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International Centre
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under the auspices of UNESCO
联合国教科文组织高等教育创新中心

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南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

2018 Seminar on ICT in Higher Education Management for Chad

Improving ICT Competency
to Promote Higher Education Development

13 July - 1 August, 2018
Shenzhen, China

2018

Seminar on ICT in Higher Education Management for Chad

Introduction

‘2018 Seminar on on ICT in Higher Education Management for Chad’ is sponsored by the Ministry of Commerce of the People’s Republic of China, and organized by International Centre for Higher Education Innovation under the auspices of UNESCO (UNESCO-ICHEI) and the Centre of Higher Education Research of Southern University of Science and Technology.

ICT is making revolutionized influence in the world, and education is also greatly changed by ICT. ICT features various application forms in higher education, such as MOOC, blended learning, etc. By application of ICT, it is possible to break the restrictions of time and space, make more people have access to education and improve the quality of education, which would finally help to achieve educational equity.

The development of ICT in African countries is uneven. Countries in the northern region of Africa are better developed in ICT than many countries in sub-Saharan region. However, there exists much space for the development of ICT for African countries, which should strengthen top-level design, provide support from the policy and institutional levels, and improve the construction of ICT infrastructure. Besides, it is important to attach importance to the cultivation of ICT talents, to improve the human resources capacity, and thus create endogenous motivation for social development and higher education innovation.

The government of Chad is fully aware of the opportunities that ICT could bring to social development, especially to higher education innovation, and is willing to take actions to seize the digital opportunities to boost higher education development. UNESCO-ICHEI actively responded to needs of Chad and organized the Seminar.

Disclaimer

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Preface

Nowadays, information and communication technology (ICT) is an important indicator to measure the development of a country or a region. The rapid development of ICT have caused an industrial and social revolution worldwide, which made significant impacts on all aspects of our society. The rapid development of Internet makes it easier for people worldwide to communicate, exchange and learn from each other.

At present, the industrialization of African countries has created increasin demand for high-tech talents. However, the current education system is unable to meet needs of the markets and national development. There is an increasing need of updated and high quality education in African countries. Beisdes, many African countries are in the satge of economic transformation from an agricultural oriented development model to a service based development model, however, the lack of high-skilled talents hinders the speed of national transformation. Moreover, many countries are faced with challenges like shortage of high quality educational resources, insufficient financial investment, and backward technology which have all made it difficult for the development of education. In order to increase higher education access and to improve education quality, many higher education institutions in Africa face the urgent need for higher education innovation.

The Sustainable Development Goal 4 (SDG4) aims to ‘ensure inclusive and equitable quality education and promote lifelong learning opportunities for all’. Under the SDG4-Education 2030 Framework for Action, ICT is highlighted for its cross-cutting role in improving inclusiveness, equity and quality in education. The potential of ICT lies in the provision of high quality and relevant higher education that matches the knowledge and skills needed by the labour market. Various ICT tools can be used to deliver quality content for on-demand training and retraining. Open Educational Resources (OER) can support the distribution of Massive Open Online Courses (MOOCs) offered by universities and content providers (ADB, 2009; Latchem, 2017). A comprehensive online Education Management Information System (EMIS) would facilitate the collection, storage, analysis and dissemination of data and information, thus enabling countries to monitor the progress towards each Education 2030 target. Therefore, ICT can be leveraged to carry out the Education 2030 agenda and to achieve the specific targets under SDG4.

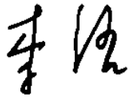
In Africa, ICT development is also high on the agenda and the Internet penetration in Africa is improving in recent years. With the popularity of smart phones, network coverage in many African countries has reached the level of more than 50%. And this has provided a good basis for the development of ICT in education.

It is under this background that UNESCO-ICHEI organized the ‘2018 Seminar on on ICT in Higher Education Management for Chad’. The Seminar was sponsored by Chinese Ministry of Commerce and it aims to demonstrate

the latest experiences and practices in terms of ICT in education from the perspectives of policy, implementation and application, and finally to improve ICT in higher education in Chad.

UNESCO-ICHEI hope to take this opportunity to further deepen cooperation with African countries in higher education, and would like to organize more trainings in the field of ICT in management, online education, big data and cloud computing for more African countries. Furthermore, UNESCO-ICHEI has beeing pursuing to build a platform linking governments, universities, and ICT enterprises between China and African countries to deepen the exchanges and cooperation.

It is hoped that the participants will bring their learning experience back to Chad after the seminar, and help make more people benefit from the training, and contribute to the development of higher education innovation in Chad.



Director of International Centre for Higher Education Innovation
under the auspices of UNESCO
September, 2018, Shenzhen

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Chapter 1
Overview

Part 1 Higher Education and ICT Development in Africa

1. Higher Education in Africa

Higher education in African countries has developed rapidly in recent years. A recent World Bank report shows that higher education in sub-Saharan Africa has experienced rapid expansion over the past few decades. The number of college students in the region increased from less than 400,000 in 1970 to 7.2 million in 2013. In the same period, the gross enrollment rate of higher education in sub-Saharan Africa grew at an average annual rate of 4.3%, exceeding the global average annual growth rate of 2.8%.[1]

The report *Sharing higher education's promise beyond the few in Sub-Saharan Africa* released by World Bank shows that higher education in the region has experienced rapid development, but it is still far from meeting the growing demand, and the distribution of higher education resources remains unequal and uneven. In addition, since the beginning of this century, many African universities have carried out large-scale expansion of enrollment. At the same time, the software and hardware such as funds, school buildings, and teachers have not kept pace with the expansion, leading to a decline in the quality of education.

