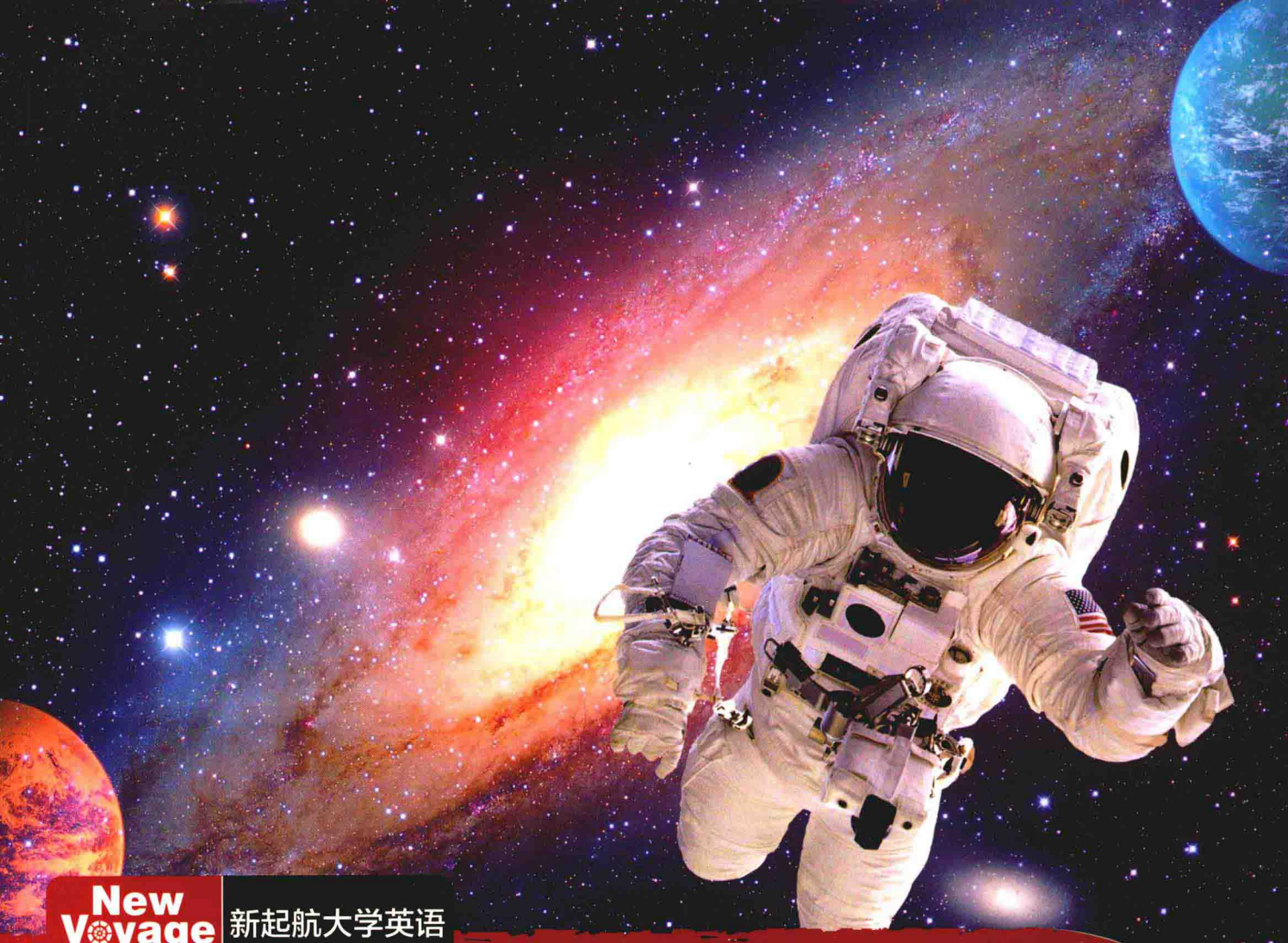

New Voyage 新起航大学英语

科技英语阅读高级教程

An Advanced Reading Course of English for Science and Technology

王新博 付 晓 主编

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内容提要

本教材基于内容依托式教学法，以话题为主线，以提高大学生科学人文素养，掌握科技前沿资讯，提升大学生学术英语交际能力为目标。全书共分10章，精选当代最为热点的10大科技话题，从不同侧面和角度予以解读和评析。这些话题涉及信息技术、生物工程、环境工程、材料科学、土木工程、机械工程、海洋探索、太空探索、汽车工程、石油工程10个方面。每章通过有内在逻辑关联的文本话题解读，帮助大学生了解科技前沿信息，掌握相关领域通用学术英语术语及表达方式，强化对科技英语文体和修辞的认知，提高大学生对学术英语文章的阅读、翻译和写作能力。

本教材适用于高校英语专业和非英语专业高年级大学生，特别是开设科技英语、学术英语等课程的各类高校，对于翻译专业硕士生和广大英语教师也具有重要的参考价值。

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前　言

随着我国高等教育的国际化，英语作为国际学术交流通用语的地位日益增强。“在绝大多数网络科技文献和国际学术交流都是用英语的时代，一个大学生如不能用英语阅读自己的专业文献，就跟不上世界前沿的研究发展；如不能用英语在国际学术界进行交流，这就等于把自己隔离于国际社会之外，为职业和学术发展带来了不利”（蔡基刚，2014）。可现实情况是，国内很多高校大学英语和英语专业的课程设置并没有把科技英语列为核心课程建设目录。科技英语在大学英语教学中的缺位造成我们的毕业生既不会用英语读专业文献，也不会用英语写科研论文。