IT Supports and Computer Bilingual Education with Belt and Road

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Abstract. With Belt and Road, many occasions have been issued for most developing countries in Asia and Africa. And, China is been focusing on by different countries and people. Recent years, in order to catch the occasions of Belt and Road, oversea students, most of them from developing countries, are explosive growth in universities of China. IT is an important support technology and skill for modern society. It supplies a powerful support for advanced industries and businesses with Belt and Road yet. Computer is a compulsory and essential course for most students. The levels in computer technology for students from various nations are very different. How to take the computer courses for oversea students is a new challenge. In this paper, some new IT applications with Belt and Road and computer bilingual education for oversea students are discussed. In fact, without IT or computer supports, development of high-tech products is impossible, and no new economic growth points are nurtured successfully. As an essential skill training, computer education is very significant and useful.

1. Introduction
Belt and Road Initiative was raised by China in 2013. Belt and Road normally mean the Silk Road Economic Belt and the 21st-Century Maritime Silk Road. The original main area of Belt and Road is shown as Figure 1.

![Figure 1. Original main area of Belt and Road.](image)

In fact, the area of Belt and Road is not limited in Figure 1 showing. The Belt and Road connect Asian, European and African countries more closely and promote mutually beneficial cooperation to a new high and in new forms[1]. Since idea of the initiative is based on peace and cooperation, openness and inclusiveness, mutual learning and mutual benefit, many countries, especially developing countries, will face very good occasions for development.
Many students from developing countries of Asia and Africa come China to study with undergraduate and postgraduate programs. They want to catch to the train of development with Belt and Road. IT is an important support to build the initiative.

2. IT applications in China with Belt and Road
Countries along the Belt and Road have their own resource advantages and their economies are mutually complementary. Therefore, there is a great potential and space for cooperation. Chinese government has been actively promoting the building of the Belt and Road, enhancing communication and consultation, planning some key programs as Figure 2.

2.1. Advanced Industries and Businesses
In order to accomplish the programs, some advanced industries and businesses have to be introduced, such as high-speed railway, mobile payment and bicycle sharing systems.

2.1.1 High-speed railway
Railway is the important infrastructure for most countries. It may be the first step of development for many industries and businesses[2]. Although the high-speed railway was not issued by China, Chinese routine of high-speed railway is number 1 in the world.

Figure 3. A Chinese high-speed train on the platform.

Figure 3 indicates operation of high-speed rains in China. The faster and more convenient communication is much positive effect for economic growth.

Figure 4. The trains in some developing country.
In fact, decades ago, Chinese trains’ situation is similar to Figure 4. Therefore, railway is quite important for a nation’s development.

2.1.2. Mobile payment
Without cash, the payment is ideal. And mobile payment is a revolution for human’s life[3].

![Figure 5. Main two companies of mobile payment in China.](image)

Nowadays, the mobile payment is very popular in China[4]. Alipay and Wechat Payment in Figure 5 are most frequently used, not only in internet shopping, supermarkets, groceries, but also in barber shops, bakeries, hawker centres, even farms’ markets.

With a mobile phone, you can travel around all China. To pay for everything is possible mostly, such as tickets (flight, train, bus, cinema, game and so on), taxi, accommodation, food, vegetables, fruits, clothes, tuition, registration and others.

People life has been promoted in happiness much with mobile payment.

2.1.3 Bicycle sharing systems
The sustainable development is a challenge for all countries in world. Cleaning energy and environment protection must be attended by human. The green transportation is a good choice.

![Figure 6. Sharing bicycles in some city of China.](image)

A bicycle sharing system is popular to be used now in China. It can be a good solution of short distance transportation, such as among subway or bus station, home, supermarket, post office, cinema and so on. In Figure 6, bicycles and their utilities are illuminated. With the system, more people choose public transportation and bicycles[5].

Therefore, the sharing bicycles have made some obvious contributions in green transportation and environment protection.

2.2. IT Support for Advanced Industries and Businesses
Above advanced industries and businesses have to be supported by IT applications. The control and signal systems of high-speed trains, the platform and control centre of mobile payments, operation and management of bicycle sharing systems, all are depended on IT and internet technology.

The bicycle sharing systems, for example, are typical and popular applications for IoT, Internet of Things[6]. There are two big companies, Mobike and OfO, for bicycle sharing systems in China. The development of bicycle sharing systems is based on sharing economy, bicycle manufacture and some new IT technology[7]. Sharing economy means share assets in hand to other people, to increase utilization[8]. In past decades, bicycle is one of major transportation in China. But from 2000, bicycle
manufacture almost stagnates. With the sharing bicycles, China total bicycle shipment is 53 million in 2016. The new IT technology is concerned to big data, cloud and IoT.

The Big Data, Cloud and IoT are the most advanced research in IT nowadays. They are all adopted in the bicycle sharing system.

For the Big Data based on Mobike smart lock, in order to modify existing bikes and optimize new bikes release, GPS and communication module produced big data. To analyze these data, the estimate market demand can be issued.

About Cloud, all the big data will store on cloud. User can scan QR code to un-lock, then make the connection between user and smart lock. Deal with recharge and payment, establish or reuse some other credit system to rule the use habit.

In a sharing bicycle, smart lock integrated GPS module to realize precise localization; exclusive SIM card makes the instant messaging, via the cloud to monitor use status. To cooperate Baidu Yun, a cloud service, is to set up “Smart point” to fuse the power supply, and to manage and maintain the system[9].

Hence, IT technology and skill are very useful and valuable now and future.