The Report also shows that the challenges of higher education in sub-Saharan Africa have become more severe since the 21st century. From the perspective of popularity of higher education, Sub-Saharan Africa still lags far behind the rest of the world. The gross enrolment ratio of higher education in the region is less than 10% in 2013, which is lower than the global average of about 30%. Besides, there are very few people in sub-Saharan Africa who are able to complete higher education which means higher education in this region is unable to provide enough much-needed talents for social and economic development.[2]

Despite the phenomenal expansion of higher education in sub-Saharan Africa, it is still far from meeting the growing demand due to the overall growth of the population and the shift of employment from agriculture to manufacturing and service industries. The unequal and uneven distribution of resources for higher education has seriously restricted the development of higher education in Africa.

At present, many African countries are trying to shift from an agricultural economic development model to a service-based economic development model. Many African governments have made transformation an important national strategy. Africa needs to diversify its economy, upgrade its technology, and enhance the competitiveness of its manufacturing and service industries. Therefore, the demand for all kinds of talents will inevitably increase. However, the lack of highly skilled personnel hinders the speed of transformation.

Sub-Saharan Africa's population is expected to increase from about 1 billion today to 1.7 billion by 2040. The labor force will increase at double the rate of the last decade. As a result, sub-Saharan Africa needs to create 20 million jobs per year to keep up with its growing labor force[3]. This poses a huge challenge to the development of higher education in the region. If there is no effective policy, youth unemployment or underemployment will become a problem, which will ultimately undermine social cohesion and increase political instability.

[1]http://world.people.com.cn/n1/2018/0206/c1002-29807269.html

[2]Sharing Higher Education's Promise beyond the Few in Sub-Saharan Africa, World Bank Group

[3]Looking Ahead to Chart Today's Course: The Future of Work in sub-Saharan Africa. Christine Lagarde.

Therefore, the development of higher education must be closely related to social development. African countries should actively use ICT to promote higher education reform and innovation, to help more people get more equal and quality higher education and training, and to effectively train young people with necessary and updated knowledge, thus release the demographic dividend and finally strengthen social productivity and economic competitiveness.

2. ICT Development in Africa

In recent years, ICT has developed rapidly in the world and has made outstanding contributions to economic and social development. Currently, more than half of the world's households have access to the Internet. The least developed countries have made progress in the development of ICTs such as Internet connectivity. Significant progress has been made in bridging the digital divide, but there is still a huge gap in different countries and regions.

ICT is significant to social and economic development. African countries need to improve their ICT level to promote national development and emergence. However, they face many challenges such as backward infrastructure, high cost and lack of ICT talents. The current state of ICT development in African countries is extremely uneven, in which northern and southern Africa take lead, while most countries in sub-Saharan region lag far behind African countries in the north and south.

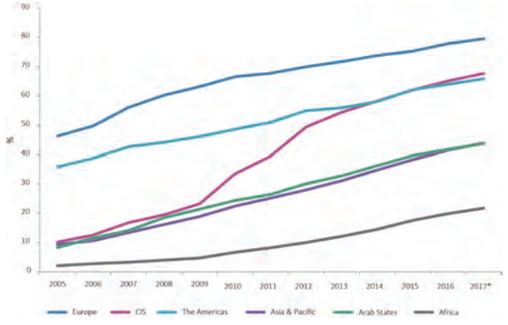


Chart 1-1: Proportion of individuals using the Internet by region, 2005-2017
(Source: ITU.) Notes: * ITU estimate.

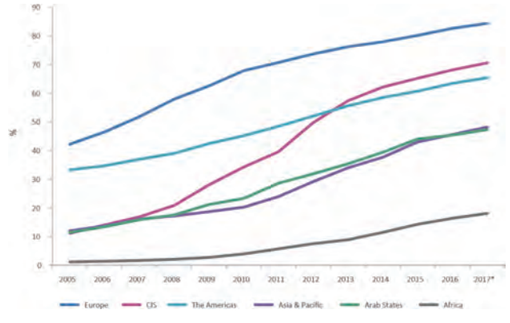


Chart 1-2: Proportion of households with access to the Internet by region, 2005-2017
(Source: ITU.) Notes: * ITU estimate.

