion of articles and textbooks written in scientific English. Therefore, over the last ten years or so the term EST (English for Science and Technology) has appeared frequently in the literature relating to the teaching of English. The language which expresses scientific and technical concepts, theories and facts is not a different language from that of everyday conversation or literature. But, due to its role in science and technology, EST covers a special range of English.

*EST — FEATURES AND APPLICATION* is a leading volume of the comprehensive EST courses designed to give help to science and engineering students at intermediate/advanced level. This book will be helpful to those students who have had a fair mastery of basic grammar and a vocabulary of about three thousand words, and who are prepared to read passages in the specialized English of science and technology.

This book gives a general survey of EST and its application. The most essential elements of EST are introduced with distinct explanations and detailed examples.

Following the first chapter which gives a brief concept of EST, there are six chapters, each of which deals with a particular subject of the language of science and technology. Language presentation is an art which can be accomplished only by practising time and time again. This book provides a lot of exercises and some sample passages. The illustrative sentences and the sentences contained in the exercises are not very complicated and would present less difficulty to the students. Students with a relatively extensive mastery of vocabulary may perhaps still have some difficulties in reading the sample passages. We have provided therefore notes on words and expressions to facilitate better understanding. The carefully selected sample passages are designed to consolidate the key points in each unit. They should be read rapidly after comprehension exercises. Of course, a passage can only cover some of the key points instead of all that are stated in the given unit. The students who wish to have a fair knowledge of EST should work steadily on all the exercises and sample passages in this book. After going through the whole book, the students will be in a position to profit by extensive reading of specialized English.

This book may also help engineers and technicians who still have some difficulty in reading technical literature in English.

Suggested answers to the exercises will be found in a key. Exercises to which the

key is not given can be answered correctly in a variety of ways. *A KEY TO THE EXERCISES IN EST — FEATURES AND APPLICATION* is published separately.

In preparing the book we have utilized a lot of original writings on English for science and technology (see Literature). The sample passages and almost all the examples and sentences in the exercises are selected and extracted from these writings. We wish to express our thanks to those authors from whom we have borrowed ideas.

It remains for us to acknowledge our gratitude to all who have generously given advice and encouragement in organizing this book.

Professor Dai Mingzhong, vice president of the Shanghai Institute of Mechanical Engineering (SIME) and David Chapman, a lecturer sent by the British Council, took the heavy burden of reading and improving the whole book with endless patience. We are glad to take this opportunity to express our appreciation for their highly valuable help.

We are also grateful to Mr. Laurence Winship, an American teacher and computer scientist, who was kind enough to help us improve the book both linguistically and technically.

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# Chapter I

## The Concept of EST

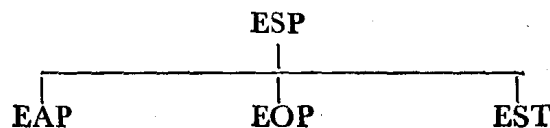
### § I. English for Special Purposes (ESP)

Over the last ten years or so the term 'language for special purposes' has appeared frequently in the literature relating to English language teaching.

English language learners require English so as to promote their educational specialty or to perform efficiently their roles as scientists, technologists, technicians, etc.

As general English can hardly meet such needs as these, consequently, English for Special Purposes (ESP) has emerged as a branch of English language study.

### § II. What does ESP consist of?



#### 1. EAP — English for Academic Purposes

English for Academic Purposes (EAP) is defined as the study skills necessary for some academic or professional course of study. It may be necessary for a student following scientific courses and lectures through the medium of English, practising in note-taking and mastering the language appropriate to seminar discussion.

#### Example:

'Every term paper is a highly individualized piece of work. Nonetheless, there are some general rules and guidelines to follow in gathering, selecting, and recording information for the rough draft of a paper.

Different topics will require the use of different information sources, but there are a number of reference tools that every student should be able to use with ease.'

*(Guide to Language and Skills for College Students of English as a Second Language)*

English for Academic Purposes (EAP) is used by overseas students, researchers and visiting scholars at schools and universities in Britain and America or in other countries where English is also used in courses and lectures.

## 2. EOP — English for Vocational or Occupational Purposes

EOP is called 'English for Careers' in the United States.

English for Vocational or Occupational Purposes (EOP) is defined as the skills necessary for some occupational requirements, e. g. for international telephone operators, international airtraffic controllers, international commerce, international railways, computer programming, tourism and so on, or vocational training programmes, e. g. for hotel and catering staff, technical trades, etc.