“培养具有国际交往和竞争能力的卓越人才不能仅仅靠学科专业的课程教学，如果学生没有用英语进行专业学习和研究的学术能力，听不懂外国教师的英语授课或讲座，不能用英语直接阅读专业文献，这个目标是很难达到的”（蔡基刚，2014）。英语专业由于历史原因，很多高校存在“千校一面”的“经院式”人才培养模式（周洵瑛，2010），即纯语言、纯文学的单科型培养模式，人才培养规格趋同，不仅造成就业难，而且难以满足市场需求旺盛的应用型科技英语翻译人才的需要。“单一的外语人才已经不再抢手，社会需要的是既精通外语，又通晓国际贸易、公司管理，尤其是科学技术等专业知识的复合型外语人才”（范武邱，2013）。实事求是地说，高校的科技英语教学在近几十年一直处于被边缘化的状态，相关的教学研究也难登“大雅之堂”，这与国际上把科技英语作为稳定学科进行研究形成明显反差（蔡基刚，2016）。

本教材正是在国内这一大背景下诞生的。时间回到 2010 年，适逢作者承担英语专业最没“前景”、最无人问津的“科技英语阅读”课程的教学工作。面临的第一个困难就是教材。国内出版的科技英语阅读书籍不少，但适合作为教材的就凤毛麟角了。在经过艰难的第一轮“边炒边卖”的痛苦经历后，作者开始查阅国外开展科技英语（学术英语）教学的情况，并结合所在学校的校本特色和大学生科技英语阅读能力培养的需要，制定了科技英语阅读的基本教学要求、内容、目标和考核评价标准等。同时，开始采编教学资料，陆续在教学中进行试用。第二轮教学完成后，教学效果很快得到了显现。学生在经过初步的科技英语阅读和翻译训练之后，能比较容易地驾驭科技英语文本，在就业面试时优势一下子体现出来。应用科技英语翻译是一个非常庞大的市场，社会需求大。由于经过这方面的训练，无论是面试还是上岗，学生上手快，适应能力强。正是这一就业信息给我增添了信心，让我舍得投入，继续无怨无悔地教好这门课。同时，这门课程成功获得学校校级规划教材校内胶印版的立项支持。几轮的试用都伴随着不断的修改完善，早期的很多单元都已“面目全非”。校内胶印版