According to statistics from the International Telecommunication Union in 2017, 70% of young people (15-24 years old) in the world are regularly online. In developed countries, 94% of young people use the Internet, and in developing countries the proportion is 67%, but the proportion for the least developed countries is 30%. 90% of the young people who do not use Internet come from countries in the Africa and Asia Pacific region. In Africa, young people accounts for 20.1% of the population, however, young netizens only accounts for 37.3 % of the young people.[4]

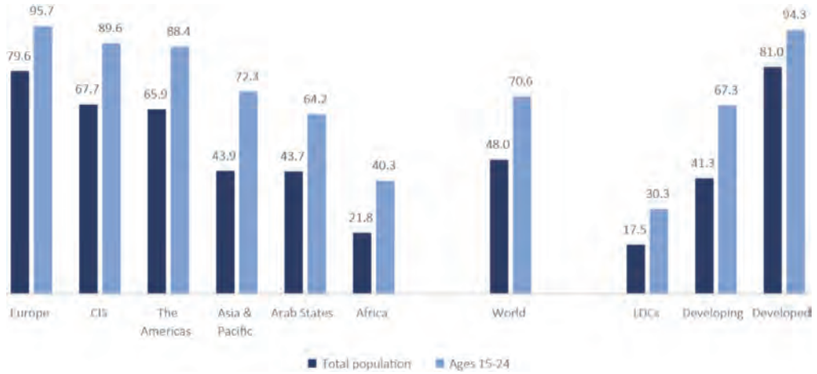


Chart 1-3: Proportion of individuals using the Internet, by age, 2017*[5]

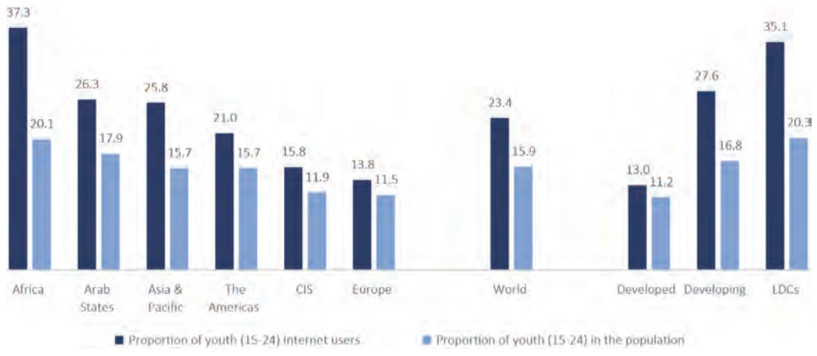


Chart 1-4: Young people aged 15-24 as a proportion of population and of Internet users, 2017* [6]

These data show that there is a big gap between African countries and developed countries in terms of ICT level, but African countries have good potential in their ICT development. Therefore, they should continue to strengthen the development of ICT infrastructure and ICT talents, thus providing endogenous motivation for the realization of higher education innovation and economic development.

[4]Measuring the Information Society Report 2017, ITU, ISBN 978-92-61-24521-4
[5]Measuring the Information Society Report 2017, ITU, ISBN 978-92-61-24521-4
[6]Measuring the Information Society Report 2017, ITU, ISBN 978-92-61-24521-4

Part 2 Higher Education and ICT Development in Chad

1. General Information of Chad

The Republic of Chad, referred to as “Chad”, is a landlocked country in central Africa. The capital and largest city is N’Djamena. It has a land area of 1,284,000 square kilometers, a population of 14.5 million and a per capita GDP of US$670. The official languages are French and Arabic. Chad is an economically backward country driven by agriculture and husbandry, and is listed by the United Nations as one of the 47 least developed countries in the world. Chad ranked third from the bottom in the world in the United Nations Human Development Index in 2016.

2. Higher Education in Chad

The level of cultural education in Chad is relatively low. The primary school stage education is compulsory, and the enrollment rate is 98.5%. However, in general, less than 40% of those who attended primary schools would finish their studies. And there is a large gender difference in enrollment rates. The literacy rate of the country’s population over 15 years old is less than 30%. For higher education, the Gross enrolment ratio of tertiary education is less than 4%, and it existss a big gender difference.

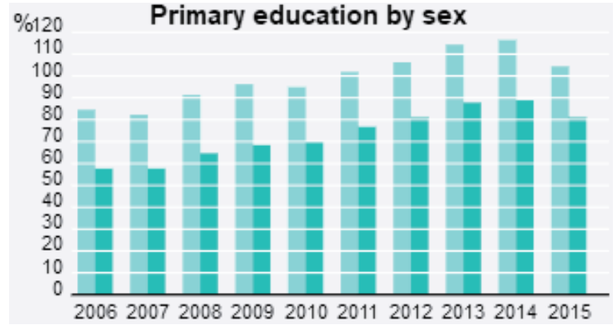


Chart 1-5: Primary education by sex (Source: UIS.)

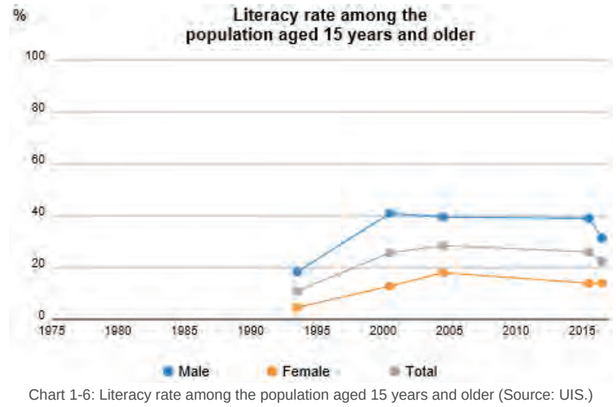


Chart 1-6: Literacy rate among the population aged 15 years and older (Source: UIS.)

