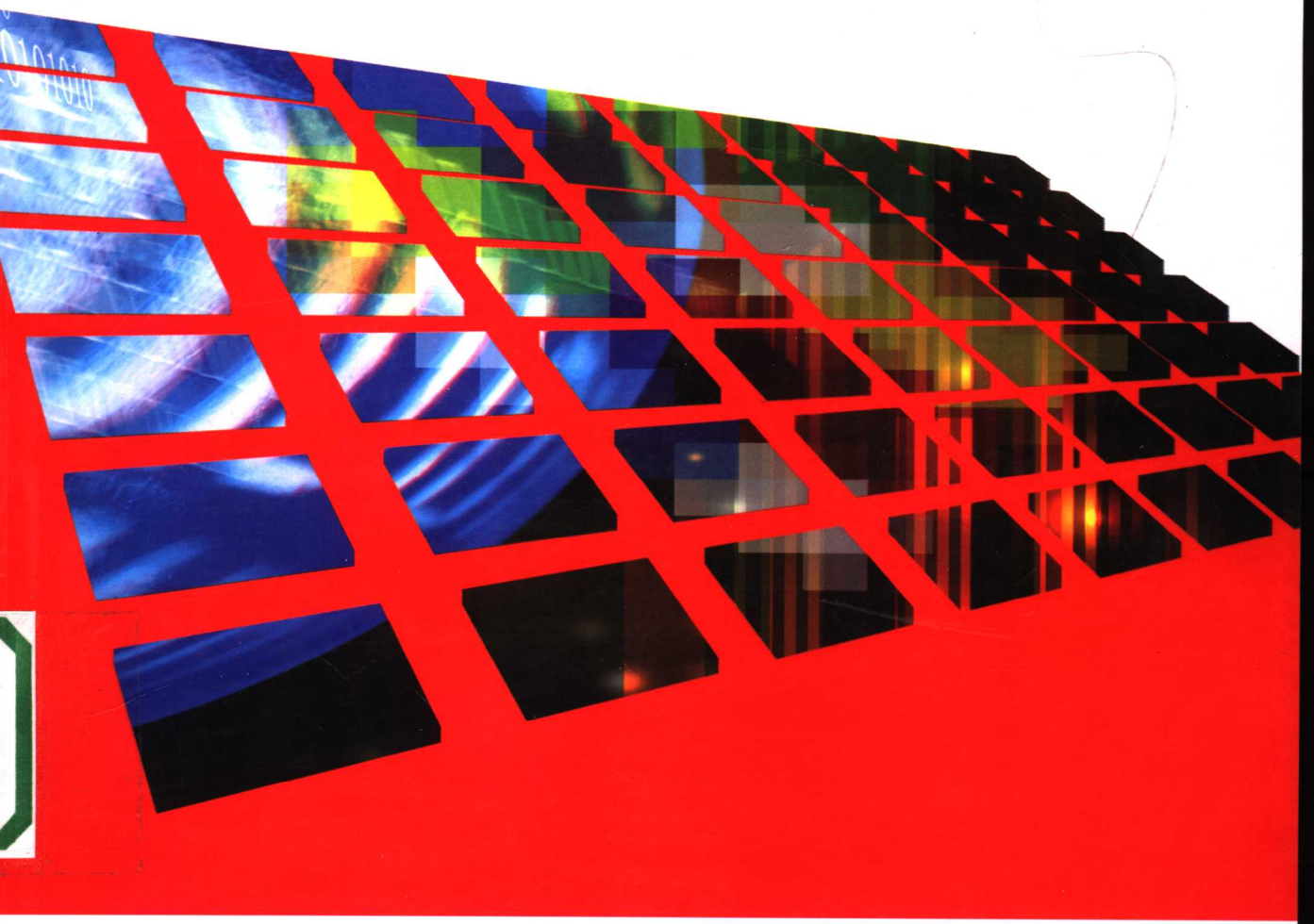
A TEXTBOOK FOR SCIENTIFIC ENGLISH

科技英语教程学习指导

魏汝尧 董益坤 主编



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科技英语教程

学习指导

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前　言

本书是《科技英语教程》的配套学习指导用书，内容丰富，结构紧凑，既可以作为教师备课用书，又可以作为学生自学的参考用书。

本书按《科技英语教程》的课文顺序编写，每个单元由六部分组成。具体内容如下：

一、相关知识链接。这一部分内容旨在帮助学生更好地了解本单元内容，特别是相应的科普基本知识，如牛顿三大定律、法拉第定律等。

二、课文单词解释。我们力求详尽地解释课文中出现的科技词汇及常用的单词、词组用法，并配有丰富而翔实的例句。

三、课文注释。这一部分讲解了课文中的难句、长句，既分析了句子的结构，又注释了关键词汇。

四、课文参考译文及练习答案。课文参考译文完整、准确，更有利于学生的自主学习。

五、阅读材料注释。这一部分讲解了阅读材料中的难点、重点，并注明有关的科技知识点。

六、Access to Scientific English 练习答案。此部分答案完备。

另外，本书还附有科技文章写作的注意事项，如表明文章句与句之间逻辑关系的常用副词等。

编　者

2005年6月

目 录

相关知识链接

1. Engineering in History

The engineering is one of the oldest occupations in the history of mankind. Indeed, without the skills that are included in the field of engineering, our present-day civilization could never have evolved. The first toolmakers who chipped arrows and spears from rock were the forerunners of modern mechanical engineers. The craftsmen who discovered metals in the earth and found ways to process and refine them were the ancestors of mining and metallurgical engineers. And the skilled technicians who devised irrigation systems and erected great buildings of the ancient world were the civil engineers of their time. One of the earliest names that has come down to us in history is that of Imhotep, the designer of the stepped pyramid at Sahara in Egypt about 3,000 BC.

Engineering is often defined as the practical application of theoretical sciences, such as physics or chemistry, for the benefit of mankind. Many of the early branches of engineering, however, were not based on science but on empirical information, that is, information that depended on observation and experience rather than theoretical knowledge. Many of the structures that have survived from ancient times, such as the aqueduct of Rome, exist because they were built with greater strength than modern standards require. But at least the Roman engineers were sure that their buildings would last for a long time. Probably the oldest text in the engineering is the work of Roman architect and engineer named Vitruvius Pollio, who wrote a book in the first century BC about the engineering practices of his day. Many of the problems encountered by Vitruvius Pollio were similar to those that modern engineers still must confront.