教材试用了四轮，获得了较好的教学效益，并于今年获得学校“十三五”校级规划教材立项，准予公开出版。因此，本教材的诞生既有社会对科技英语教学需求大环境的影响，又是我校[中国石油大学(华东)]人才培养方案调整后的新目标和新规格所提出的新要求。

本教材精选当代最为热点的10大科技话题，从不同侧面和角度予以解读和评析。这些话题涉及信息技术、生物工程、环境工程、材料科学、土木工程、机械工程、海洋探索、太空探索、汽车工程、石油工程等10个方面。通过本教材的学习，大学生在获取科技信息的同时，潜移默化地学习相关领域的通用术语及表达方式，从词法、句法、语篇等多个视角，强化对科技英语文体和修辞的认知，学会把握科技文章的信息组织方式、内部衔接机制和科技翻译中的语篇信息整合和转换方法，提高科技英语文本的阅读和翻译水平，从而达到提升学术英语交际能力的目标。

不同于常规强化语言输入为主的科技英语阅读教材，本教材突出话题的体系性、内在逻辑性和基于语言输出驱动的能力导向性；融信息获取、深度解析和文本翻译于一体。主要特色如下：第一、话题导引。以话题为线索，串联多姿多彩的科技信息和文本知识，形成相互关联的有机整体。第二、内容依托。以CBI(content-based instruction)语言教学观为指导，选材突出可思性、学术性，突出学生思辨能力培养。第三、见林见树。突出学生文本分析和信息整合能力培养，着力解决快速搜索信息，把握文章主要信息的能力。第四、学以致用。基于科技英语文本阅读，体会行文差异，并进行得体转换，大力推进科技英语语篇翻译能力培养。

本教材在编写过程中，参考了大量国外各类学术杂志登载的文章，比较严肃网站的学术英语读物、公开出版的书籍杂志等，在此无法一一列出，谨向原文作者表示最诚挚的谢意。另外，本教材文章仅限于英语学习交流用途，不代表编者和出版社认同文章观点。

本教材在多年试用过程中得到了学校教务处的大力支持，得到了英语语言文学系各位同仁的帮助和关心。英语专业09、10、11和12级同学们在试用阶段提出了很多宝贵的意见和建议。在此，向以上为本书付梓给予支持、关心和帮助的领导、同事和广大学子表示最衷心的感谢。

由于编者水平有限，书中疏漏和不足之处在所难免，恳请业内同行和广大读者不吝赐教。

编　者

2016年8月15日

目　录

Unit One

Information Technology (InfoTech)

Tips on Unit Reading

Information technology (IT) is the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by a microelectronics-based combination of computing and telecommunications. Today, it has entered a big-data era. From social media to medical revolutions anchored in metadata analyses, wherein astronomical feats of data crunching enable hitherto unimaginable services and businesses, we are on the cusp of unimaginable new markets. Facing the transformational power ushered in by InfoTech, this unit is intended to present some topics of current interest or concern, including what IT can do for us, its future development, and some controversial issues concerning its use. The selected readings are like "a drop in the ocean", hoping to offer readers an easy access and an alternative way of getting to know the IT world.

Topical Scenario One

What Can IT Do for US?

Text A Cell Phones—Your Next Computer

Notes for reading

A mobile phone (also known as a cellular phone, cell phone, and a hand phone) is a device that can make and receive telephone calls over a radio link while moving around a wide geographic area. It does so by connecting to a cellular network provided by a mobile phone operator, allowing access to the public telephone network. By contrast, a cordless telephone is used only within the short range of a single, private base station. Most current mobile phones connect to a cellular network of base stations (cell sites), which is in turn interconnected to the public switched telephone network (PSTN) (the exception is satellite phones).