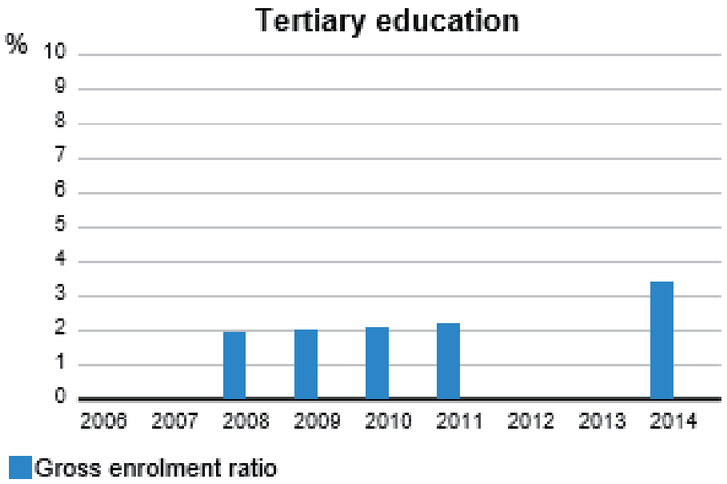


Chart 1-7: Gross enrolment ratio of tertiary education (Source: UIS.)

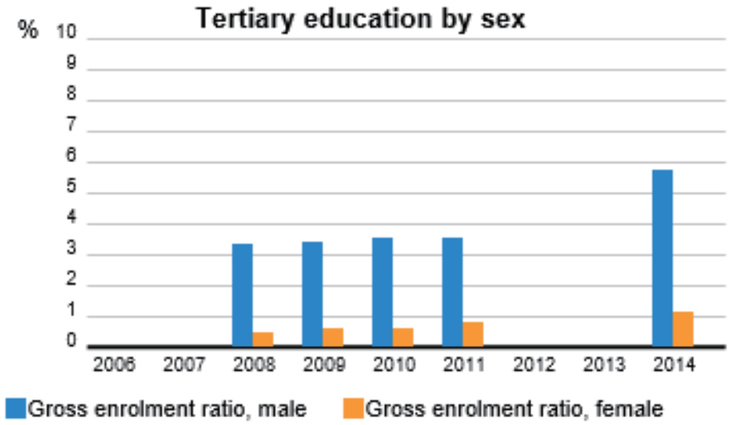


Chart 1-8: Gross enrolment ratio of tertiary education by sex (Source: UIS.)

Higher education is mainly provided by the University of N'Djamena, King Fayçal University, the Moundou Business Technical School, National Institute of Science and Technology Abéché. The first higher education institution in Chad was established in 1971, and the University of Chad is now known as the University of N'Djamena.

However, Chad's higher education has experienced accelerated growth over the past decade. According to the statistics from the Ministry of Higher Education, Research and Innovation, the number of public and private higher education institutions in Chad increased from 7 to more than 150 between 2001 and 2016, which is an average annual increase of about 22.7%. At the same time, the number of students increased from 6,730 to 40,749, which are mainly in public institutions. It is estimated that there will be 130,000 students by 2030 in Chad.

Chad has a total of 157 educational institutions. Among them, public higher education institutions include 10 universities, 6 higher education colleges, and 4 higher education schools. In addition, there are seven institutions of higher education which is outside the supervision of the Ministry of Higher Education, Research and Innovation.

The Ministry of Higher Education, Research and Innovation also has four agencies under its supervision, namely the National University Work Center, the National Examination and Competitions Office, the National Development Research Center, and the Chadian Land Observatory.

3. ICT Development in Chad

There are three mobile operators: TIGO, a subsidiary of the Luxembourg based MILLICOM mobile group; AIRTEL, a subsidiary of the Indian mobile group; and Salam, the mobile arm of the State-owned incumbent Telecommunications Society of Chad (SOTEL).[6]

In 2015, 59 percent of households had mobile telephones, with a significant difference between urban (85 per cent) and rural areas (52 per cent).125 One challenge is the limited coverage in rural areas. Another is the relatively high tax burden on mobile use (e.g. additional SIM card tax, daily usage tax and per call tax) that decrease affordability. Mobile-broadband has been deployed relatively recently. Both AIRTEL and TIGO launched 3G services in 2014, with TIGO simultaneously launching LTE in 2014, the first by a MILLICOM operation in Africa. [7]

In terms of fixed services, SOTEL is the sole provider of fixed telephone services using copper lines and CDMA wireless local loop. Fixed-telephone connections have been dropping due to the popularity of mobile services. Fixed-broadband connections are very limited and most fixed-broadband connections are based on fixed wireless technologies, which are provided by several operators. As a landlocked country, Chad relies on the backbone connectivity of neighboring countries to access undersea fiber-optic cables. A fibre-optic backbone network running along oil pipelines to Cameroon was completed in 2012, although the capacity contracted remains low. There are two other projects supported by development partners to extend fibre-optic backbones. The CAB project is sponsored by the World Bank and would link Chad to neighbouring countries. The African Development Bank is sponsoring the Trans-Sahara Optic Fibre Backbone Project, which would lay fibre-optic cable along the Trans-Sahara Highway connecting Chad to Algeria via Niger, as well as Chad to Nigeria. Meanwhile, Chad continues to rely on satellite for a substantial portion of its international Internet bandwidth.[8]

The landlocked country faces challenges to expand access to rural areas. Planned projects to build out the national backbone with multiple cross-border connections should help to increase coverage while lowering costs due to increased choices in undersea fibreoptic cables. At the same time, a reduction in telecommunication usage charges could increase affordability.