2. Civil Engineering in Origin

The term civil engineering originally came into use to distinguish it from military engineering. Civil engineering dealt with permanent structures for civilian use, whereas military engineering dealt with temporary structures for military use. An example of the latter is the bridge built across the Rhine in 55 BC. That is described in Julius Caesar's Commentaries on the Gallic War. A more appropriate definition of civil engineering is that it deals with the design and construction of objects that are intended to be stationary. In practice, this definition includes buildings and houses, dams, tunnels, bridges, canals, station systems, and stationary parts of transportation system-highways, airports, port facilities, and roadbeds for railroad.

3. Developments of Civil Engineering Influenced by Scientific Knowledge

Civil engineering offers a particular challenge because almost every structure or system designed and built by civil engineers is unique. One structure rarely duplicates another exactly. Even when structures seem to be identical, site requirements or other factors generally result in modifications. Large structures likes dams, bridges, or tunnels may differ substantially from previous structures. The civil engineer must therefore always be ready and willing to meet new challenges.

Since the beginning of the modern age in the 16th and 17th centuries, there has been an explosion of knowledge in every scientific field: physics and chemistry, astronomy and physiology, as well as recently evolved disciplines like nuclear and solid-state physics. One reason for this rapid increase in scientific knowledge was the development of the experimental method to verify quantification, that is, putting the data from the results of the experimentation into precise mathematical terms. It cannot be emphasized too strongly that mathematics is the basic tools of modern engineering.