3. Bilingual education of computer

With Belt and Road, China is been focusing on by different countries and people. Recent years, in order to catch the occasions of Belt and Road, oversea students, most of them from developing countries, are explosive growth in universities of China.

3.1. Computer Course with Bilingual Education

Normally, oversea students learn Chinese firstly. When their language level matches to study professional subjects, they may start their undergraduate or postgraduate programs. In order to decrease study time, some universities in China enrolled oversea students in English undergraduate programs that mean study in English. To teach some course in English is a type of bilingual education in Chinese universities[10].

Opening computer courses in English has to face some challenges. Since the education system in China is a lot of differences from UK or USA, the books, subjects, software system, students and teachers have to be made much changes.

Computer Application Fundamentals, for example, is a compulsory course for most oversea undergraduate students. It may be concerned to history, basic concept, architecture, number system, binary calculation, knowledge of operating system, how to use Windows and Microsoft Office, how to use internet and so on. The contents of the course cover several subjects in western countries. Therefore, to find a suitable book from UK or UAS for the subject is difficult.

On the other hand, the oversea students are quite different from Chinese students. They come from many various countries, Asia, Africa, South America, with much various background and culture. How to make them get the concept and skill for computer applications is a big challenge.

Here, the teaching method and content will be discussed for a computer subject or course. Figure 7 shows some students doing exercise in a computer classroom.

Figure 7. Oversea students on the computer class.
3.2. 6 Ws and Key points
6 Ws, What, When, Who, Why, Where and How, are available education way for most subjects. For the computer application course, the 6Ws mean What-definition, When-history, Who-suppliers, Why-features, Where-application fields, How-design and utility. The key points are basic concepts and skills.

3.2.1 History and men
In the 6 W, when and what are hard points in study. The when is to talk about history, and what for definition and architecture.

With the history, the content concerned to electronic computer may be focused on. About the first electronic computer, a common knowledge is ENIAC (Electronic Numerical Integrator and Computer) built in the US, end of 1945. But it is wrong. In fact, Colossus was the world's first electronic programmable computer by British in end 1943. Colossus used a large number of valves (vacuum tubes). It was very useful for breaking encrypted German military communications in the second world war. ENIAC was huge, weighing 30 tons, using 200 kilowatts of electric power and contained over 18,000 vacuum tubes, 1,500 relays, and hundreds of thousands of resistors, capacitors, and inductors. And, the paper shown in Figure 8 was a useful memory.

![Figure 8. Paper memory.](image)

When to talk about electronic computer, two men, Alan Turing and Von Neumann, must be remembered.

Alan Turing, 1912-1954 in British, is the father of computer science and artificial intelligence. The top award in computer is Turing Award.

Von Neumann, 1903-1957 in US (Hungarian), is the father of modern computer. Nowadays, most computers built with Neumann Architecture.

Intel has a great contribution for computer to enter people’s family. It issued the first 4-bit commercial microprocessor, Intel 4004, in 1971.

The microprocessor is the core of a microcomputer. Some PC and semiconductor memory decades ago are indicated as Figure 9.

![Figure 9. PC and memory chips decades ago.](image)

So far, Intel’s design of microprocessor is still the leader in the world.
3.2.2 Architecture and number system

Neumann Architecture defines to set up a computer with I/O, CPU and memory based on program storage and binary operation.

Figure 10 is a basic architecture of computer, Neumann Architecture.

![Basic architecture of a computer](image)

CPU, Central Processing Unit, is the core of a computer. In the CPU, the primary components are the ALU (Arithmetic Logic Unit) that performs mathematical, logical, and decision operations and the CU (Control Unit) that directs all of the processors operations.

For memory, especially semiconductor memory, there are non-volatile memory and volatile memory.

The non-volatile memory can keep information after power off, such as PROM, EPROM, EEPROM and Flash memory. The volatile memory may lose information after power off, such as SRAM (Static RAM) and DRAM (Dynamic RAM).

The input and output are necessary. The input devices mainly include keyboard, mouse, scanner, camera, microphone, touch screen, writing board, joystick and joypad. Output devices normally are concerned to LCD, printer, plotter, projector, audio and so on.

The number system for computer hardware is binary. But the decimal system is common in people’s life. Hence, some concept about number system is to be identified.

For decimal, the numerical value is between 0 and 9, sum of the n\textsuperscript{th} power of 10 (10 to the n\textsuperscript{th} power).

\[(654.321)_{10} = 6 \times 10^2 + 5 \times 10^1 + 4 \times 10^0 + 3 \times 10^{-1} + 2 \times 10^{-2} + 1 \times 10^{-3}\]

About binary, its numerical value may be between 0 and 1, sum of the n\textsuperscript{th} power of 2 (2 to the n\textsuperscript{th} power).

\[(101.011)_2 = 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 + 0 \times 2^{-1} + 1 \times 2^{-2} + 1 \times 2^{-3}\]

Then, hexadecimal value is between 0 and 15,10-15 to show as A-F, sum of the n\textsuperscript{th} power of 16 (16 to the n\textsuperscript{th} power).

\[(A3E.D)_{16} = A \times 16^2 + 3 \times 16^1 + E \times 16^0 + D \times 16^{-1}\]

The conversation of various systems can be calculated with multiplication or division.

4. Conclusions

Belt and Road Initiative shows very good occasions for most developing countries in Asia and Africa. IT is an important support for the initiative and advanced industries and businesses. As an essential skill training, computer education is very significant and useful.

In fact, the computer bilingual education for oversea students is required and significant with challenges. With suitable idea and method, the education may obtain a good result.
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