[7]Measuring the Information Society Report 2017 Volume 2. ICT country profiles
[8]Measuring the Information Society Report 2017 Volume 2. ICT country profiles

Key indicators for Chad (2016)		Africa	World
Fixed-telephone sub.per 100 inhab.	0.1	1.0	13.6
Mobile-cellular sub.per 100 inhab.	44.5	74.6	101.5
Fixed-broadband sub.per 100 inhab.	0.1	0.4	12.4
Active mobile-broadband sub.per 100 inhab.	9.5	22.9	52.2
3G coverage (% of population)	22.0	59.3	85.0
LTE/WiMAX coverage (% of population)	22.0	25.7	66.5
Mobile-cellular prices (% GNI pc)	21.4	14.2	5.2
Fixed-broadband prices (% GNI pc)	577.2	39.4	13.9
Mobile-broadband prices 500 MB (% GNI pc)	11.5	9.3	3.7
Mobile-broadband prices 1 GB (% GNI pc)	23.0	17.7	6.8
Percentage of households with computer	3.3	9.6	46.6
Percentage of households with Internet access	3.5	16.3	51.5
Percentage of individuals using the Internet	5.0	19.9	45.9
Int.Internet bandwidth per Internet user (kbit/s)	3.8	51.0	74.5

Table 1-1: Key ICT indicators for Chad (2016)

Note: Data in italics are ITU estimates. Sources: ITU (as of June 2017)

Part 3 2018 Seminar on ICT in Higher Education Management for Chad

1. Importance and Necessity of the Seminar

1.1 Meeting the urgent need of Chad to improve ICT application in higher education

In recent years, the Chadian government has recognized the importance to enhance informatization of national higher education institutions. In view of China's rich experience in this field, the Government of Chad had expressed hope that China could organize a seminar on ICT in management of higher education institutions for Chad, aiming at improving the ICT literacy of Chadian higher education practitioners. Based on the overall level of higher education and ICT development in Chad, the seminar designed a series of curriculum to enhance ICT in higher education.

1.2 Enhancing the ICT capacity of higher education practitioners in Chad

Talent is the foundation of national development. The Chadian government has selected 20 high-level representatives in the field of higher education to study in China. Through the seminar, 20 representatives have greatly improved their ICT literacy and capacity, and they will bring what they have learned in China back to Chad and make more higher education practitioners benefit from this seminar.

1.3 Deepening higher education cooperation between China and Chad

In recent years, heads of state of China and Chad have held several meetings and exchanged views on cooperation in various fields and reached many important consensuses. In this context, the Chinese government was willing to organize a specific training seminar to improve ICT in higher education institutions in Chad. The Training Center of the Ministry of Commerce in China seriously considered the needs of Chad and finally chose Center of Higher Education Research of Southern University of Science and Technology to organize a seminar for Chad, with the aim of teaching them China's advanced experience in the field of higher education and information technology, thus improving the ICT literacy and capacity of Chad's higher education practitioners. The Center of Higher Education Research of Southern University of Science and Technology together with UENSCO-ICHEI are responsible for the course design and organization. The Chadian government will be responsible for selecting 20 high level higher education practitioners from Chad to study in China. The organization of this seminar is not only an important opportunity to help Chadian higher education institutions to improve their ICT capabilities, but also an important measure to promote and deepen the educational cooperation and friendly exchanges between China and Chad.

2. China becomes a leader in digital revolution

The Chinese government attaches importance to the country's ICT development. The Outline of the National Informatization Development Strategy proposes to accelerate the construction of a digital China. The "13th Five-Year National Informatization Plan" regards "Achieving significant results in the construction of a digital China" as the overall goal of China's informatization development.

Digital China Construction Development Report (2017) shows that China's digital economy ranks second in the world, and the digital economy is deeply integrated with the real economy. In 2017, the number of Internet users in China reached 772 million, and the network speed-up and fee reduction continue to increase in China.

According to a report released by the think tank McKinsey Global Institute (MGI), China accounted for less than 1 percent of the global retail e-commerce transaction values in 2005 and the share is now 42.4 percent. The current value of China's e-commerce transactions is estimated to exceed France, Germany, Japan, the United Kingdom and the United States combined.

Mobile payment penetration rate has increased from 25 percent in 2013 to 68 percent in 2016. Individual consumption via mobile payments totaled $790 billion in 2016, 11 times that of the US.