As scientific knowledge increased, so did the practical applications. The 18th century witnessed the beginning of what is usually called the Industrial Revolution, in which machines began to do more and more of the work that previously had been done by human beings or animals. In the 19th century and in our own day, both scientific research and the practical applications of its results have progressed rapidly. They have given the civil engineer new and stronger materials, and machines that make possible the construction of skyscrapers, dams, tunnels, and bridges that could never have been built before.

Another result of the explosion of knowledge was an increase in the number of scientific and engineering specialities. By the end of the 19th century, not only were civil, mechanical, mining and metallurgical engineering recognized, but courses were also being offered in the newer specialties of electrical engineering and chemical engineering. This expansion has continued to the present day. We now have, for example, nuclear, petroleum, aerospace, and electronic engineering. Of course, many of these disciplines are subdivisions of earlier specialties.

4. Subdivisions of Civil Engineering

Within the field of civil engineering itself, there are subdivisions: structural engineering, which deals with permanent structures; hydraulic engineering, which is concerned with systems involving the flow and control of water or other fluids; and sanitary or environmental engineering, which involves the study of the water supply, purification, and sewer systems. Obviously, many of these specialties overlap. A water supply system, for example, may involve dams and other structures as well as the flow and storage of water.

Many different kinds of engineers often work on large projects, such as space exploration or nuclear power development. In the space program, for example, the launching pads and the rocket assembly and the storage building at Cape Canaveral, Florida, the largest such structure in the world-are primarily the work of civil engineers. In a nuclear power plant, civil engineers work with specialists in aerospace, nuclear, and electrical engineering. In projects of this kind, the engineer is a member of a team that is often headed by a system engineer who coordinates the construction of all members of the team. Because teamwork is necessary in so many engineering projects nowadays, an important qualification for engineers is the ability to work successfully with other people.

5. Civil Engineering as a Profession

Engineering has grown into a profession with the increase in scientific knowledge. A profession is an occupation that requires specialized, advanced education; indeed, they are often called the "learned professions." Until the 19th century, engineers generally were craftsmen or project organizers who learned their skills through apprenticeship, on the job training, or trial and error. Nowadays, many engineers spend years studying at universities for advanced degrees. Yet even those engineers who do not study for advanced degrees must be aware of changes in their field and those related to it. A civil engineer who does not know about new materials that have become available cannot compete successfully with one who does.

Engineers must be willing to undergo a continual process of education and be able to work in other disciplines. They must also adapt themselves to the two requirements of all engineering projects. First, the systems that engineers produce must be workable not only from a technical but also from an economic point of view. This means that engineers must cooperate with management and government officials who are very cost-conscious. Therefore, engineers must accommodate their ideas to the financial realities of a project. Second, the public in general has become much more aware, especially in the last ten years or so, of the social and environmental consequences of engineering projects. For much of the 19th and 20th centuries, the attitude of the public could be summed up by the phrase: "science is good". The most visible part of science was the engineering work. No one can avoid seeing the great dams, the bridges, the skyscrapers, and the highways that have created an impressive engineered environment around us.

Nowadays, however, the public is more conscious of the hidden or delayed hazards in new products, processes, and many other aspects of civil engineering systems. For instance, new highways in the United States are no longer approved routinely; instead, highways and other similar projects must now undergo environmental impact studies to assess the project's effect on air pollution and other environmental concerns.

A recent news story which reported that the Egyptian government now permits public criticism of the Aswan High Dam underlines this concern. The Aswan Dam is one of the engineering wonders of modern times, but several undesirable effects have been noted. The dam has, for in-

stance, blocked the flow of silt down the Nile, so that the fertility of the land below the dam has decreased. Nutrients that were once carried down the river have been held back by the dam, and consequently schools of fish that once thrived around the Nile Delta have gone elsewhere. Still another reported effect of the dam has been the increase of the salinity of the soil, which is irrigated by the water behind the dam. These and other problems might have been prevented by more thorough studies before construction was undertaken.