The following example is from *The Language of Tourism<sup>1</sup> in English*. It is used to train travel guides and the staff of tour companies.

'A wide variety of accommodation<sup>2</sup> is available to the modern tourist<sup>3</sup>. It varies from the guest house<sup>4</sup> or tourist home<sup>5</sup> with one or two rooms to grand luxury hotels with hundreds of rooms. A feature of Europe is the pension<sup>6</sup>, a small establishment with perhaps ten to twenty guest rooms. Another modern development in the hotel business is the motel<sup>7</sup>, a word made up from *motor* and *hotel*. The motel might best be described as a place that has accommodations both for automobiles and human beings. Casinos<sup>8</sup>, wherever they are legal, are another feature of some hotels. In Las Vegas, Nevada<sup>9</sup>, the hotels are usually secondary to gambling<sup>10</sup>. They feed, house, and entertain the guests, but the real profits come from the casinos. Caravaning<sup>11</sup> and camping<sup>12</sup> reflect another trend in modern tourism, thanks in large part to the automobile. A similar kind of arrangement exists for boat owners who wish to use their boats for accommodations while they are traveling in them. This invokes the marina,<sup>13</sup> a common feature of resort areas on waterways.'

### Notes

- (1) tourism: the business of providing holidays, tours, hotels, etc. for tourists (旅游; 观光事业)
- (2) accommodation: a place to live; room, flat, house, hotel room, etc. ([旅客]住所; 食宿安排)
- (3) tourist: a person travelling for pleasure and sightseeing (旅游者; 游览者)
- (4) guest house: a private house where visitors may stay and have meals; a superior state-owned boarding house (客房; 宾馆)
- (5) tourist home: the same as guest house (旅客之家; 客房; 宾馆)
- (6) pension: a house where for a fixed amount of money per week or month one is provided with a room and food ([欧洲大陆国家的膳宿]公寓)
- (7) motel: a hotel specially built for travelling motorists, made up of separate rooms or small houses, each with space for a car (汽车旅馆, 这种旅馆专供自己驾车旅行的游客, 馆内设有停车的车库)
- (8) casino: a building used for social activities, specially for gambling (娱乐场;

### 赌场)

- (9) Las Vegas, Nevada: a city in the southeast part of Nevada (a state of the U. S. A.)  
(美国内华达州的拉斯维加斯市, 出名的赌城)
- (10) gamble: play cards or other games for money (赌博)
- (11) caravanning: the practice of taking holidays in a vehicle pulled by cars carrying apparatus for cooking and sleeping, and in which people live or travel for holidays (乘篷车旅行) 佳汽车拖动的以炉灶房子旅行或过夜。
- (12) camping: sleeping outdoors in a tent during a trip (在户外自备帐篷里宿夜的一种旅游方式)
- (13) marina: an area near the sea where small boats can come into harbour, and the people could stay in the harbour hotels (汽艇旅馆; 小艇停泊补给站)

(The following example is from *The Motor Car — Shell Motor Book No. 2, A Practical Manual for Motor Mechanics.*)

### Shock Absorbers<sup>1</sup>

'The function of the shock absorber is to damp down<sup>2</sup> the bouncing of the wheel after it has hit a hump<sup>3</sup>, and also to damp down the oscillations<sup>4</sup> of the springs. There are many types of shock absorber, most of which work on the hydraulic principle<sup>5</sup>. They consist of a cylinder filled with a hydraulic fluid which is transferred from one part of the cylinder to the other through a controlled orifice<sup>6</sup> by the action of a piston connected to the axle. In this way the vertical motion of the wheel or axle is rapidly damped out.'

### Notes

- (1) shock absorber: apparatus in a car to absorb shocks (减震器)
- (2) damp down: to control so as to reduce (减弱)
- (3) hump: a lump or round part which stands out noticeably (圆形隆起物; 小丘)
- (4) oscillation: swinging backwards and forwards as a clock pendulum does (摆动)
- (5) hydraulic principle: principle worked by water or other fluid power (液压原理)
- (6) orifice: outer opening (口; 喷口)

As illustrated by these examples, English for Vocational or Occupational Purposes (EOP) uses a large number of specialised terms.

### 3. EST — English for Science and Technology

Our era is the age of machines, electronics and computers. Only by obtaining a good knowledge of science, can one live successfully in modern society.