China's venture capital industry is also focused on the digital world. The majority of investments are in digital technologies such as big data, artificial intelligence and financial technology companies. In particular, China enters the top three in the world for venture capital investments in virtual reality, autonomous vehicles, robotics and drones, according to the report.[9]

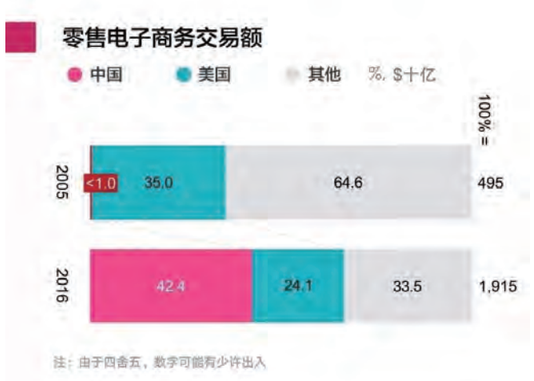


Chart 1-9: China-US retail e-commerce turnover

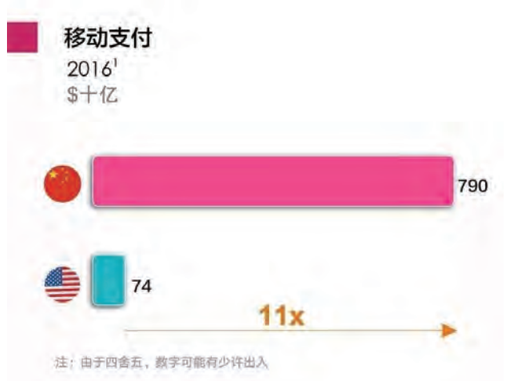


Chart 1-10: Total of China-US mobile payment

Data from the Ministry of Industry and Information Technology of the People's Republic of China shows that the scale of China's broadband access users has expanded significantly. Under the promotion of the broadband China strategy and the open pilot of the broadband access market, private capital continued to enter the broadband access market, and the number of users increased steadily. As of the end of December 2017, Chinese Internet companies had a total of 45.65 million broadband access users, an increase of 39.9% over the previous year.[10]

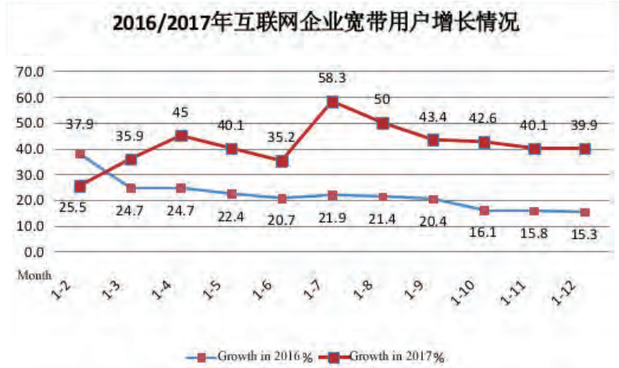


Chart 1-11: Growth rate of internet companies' broadband users in 2016/2017

Shenzhen is China's first special economic zone and a window for China's reform and opening-up. Over the past 30 years, Shenzhen's GDP has grown at an average annual rate of 25%. The total GDP in 2017 reached 224.438 billion yuan (about 356.368 billion US dollars).[11]

Innovation is in the gene of Shenzhen. Shenzhen is China's first national independent innovation demonstration zone with cities as its basic unit. The city is accelerating its construction as an international technology and industrial innovation center, which would have a leading position in the fields of electronic information, Internet, biology and new energy. Shenzhen has nurtured a large number of high-tech enterprises such as HUAWEI, ZTE, Tencent, BYD, BGI, DJ-Innovations, GAC Group and ROYOLE, and is known as the "City of Innovation''.

[9]Digital China Powering the Economy to Global Competitiveness, McKinsey Global Institute

[10]Ministry of Industry and Information Technology of the People's Republic of China
[11]Shenzhen Statistics Bureau

Chapter 2
Seminar Syllabus

Part 1 Expected Objectives

The Chadian government realizes the importance of ICT to the development of higher education and hopes to improve the ICT literacy of the Chadian higher education practitioners, thus making use of ICT to promote higher education innovation in the country.

China has made great achievements in ICT in higher education in recent years, and is willing to share with other developing countries its successful practices and experiences.

The Seminar aims to:

1. Help participants to learn from China's successful experiences and practices in the reform and development of ICT in higher education;

2. Enhance the overall understanding and knowledge of the Chadian higher education practitioners in ICT in education, and encourage them to formulate ICT in higher education development proposals for Chad;

3. Establish a platform of exchange and cooperation among Chinese enterprises, leading universities, research institutions and higher education representatives from Chad;

4. Understand and analyze the situation and needs of Chad's higher education and ICT development, and enrich the database of African higher education research, thus to lay a better foundation for conducting national and regional higher education research in the future;

5. Set up a platform for Chinese enterprises to participate in the development of higher education innovation in Chad and more countries in this region;

6. Promote mutual understanding in terms of higher education, ICT development and general situation of each other, thus deepen higher education cooperation between China and Chad.

Part 2 Participants Analysis

1. Participants Background

There are 20 representatives from Chadian higher education field, including representatives from the Ministry of Higher Education, universities, higher education colleges and other institutions. Among them, there are 4 representatives from the Ministry of Higher Education, 8 representatives from universities, 5 representatives from higher education colleges, and 3 representatives from higher education institutions. The composition is shown in Figure 2-1.