In addition to telephony, modern mobile phones also support a wide variety of other services such as text messaging, MMS(彩信), e-mail, wechat, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming and photography. Mobile phones that offer these and more general computing capabilities are referred to as smartphones.

The modern mobile-phone era dates back only to the 1970s. In just 40 years, in the West, they've gone from suitcase-size novelty to ubiquity. And they're no longer just luxury goods. More than 6 billion people on earth now have cell phones, with a quarter of those owners getting one in just the last two years. And many are using them, in a giant global experiment, to change the way life is lived, from Manhattan to Ouagadougou.

The phones now allow Masai tribesmen in Kenya to bank the proceeds from selling cattle; Iranian protesters to organize in secret; North Koreans to communicate with the outside world; Afghan villagers to alert Coalition soldiers to Taliban forces; insurgents to blow up roadside bombs in Iraq; and charities to see, in real time, when HIV drugs run out in the middle of Malawi.

The first hand-held mobile phone was demonstrated by John F. Mitchell and Dr Martin Cooper of Motorola in 1973, using a handset weighing around 2.2 pounds (1 kg). In 1983, the DynaTAC 8000x was the first to be commercially available. From 1990 to 2011, worldwide mobile phone subscriptions grew from 12.4 million to over 6 billion, penetrating about 87% of the global population and reaching the bottom of the economic pyramid. Some people even predict that they soon could make your PC obsolete.

[1] One hundred nineteen hours, 41 minutes and 16 seconds. That's the amount of time Adam Rappoport, a high school senior in Philadelphia, has spent talking into his silver Verizon LG phone since he got it as a gift last Chanukah(犹太教的光明节,每年12月左右,为期8天). That's not even the full extent of his habit. He also spends countless additional hours using his phone's Internet connection to check sports scores, download new ring-tones (at a buck apiece) and send short messages to his friends' phones, even in the middle of class. "I know the touch-tone pad on the phone better than I know a keyboard," he says. "I'm a phone guy."

[2] In Tokyo, halfway around the world, Satoshi Koiso also closely eyes his mobile phone. Koiso, a college junior, lives in the global capital of fancy new gadgets—20 percent of all phones in Tokyo link to the fastest mobile networks in the world. Tokyoites use their phones to watch TV, read books and magazines and play games. But Koiso also depends on his phone for something simpler and more profound: an anti-smoking message that pops up on his small screen each morning as part of a program to help students kick cigarettes.

[3] In some European airport, Peter Hiltunen, a computer-sales executive from Finland, is waiting for yet another flight. Hihunen was Finland's amateur motor-racing champion in 1994, but at 32 he's too old to indulge his hobby, and besides, he has to travel every week for his job. To pass the time, he downloads the sports magazine *Riento*! to his mobile phone. For €2, publisher Sendandsee gives him eight pages of pictures and text about sporting events and athletes.

[4] Technology revolutions come in two flavors: jarringly fast and imperceptibly slow. The fast kind, like the sudden ubiquity of iPods or the proliferation of music-sharing sites on the Net, seem to instantly reshape the cultural landscape. The slower upheavals grind away over the course of decades, subtly transforming the way we live and work.

[5] There are 1.5 billion cell phones in the world today, more than three times the number of PCs. Mobile phones are so integral to our lives that it's difficult to remember how the heck we ever got on without them.

[6] As our phones get smarter, smaller and faster, and enable users to connect at high speeds to the Internet, an obvious question arises: Is the mobile handset turning into the next computer? In one sense, it already has. Today's most sophisticated phones have the processing power of a mid 1990s PC while consuming 100 times less electricity. And more and more of today's phones have computer-like features, allowing their owners to send e-mail, browse the Web and even take photos; 84 million phones with digital cameras were shipped last year. Tweak the question, though, to ask whether mobile phones will ever eclipse, or replace, the PC, and the issue suddenly becomes controversial. PC proponents say phones are too small and connect too sluggishly to the Internet to become effective at tasks now performed on the luxuriously large screens and keyboards of today's computers. Fans of the phone respond: just wait. Coming innovations will solve the limitations of the phone. "One day, 2 or 3 billion people will have cell phones, and they are all not going to have PCs," says Jeff Hawkins, inventor of the Palm Pilot and the chief technology officer of PalmOne. "The mobile phone will become their digital life."