In other words, engineers do not work in a scientific vacuum. They must consider the social consequences of their work. We have, after all, described engineering as a profession that makes practical applications of the findings of theoretical science. Successful engineers must include in their definition of "practical" the idea that the work is also desirable and safe for society.

TEXT

Civil Engineering

Part I 单词解释

1. aqueduct *n.* 导水管,沟渠,渡槽
   aqueduct canal 输水渡槽;输水渠道
   aqueduct bridge 渡槽
   Synonym: canal, channel, pipe, waterway
2. canal *n.* 运河, 小道,导管,槽,沟渠,(人体内的)管道
   The canals take water to the rice fields. 水渠把水送到稻田里。
   the Suez Canal 苏伊士运河
   the Canal Zone 巴拿马运河区
   the alimentary canal of the human body 人体内的消化管道
3. persistent *adj.* 坚持的,百折不挠的,固执的,持续[久]的,不断的
   persistent effort 坚持不懈的努力
   a persistent ringing of the telephone 响个不停的电话铃声
   persistent rumors 持久的谣言
   a persistent infection 持久性传染病
4. discipline *n.* 纪律,规定,训练,修养,教养,教规,戒律,学科,方法,规律性
   labor discipline 劳动纪律
   military discipline 军纪

special disciplines 专业课，专业学科
be strict in discipline 纪律严明
a commission for discipline inspection 纪律检查委员会
strict discipline 严格的训练
discipline of the tides 潮汐的规律性
be under perfect discipline 受着很好的训练
compulsory discipline 必修学科
He needs a little discipline. 他需要略加惩戒。
In learning a foreign language, question and answer drills are good disciplines. 学外语时，问答练习是很好的训练方法。

5. leading *adj.* 主要的，最重要的，指导的，领导的
the leading cause of high inflation 导致高通货膨胀率的主要原因
a leading role 主角
a leading lady 扮主角的女士
a leading question 一个引题

6. empirical *adj.* 完全根据经验的，经验主义的，[化]实验式
empirical laws 约定俗成的法律

7. formula *n.*（pl. formulas，formulae [-li:]）公式，方程式，原则，方案
formula of integration 积分公式
a legal formula 法律上的惯用语句
Drinking and driving is a formula for trouble. 酒后开车是引起事故的不变法则。
The employers and the union leaders have agreed an acceptable formula for wages. 雇主和工会领袖已就工资问题达成了一个可行方案。

8. codify *vt.* 编成法典，使法律成文化
codify laws 编撰法律

9. interlock *vt.* 使联锁，使联结 // *n.* 联锁（装置），连结，保险设备
dynamic interlock 动力制动联锁
gate interlock 门联锁
gear lever interlock 变速杆联锁装置
safety interlock 安全联锁装置

10. foremost *adj.*（位置或时间）最先的，最初的，最重要的 // *adv.* 首要地，首先
first and foremost 首先，第一
head foremost 轻率地；头朝前地

11. masonry *n.* 石工术，石匠职业，石工技术，石工行业
Masonry is a careful skill. 砖石工艺是一种精心的技艺。

12. entrepreneur *n.*（法）企业家，主办人
shipping entrepreneur 航运企业家

13. faculty *n.* 学院、大学或学院里的分支机构；学术性专业的全体成员

the faculty of law 法学院
the medical faculty 全体医学界成员

14. pursue *vt.* 追赶，追踪，追击，继续，从事
pursue a calling 从事一种职业
pursue a discussion 继续讨论
pursue one's studies 从事研究
pursue the enemy 追击敌人
She pursued the study of English for five years. 她持续不断地学了五年英语。
The ship continued to pursue a northern course. 船继续向北航行。