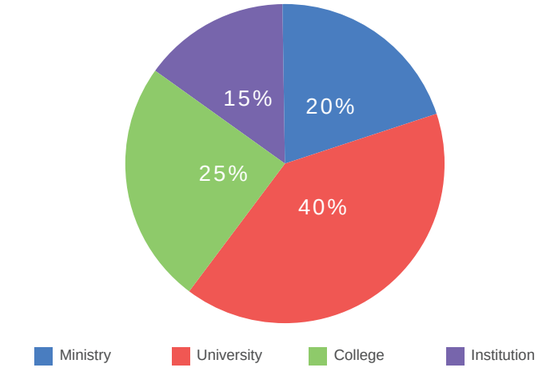


Figure 2-1: Composition of seminar participants

2. Gender and Age of Participants

There are 20 participants in the seminar, including 17 male participants, accounting for 85% of the total number of participants; 3 female participants, accounting for 15% of the total number of participants. The gender distribution of the participants of the seminar is shown in Figure 2-2.

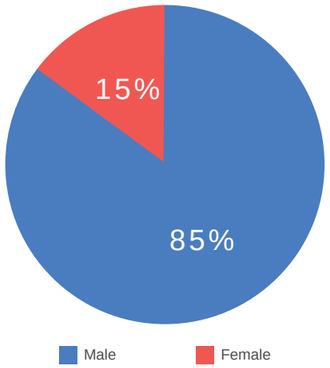


Figure 2-2: Gender distribution of the participants

In this Seminar, the youngest participant is 28 years old, the oldest participant is 44 years old, and the age distribution is relatively average. Among them, the proportion of participants aged 31-35 is relatively big, with a total of 7 students, accounting for 35% of the total number of participants; other age groups account for about 20%-25%. The age distribution of the participants in this seminar is shown in Figure 2-3.

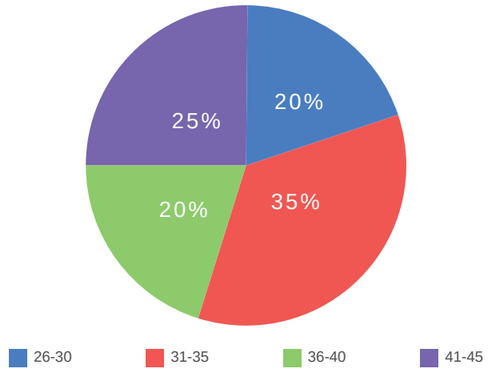


Figure 2-3: Age distribution of the participants

3. Education Level of Participants

The participants have an average high level of education, 45% of whom are doctoral students, 30% are masters, and 25% are bachelors. The background of the academic qualifications of the participants in this seminar is shown in Figure 2-4.

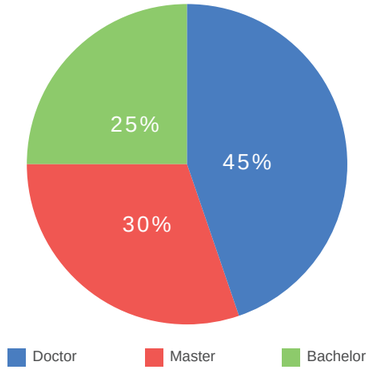


Figure 2-4: Academic qualifications of the participants

As shown in Figure 2-5, there are only 3 students in the ICT-related majors in the seminar, accounting for 15% of the total number of participants. Participants mainly studied in the field of humanities, accounting for 50% of the total number of participants.

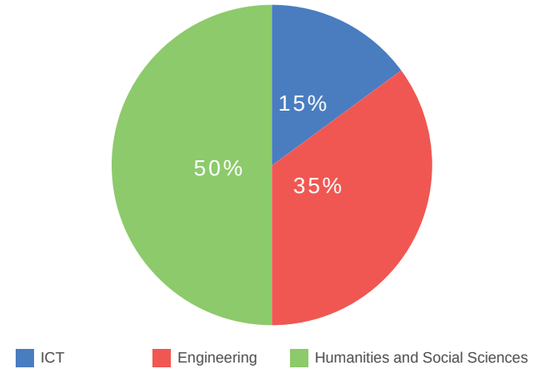


Figure 2-5: Professional background of the participants

Part 3 Curriculum Design

Participants included officials from the Ministry of Higher Education, lecturers and administrators from universities and higher education institutions. All participants have bachelor degree or above, and 45% of the participants have doctoral degrees, however, the participants have different academic backgrounds. Among them, only 15% of the participants are from ICT relative backgrounds, like computer or information engineering, and most (50%) participants are with the background of humanities and social sciences. Participants with different academic and working backgrounds will have different needs and expectations from the Seminar.

In addition, the overall level of the informatization in Chad is relatively low, with inadequate application conditions for higher education informatization. Besides, the government also in lack of sufficient knowledge and awareness for the application of informatization in higher education.

Considering all factors mentioned above, the design of the curriculum should value professional knowledge, but also need to avoid courses that are too technical; there should be general introductory courses and also courses with detailed explanation and analysis; it should cover theory and practice and should be conducted in the form of lectures, field visits and exchanges.

Therefore, the courses are composed of professional courses, the purpose of which is to teach professional knowledge; case studies, the purpose of which is to showcase how ICT could be applied to strengthen management through presentation of specific cases; field visits, the purpose of which is to show how private sectors participate in higher education innovation and the ICT solutions offered by them; general courses, the purpose of which is to introduce themes that are of particular importance to Chinese economic development and Sino-Africa cooperation; cultural and practical courses, the purpose of which is to demonstrate Chinese social development and traditional culture.