[7] PalmOne is among the firms racing to trot out the full-featured computer-like phones that the industry dubs "smartphones". Hawkins's newest product, the sleek, pocket-size Treo 600, has a tiny keyboard, a built-in digital camera and slots for added memory. Other device makers have introduced their own unique versions of the smartphone. Nokia's N-Gage, launched last fall, with a new version to hit stores this month, plays videogames. Motorola's upcoming MPx has a nifty "dual-hinge" design:

the handset opens in one direction and looks like a regular phone, but it also flips open along another axis and looks like an e-mail device, with the expanded phone keypad serving as a small QWERTY keyboard. There are also smart-phones on the way with video cameras, GPS antennas and access to local Wi-Fi hotspots, the superfast wireless networks often found in offices, airports and local cafes. There's not yet a phone that doubles as an electric toothbrush, but that can't be far away.

[8] The smartphone market constitutes only a slender 5 percent of overall mobile phone sales today, but the figure has been doubling each year, according to the Gartner research firm. In the United States, it's the business crowd that's primarily buying these souped-up handsets. "What makes (the smart phone) so much better than the computer is that it's always with you, always up and always ready," says Jeff Hackett of Gordon, Feinblatt, an 80-member law firm in Baltimore, Maryland, that recently started giving its lawyers Treo 600s instead of laptops.

[9] In Asia, it's not the boring professionals driving the newest innovations in the mobile market, but by what the Japanese call *keitai*-crazy kids. Teens sit in Tokyo's crowded plazas, furiously messaging each other, reading e-mail magazines and playing fantasy games like *Dragon Quest*. In South Korea, phones are so cherished by youngsters that in a recent survey of elementary school kids, half said they wanted a phone as their gift for Children's Day. *Dogs* got 22 percent of the vote, PCs a meager 10 percent. Many Asian phone manufacturers think the next killer app for all these kids is actually 75 years old: television. In May, Samsung announced it would launch a phone that receives 40 satellite TV stations.

[10] **Mobile-phone watchers say that handsets in the next few years will pack a gigabyte (1G) or more of flash memory, turning the phone into a huge photo album or music player and giving stand-alone iPods a run for their money.** For several years the industry has also talked about "location-based services", built around a phone's ability to detect its exact location anywhere in the world. With this capability, phones will soon be able to provide precise driving directions, serve up discounts for stores as you walk by them and expand dating services.

[11] But it's not all mobile technologists think the ultimate promise of the mobile phone ends there. Could your phone one day actually perform many of the functions of the PC, like word processing and Web browsing? PalmOne's Hawkins thinks so. Within the next few decades, he predicts, all phones will become mobile phones; all networks will be capable of receiving voice and Internet signals at broadband speeds, and all mobile bills will shrink to only a few dollars as the phone companies pay off their investments in the new networks. "You are going to have the equivalent of a persistent (fast) T1 line in your pocket. That's it. It's going to happen," Hawkins predicts. The computer won't go away, he says, but it might fade to the background, since people prefer portability and devices that turn on instantly instead of having to boot up.

[12] Defenders of the PC react with religious outrage to this kind of prophecy. Laptops allow another kind of mobile computing, they point out, particularly with the emergence of thousands of Wi-Fi networks around the world over the past four years. By the end of this year half of all laptops shipped will be Wi-Fi-equipped, allowing laptop owners to set up temporary offices in the local cafe or public park. Then there's the matter of simple practicality: mobile phones are small and getting smaller. Humans are not. "Hundreds of millions of people are not going to replace the full screen, mouse and keyboard experience with staring at a little screen," says Sean Maloney, an executive VP at chipmaker Intel, which is investing heavily both in Wi-Fi and mobile-phone technology.