15. charter *n.* 特许状，许可证，宪章，特权，豁免权，合同，契约
the Charter of the United Nations 联合国宪章
the Great Charter（英国）大宪章

16. dock *n.* [美] 码头，船坞 // *v.* 使船入港
load-out dock 装卸船坞
oil dock 油船坞；油船码头
The sailors docked the ship. 船员把船靠了码头。

17. intercourse *n.* 交往，交流
diplomatic intercourse 外交往来
social intercourse 社交
friendly intercourse 友好往来
hold intercourse with sb 和某人交往
have intercourse with sb 和某人交往

18. drainage *n.* 排水，排泄，排水装置，排水区域，排出物，消耗
the drainage of the swamps 沼泽地的排水
drainage and irrigation work 排灌工程
The drainage of the city is not good, some of the pipes are broken.这个城市的排水系统不好，有些排水管都破裂了。

19. infrastructure *n.* 基础，基础结构［设施］，尤指社会、国家赖以生存和发展的，如道路、学校、电厂、交通、通讯系统等
transportation infrastructure 运输基本设施
infrastructure of city 城市内部结构

20. ecology *n.* 生态学
animal ecology 动物生态学
forest ecology 森林生态学
global ecology 社会（全球）生态学
grassland ecology 草地生态学
human ecology 人类生态学

21. bid *n.* 投标，招标，出价

Bids for building the bridge were invited. 应邀参加建造那座桥梁的投标。

Park wants to sell his farm, and he has already had two large bids for it. 帕克想卖掉他的农场，并且已经有两个出大价的买主。

He bid $5 for an old book. 他为一本旧书出价 5 美元。

22. supervision *n.* 监督，管理

accounting supervision 会计监督

food supervisions 食品卫生监督

banking supervision 银行业务的监督

circuit supervision 电路监控

The house was built under the careful supervision of an architect. 这房子是在一位建筑师的细心监督下建造的。