With the development of science and technology, scientists and engineers strive to exchange their ideas, discoveries and inventions, collect information and data, interpret concepts and theories, comment on the latest scientific advances and write reports

based on experimental procedures, etc. The need increases day by day for scientists and engineers to have a swift, economical, efficient, impersonal and sometimes international means of communication.

When language teachers first used the phrase "EST", they were content to deal superficially with scientific discourse. Instead of investigating the authentic language of science, they relied on popularised accounts of technical subjects as are found in encyclopedias or books intended for general readers. Lately, however, textbooks have been appearing that attempt to reflect the nature of the language actually used by scientists and the function it serves.

However some people still ignore the existence of EST altogether, while others are quite indifferent to it. They draw a simple formula like this:

**EST = General English Grammar + Technical Words**

They thought that they would be able to understand EST by simply knowing grammatical rules in addition to some technical words. Unfortunately, this judgment gives no fruitful comprehension about the nature of EST. They do not seem to be aware that EST presents linguistic varieties with its own characteristic features.

Since scientists and engineers try to be impersonal in narrating the natural phenomena and facts, their processes, properties and characteristics, English for Science and Technology (EST) must be evidently precise, concise, clear and restricted and includes many mathematical equations, formulae, diagrams, tables, etc. Scientists also prefer some typical sentence patterns and a large number of technical and semi-technical terms which make English for Science and Technology different to a very wide extent from ordinary English.

Here are two passages on the same subject, one is in ordinary English and the other in the form of EST:

### A

'We made a hole in a cork and pushed into it<sup>1</sup> a narrow glass tube. Then we pushed this into the neck of a bottle which we had filled<sup>2</sup> with coloured water. When we did this,<sup>3</sup> some of the coloured water went up<sup>4</sup> into the tube. We marked the level of the coloured water in the tube. Then we put<sup>5</sup> the bottle into a pan of hot water.

Almost at once,<sup>6</sup> the water level in the tube went down<sup>7</sup> a little<sup>8</sup>, but then it started to go up, until the water poured out over the top.<sup>9</sup>

The reason for this is that, when it gets hot,<sup>10</sup> the volume of water increases.<sup>11</sup> The reason why the water level went down at first is that the bottle became hot<sup>12</sup> first and it became a little bigger.<sup>13</sup> The water went up in the tube because, when the water became hot, its volume increased. Nearly all liquids and solids get bigger like this when they



become hot.

Next we emptied the bottle and left a small amount of coloured water in the tube. We put back<sup>15</sup> the cork and we put the bottle back into the hot water. The water in the tube was at once blown out at the top. This is because, when the air in the bottle became hot, its volume increased a lot<sup>16</sup> and very quickly<sup>17</sup>. This shows<sup>18</sup> that the volume of a gas increases quickly when it gets hot.'

## B

'After a hole was made in a cork, a narrow glass tube was inserted and the cork was inserted into the neck of a bottle filled with coloured water. On doing this, some of the coloured water rose in the tube. The level of the coloured water in the tube was marked. Then the bottle was placed into a pan of hot water.

Almost immediately, the water level in the tube fell slightly, but then it started to rise until the water overflowed.

The reason for this is that, when heated, water expands. The reason why the water level fell at first is that the bottle was heated first and so it increased slightly in size. The water rose into the tube because it expanded on heating. Nearly all liquids and solids expand in this way when heated.

Next the bottle was emptied, leaving a small amount of coloured water in the tube, and the cork was replaced. Then the bottle was replaced in the hot water. The water in the tube was immediately blown out at the top. This was because, when heated, the air in the bottle expanded a great deal and rapidly. This proves that a gas expands rapidly on heating.'

## Notes

- (1) to push into: insert (插入)
- (2) which we had filled: filled (我们已经装入; 盛有)
- (3) when we did this: on doing this (当我们这样做时; 在这样做时)
- (4) to go up: to rise (上升)
- (5) to put: to place (放)
- (6) at once: immediately (立刻)
- (7) to go down: to fall (下降)
- (8) a little: slightly (一些; 少量地; 一点儿)
- (9) to pour out over the top: to overflow (溢出)
- (10) when it gets hot: when heated (加热时)
- (11) the volume of sth. increases (increased): sth. expands (expanded) (膨胀)
- (12) to become hot: to be heated (on heating) (发热; 变热; 受热)