[13] Yet mobile-phone innovators are working to solve that tricky problem, too. Scientists are

continuing decades of research into speeeh-recognition systems and have recently introduced the technology into PDAs (personal digital assistant). Users can control these gadgets with simple voice commands. Phones don't have enough processing power for speech recognition yet, but Moore's Law—the inevitability of annual improvements in computing power—will help phones get there soon, provided that battery life can keep up. Other innovators are working on improving the keyboard instead of scrapping it altogether. Canesta, a five-year-old firm in San Jose, Calif., is working on a product called a "projection keyboard". A laser inside the phone emits the pattern of a large keyboard onto a flat surface, and the phone's camera perceives the user's finger movements. Canesta's first products for phones will be available as plug-ins later this year, but one day they could be cheaply integrated into handsets.

[14] Cell phones aren't likely to take the fastest road to this bright future. Innovation in the mobile industry is full of zigzags and wrong turns, often because no single company completely controls the device in your pocket. Local carriers sell the phone to customers, provide billing and run the phone network; device makers like Sony, Nokia and Samsung design the phone itself, and outsource the actual manufacturing to factories in China. Another challenge is that, unlike the Internet, the phone world has no open and single set of protocols for programmers to build around. Software written for one kind of phone won't work on all the others. The uncoordinated, noncommercial programming that led to the quick evolution of the Internet hasn't taken hold in the world of mobile phones.

Reading Task One

1. *Decide on the meaning of each of the following proper terms or idiomatic expressions within the context with the help of some references if necessary.*

1) download new ring-tones _____
2) mobile networks _____
3) reshape the cultural landscape _____
4) mobile handset _____
5) browse the Web _____
6) digital camera _____
7) connect sluggishly to the Internet _____
8) the full-featured computer-like (cell) phone _____
9) a small QWERTY keyboard _____
10) GPS antennas _____
11) access to local Wi-Fi hotspots _____
12) buy the souped-up handsets _____
13) the killer app _____
14) pack a gigabyte (1G) or more of flash memory _____
15) a stand-alone iPod _____
16) receive voice and Internet signals at broadband speeds _____
17) boot up _____
18) invest heavily both in Wi-Fi and mobile-phone technology _____
19) the speech recognition system _____
20) voice commands _____

21) emit the pattern of a large keyboard onto a flat surface _____
22) be full of zigzags and wrong turns _____
23) outsource the actual manufacturing to factories in China _____
24) a single set of protocols _____

2. *Put the following sentence into Chinese.*

Mobile-phone watchers say that handsets in the next few years will pack a gigabyte (1G) or more of flash memory, turning the phone into a huge photo album or music player and giving stand-alone iPods a run for their money.

_____

_____

_____

3. *Is it possible for the cell phone to replace PC? What arguments does the writer put forward to verify his point? What do you think? Supply more references if possible to show your own ideas.*

4. *What are some of the key difficulties confronting the mobile phone innovators if they want the cell phone to perform like PC?*

Topical Scenario Two

A Glimpse into the Future

Text B Video Game, the Ultimate Design Fantasy

[1] It started with two lines and a dot. Those were the only images on the screen of Tennis for Two, a contraption made in 1958 by William Higinbotham, a scientist at the Brookhampton National Laboratories in New York State, by hooking up an analogue computer to an oscilloscope.

[2] On open days at the lab, visitors waited for hours to play on the machine, but Higinbotham didn't even try to make money from it. Lots of other people cashed in on his idea though, when it resurfaced in the 1970s as *Pong*, one of the first commercially successful video games. *Pong* used a different technology to Higinbotham's invention, but as anyone with fond memories of "batting" a "ball" across a black and white TV screen will recall, the game itself wasn't much more sophisticated.