23. quasi *adj.* 类似的，有点像，准的，半

a quasi governmental agency 类似政府机关的一个机构

He was a quasi actor. 他有点像演员。

24. contractor *n.* 订约人，承包人（尤指建筑工程的承包人）

general contractor 总承包者，建筑公司

independent contractor 独立承包人

labor contractor 包工头

prime contractor 总承包人

project contractor 工程承包

removal contractors 搬运公司

25. partnership *n.* 合伙人身份，合作关系，伙伴关系

in partnership with 和……合伙（合作）

commercial partnership 商业合伙

family partnership 家庭合伙

"joint-venture" partnership 联营，合营

26. municipal *adj.* 市政的，市立的，地方性的，地方自治的

municipal affairs 市政

a municipal council 市议会

the municipal government 市政府

a municipal university 市立大学

27. sewage *n.* 下水道，污水

sewage purification 污水净化

sewage tank 化粪池；污水（沉淀）池

28. welfare *n.* 福利，安宁，幸福，福利事业，社会安全 // *adj.* 福利的，社会福利的

a welfare hotel 福利旅馆

welfare families 福利家庭

on welfare 接受社会救济

welfare officer 福利人员
welfare state 福利国家

Part II 课文注释

1. Civil engineering the profession of designing and executing structural works that serve the general public（lines 1～2，para.1）
“the profession of designing and executing structural works”是对前面 Civil engineering 的解释说明。这种结构常见于科技文章中开头，相当于表达定义的一种形式。
2. The term was first used in the 18th century to distinguish the newly recognized profession from military engineering，until then preeminent.（lines 2～3，para.1）
1）常与 from，between 连用，意思是辨别、识别、把……和……区别开。
distinguish right from wrong 明辨是非
distinguish good from evil 分辨善恶
People who cannot distinguish between colours are said to be colour-blind.不能分辨颜色的人被称为色盲。
Can you distinguish between those two objects?你能区分那两个物体吗?
2）常与 from 连用，意思是使别于、有……特点。
Speeches distinguishes man from the animals. 言语使人区别于动物。
Elephants are distinguished by their long noses / trunks.象因为有长鼻子而有别于其他动物。
3）until *prep.* 直到……时，到……为止
3. From earliest times，however，engineers have engaged in peaceful activities，（lines 3～4，para.1）
be engaged in: 从事，着手，忙于，常用被动语态。
4. As design and calculation replaced rule of thumb and empirical formulas，and as expert knowledge was codified and formulated， the nonmilitary engineer moved to the front of the stage.（lines 8～12，para.2）
as（表示时间）当……的时候，一边……一边……，随着
She sang as she worked.她一边工作一边唱歌。
I saw him as he was getting off the bus.正当他下公共汽车时，我看见了他。
As a child，he lived in America.他小时候住在美国。
You will grow wiser as you grow older.随着你年龄的增长，你会变得更聪明。
5. His design of Eddystone Lighthouse（1756—59），with its interlocking masonry，was based on a craftsman’s experience.（lines 20～22，para.2）
be based on [与 on，upon 连用]根据，基于
This news report is based entirely on fact.这篇新闻报导是完全根据实际情况写成的。
Judgment should be based on facts，not on hearsay.判断应该以事实为依据，而不应该依

靠道听途说。

6. Its object was to bring together experienced engineers, entrepreneurs, and lawyerst to promote the building of large public works, such as canals (and later railways), and to secure the parliamentary powers necessary to execute their schemes. (lines 23～25, para.2)

1) bring together 集合

2) secure *v.* 获得……财产,取得

secured a job 找到一份工作

7. It was this lack of opportunity for scientific study and for the exchange of experiences that led a group of young men in 1818 to found the Institution of Civil Engineers. (lines 2～4, para.3)

It was...that...是一个强调句型。

8. The founders were keen to learn from one another and from their elders, and in 1820 they invited Thomas Telford, by then the dean of British civil engineers, to be their first president. (lines 4～6, para.3)

1) be keen to 热心的;渴望的

They are rather keen to purchase Chinese goods. 他们渴望购买中国货。

2) be keen on 热心……的;对……有兴趣;喜爱……的

She's keen on sailing. 她喜爱驾船。

3) invite...to sth/to do sth [常与 to 连用]邀请,请求,恳请

She invited us to her party. 她邀请我们参加她的聚会。

invite sb to sing 请求某人唱歌

9. In Great Britain the universities, traditionally seats of classical learning, were reluctant to embrace the new disciplines. (lines 2～3, para.4)

1) Great Britain 英国,大不列颠岛,欧洲西海岸的一个岛屿,包括英格兰、苏格兰和威尔士。英吉利海峡将它与大陆隔开,隔爱尔兰海与爱尔兰相望。

2) be reluctant to 勉强的,不愿意的,常与不定式连用。

The child was reluctant to leave her mother. 这个孩子不愿意离开她的妈妈。

He was very reluctant to go away.他很不愿意离去。

10. ...and in 1840 Queen Victoria founded the first chair of civil engineering and mechanics at the University of Glasgow, Scot. (lines 5～7, para.4)

1) Queen Victoria 维多利亚女王,英国、爱尔兰(1837-1901)和印度女王(1876—1901)。她的职责感和严厉的道德水平对 19 世纪英国社会产生了深远影响。

2) Glasgow 格拉斯哥,英国城市,苏格兰西南部克莱德河上的一个城市,建于 6 世纪晚期,格拉斯哥是主要港口和工业中心而且是苏格兰最大的城市。

11. Civil engineering is a form of human activity that has been pursued as long as human beings have sought to change the natural environment for their own benefit. (lines 1～2, para.5)

1) as long as: so long as 只要

You may borrow this book as long as you promise to give it back. 只要你答应归还,