[3] Times have changed. Half a century after *Tennis for Two*'s debut, the games market is a multibillion-dollar business, and some of the new titles being prepped for release this year are very, very sophisticated indeed. One empowers its players to play God by creating a galaxy from single cells upwards and testing the Drake equation—a formula to calculate the probability of intelligent alien life to boot. That's *Spore*, the new game devised by Will Wright, inventor of *The Sims*. Another deploys biomechanical artificial intelligence technology to equip its characters with virtual central nervous systems making it impossible to predict how they'll respond. That's *Star Wars: The Force Unleashed*.

[4] The new *Star Wars* game is to be released this summer, and *Spore* in autumn. A third design-savvy title goes on sale next month—*Liberty City*, the fourth installment of *the Grand Theft Auto* series, which is famous for three things. The first is violence. The second, great music. And the third, a wealth of lavishly realized visual references to fashion, design, architecture and pop culture.

[5] A video game is a megalomaniacal design fantasy. It is an entirely artificial environment where everything is conceived and constructed by the development team, which not only determines how the characters, buildings, landscapes and props will look, but what they'll do, and how they'll do it.

[6] Over the years, games developers have harnessed advances in science and technology to make their games more absorbing, thrilling and convincing. Their goal is to produce another classic, like *Pong*, *Space Invaders*, *PacMan*, *Donkey Kong*, *Super Mario 64*, *Tetris*, *Doom*, *Tomb Raider*, *The Sims or Halo*. As sales have soared to more than $300 million for *Halo 3* in its first week of release last year—games have become more complex, and so has the design process. **The development budget of a would-be blockbuster is now $15 million to $30 million, and teams of up to 300 people, including animators, scientists, illustrators and programmers, strive to give each title a design edge.**

[7] Some of the innovations in launches this year continue the long running efforts to develop more realistic, engrossing games. Critical to this is the increased power of the current crop of games consoles, *the Sony PlayStation 3* and *Microsoft's Xbox 360*, which are equipped with several central processing units, against one for their predecessors, and more advanced graphics processing capacity.

[8] *The Force Unleashed* uses the latest facial scanning and motion capture technologies to make its characters look like the actors in the *Star Wars* movies. Its designers also applied Pixelux's Digital Molecular Matter, a material simulation technology that depicts wood splintering, ice chipping and glass shattering. The *Spore* team deployed a procedural animation system to enable players to create believable creatures and settings. Similarly *GTA IV's* designers have finessed the graphic quality of *Liberty City* and its population to make them more convincing than their forerunners.

[9] But the biggest breakthroughs are in areas that are relatively new to games, and reflect wider developments in design, most of which are making games design a little less megalomaniacal.

[10] One is individuality (or the illusion of it), which consumers have come to expect in an era when they can customize the interior of a *Fiat 500*. *The Force Unleashed* achieves this using Euphoria, a biomechanical artificial intelligence software developed by NaturalMotion. "Everything happens differently every time you play the game," said Haden Blackman, who led the game's development. **"Storm troopers may duck or dodge out of the way, or block projectiles; enemies may squirm or wriggle, and, depending on the environment, they may grab on to ledges, or hang on to each other."**

[11] Another development is for designers to leave others to complete their work. An extreme example is a stellar design of 2008—*Tomfs Gabzdil Libertiny's Honeycomb Vase*, which he made by placing a beeswax mold in a beehive so the bees could finish it. Will Wright started this with *The Sims*, but *Spore*'s designers have taken it to a new level by devising tools with which players can construct imaginary galaxies in obsessive detail. "We can store and trade millions of creations between, hopefully, millions of users," said Alex Hutchinson, the lead designer. "The fact that you can zoom smoothly from a view of the world on the ground, all the way to a view of the planet from space still makes me smile."

[12] Games developers have also picked up on the trend to open up the design process. This open source approach is now standard in software design, and is one of the most popular elements of the online virtual world, *Second Life*. *Spore*'s designers have introduced a similar feature to enable players to invite other people to scrutinize and comment on their work.

[13] Future advances in artificial intelligence and simulation technologies will determine the development of the next generation of games. "The hope is that one day we'll be able to simulate authentic characters who can engage in believable conversations with the player, and who'll react and respond authentically," said Blackman. "We're still a long, long way from that, but every successive project will be a little bit better and add something new."

Reading Task Two

1. *Decide on the meaning of each of the following proper terms or idiomatic expressions within the context with the help of some references if necessary.*
   1) hook up an analogue computer _____
   2) artificial intelligence technology _____
   3) virtual central nervous systems _____

4) design-savvy _____
5) harness advances in science and technology _____
6) games consoles _____
7) central processing units _____
8) graphics processing capacity _____
9) motion capture technologies _____
10) simulation technology _____
11) dodge out of the way _____
12) the lead designer _____
13) open source approach _____
14) simulate authentic characters _____

2. *Put the following sentences into Chinese.*

1) The development budget of a would-be blockbuster is now $15 million to $30 million, and teams of up to 300 people, including animators, scientists, illustrators and programmers, strive to give each title a design edge.

_____
_____
_____

2) Storm troopers may duck or dodge out of the way, or block projectiles; enemies may squirm or wriggle, and, depending on the environment, they may grab on to ledges, or hang on to each other.

_____
_____
_____

3. *Compared to the forerunners, the present video games have undergone dramatic changes. Try to summarize the several points or aspects that reflect these changes.*

4. *What are some chief features video games developers are picking up on in their design?*

Topical Scenario Three

Is the Internet Friend or Foe?

Text C Cybercrime

[1] President Obama is searching for yet another White House czar to tackle a pressing public concern—and this time it's personal. On May 29, 2009, Obama announced a high-level initiative to address the growing problem of computer attacks—against the government, corporations and individuals—by coordinating the various efforts to fight hackers and other computer criminals under the direction of a coordinator already dubbed the "cyber czar."

[2] "I know how it feels to have privacy violated because it has happened to me and the people around me," Obama said in his announcement. Online intruders, he revealed, had penetrated his campaign's website in late 2008 and rummaged through e-mails, travel plans and other files—a "powerful reminder" of the Internet's glaring vulnerabilities, he said. According to a survey the President cited, computer crime has cost Americans $8 billion over the past two years.

[3] For practically as long as there's been an Internet, vandals, troublemakers and criminals have sought to exploit it. Even before the advent of the personal computer, phone phreaks (非法利用电子装置不付钱打电话,亦作 phone freak) manipulated computerized phone systems to make free long-distance calls. (Reportedly among them, by many accounts: future computer pioneers Steve Wozniak and Steve Jobs, who would go on to found Apple Computer.) **One infamous phreak, John Draper, became known as Captain Crunch after discovering in 1972 that he could fool AT&T's network with the tone from a plastic whistle distributed with the breakfast cereal.** Computer hacker Kevin Mitnick became a top target for the FBI for breaking into academic and corporate computer systems and causing millions of dollars in damage; after years eluding capture, he spent half a decade behind bars in the 1990s and was ordered to stay away computers for three additional years. The "Melissa" and "I Love You" viruses of the late 1990s and early 2000s drew widespread attention to expanding cyberthreats and jump-started the sale of virus- and worm-protection software, now a multibillion-dollar industry.

[4] Cyberattacks have grown more frequent and destructive in recent years. One form of hacking—the denial-of-service (DoS) attack—has apparently even become a tool of war. The attacks are designed to paralyze websites, financial networks and other computer systems by flooding them with data from outside computers. A 15-year-old Canadian with the handle "mafiaboy" launched the first documented DoS attack in 2000, against numerous e-commerce sites, including eBay and Amazon.com, shutting some down and wreaking havoc that cost an estimated $1.7 billion. In 2007, entities believed to have been associated with the Russian government or its allies launched a DoS attack