Table 2-1: Seminar syllabus		
	Category	**Themes**
1	Professional Courses	Higher education in China; China's practices in the development of higher education informatization; How to conduct on-line teaching; ICT application in economic and social development.
2	Case Studies	Case of Information Management in University; Case of Information Management in Government; Case of Information Management in a city.
3	Enterprise Visits	Leading ICT Enterprises in China; Smart education themed enterprise; Education Information products.
4	Higher Education Institutions Visits	Leading research centres and laboratories
5	General Courses	China's development; Sino-Africa cooperation.
6	Cultural and Practical Courses	Chinese traditional culture; Chinese economic and social development.

Part 4 Curriculum Modules

The seminar courses consist of five modules, namely professional courses, case studies, general courses, practical courses, cultural visits, the details are as follows:

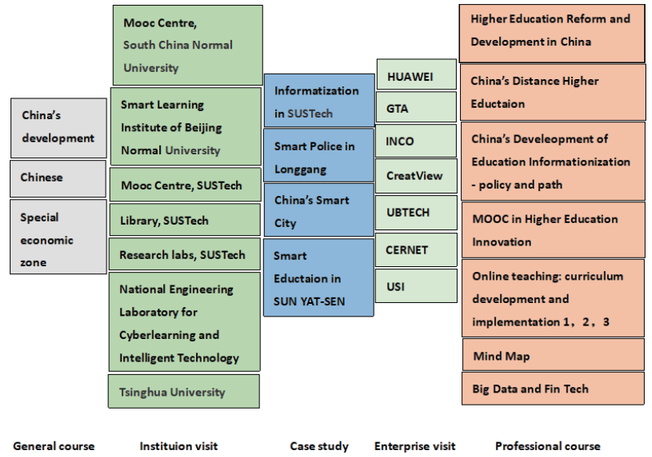


Figure 2-6: Seminar courses module

1. Professional Courses

Professional courses aim to:

(1) Help participants understand higher education in China;

(2) Share with participants about China's experiences in the development of ICT in higher education;

(3) Focus on some specific topics of ICT in education, like MOOC and online learning;

(4) Teach participants to master a teaching software.

Table 2-2: Module of professional courses	
Professional Courses	
Type	**Name of courses**
Introduction	Higher Education Reform and Development in China; China's Distance Higher Education; MOOC in Higher Education Innovation; Online Teaching 1: Online Education
Application	Online Teaching 2: Development of online courses; Online Teaching 3: How to use Moodle Mind Map Big Data and Fin Tech

2. Case Studies

This module selects some typical cases on ICT in management to showcase how to use ICT to strengthen management. It involves cases from different levels, like university level, government level and city level. Through studying specific cases, students will gain a better understanding of ICT in management.

The case studies aim to:

(1) Help participants learn about ICT in university management;

(2) Demonstrate how government bodies could utilize ICT to improve governance and better serve citizens;

(3) Demonstrate new practices in the construction of smart city.

Table 2-3: Module of case studies

Case Studies	
Theme	**Name of Courses**
Management Informatization in University; Management Informatization in Government Institutions; Management Informatization in Cities;	Intelligent University in SUSTech; Smart policing in Longgang; Smart Cities in China; Smart Education in Sun Yat-Sen University

3. Field Visits

The seminar selects representative enterprises in the field of ICT and ICT in education. Each enterprise visit has a specific theme based on the enterprise's specialties. The visits generally include general introductions of enterprises, ICT solutions and products of enterprises, their international cooperation, and interaction between the enterprises' leaders, experts and participants.

Enterprise visits aim to:

(1) Show some leading enterprises in the field of ICT, and especially ICT in education to participants;

(2) Show how enterprises could participate in and promote higher education innovation;

(3) Create platforms of exchange and communication between participants and enterprises.

Table 2-4 Module of enterprises visits

Enterprises Visit	
Theme	**Name of Courses**
Traffic Brain of Shenzhen	HUAWEI
VRinClass Smart Education Solutions	Shenzhen GTA Education Tech Ltd.
"Immersive" Smart Classroom Integrated Solution	Beijing INCON Electronic Co. Ltd.
Smart Teaching System	Guangzhou Createview Education Technology Co., limited
Multimedia Interactive Cloud Classroom System	USI Technology (Shenzhen) Company Limited
Educational research network	CERNET
Smart education robot	UBTECH

Institution visits aim to help participants:

(1) Gain knowledge of online education platforms and hardware;

(2) Know advanced research labs in universities.

Table 2-5 Module of institutions visit

Institutions Visit	
Theme	**Name of Courses**
MOOC Production	MOOC Center in SUSTech
MOOC Filming, Virtual Studio	MOOC Classroom, South China Normal University
Management Informatization of Library	SUSTech Library
Advanced Research and Equipment	Research Labs in SUSTech
Smart Learning Environment, Platform and Solutions	Smart Learning Institute of Beijing Normal University
Internet+ Education	National Engineering Laboratory for Cyberlearning and Intelligent Technology

4. General Courses

The general courses will showcase China’s modern development, foreign policy and position, and China-Africa cooperation. It aims to:

(1) Showcase China’s development achievements;

(2) Deliver China’s policies and positions on cooperation with Africa.

Table: 2-6 Module of general courses

General Courses	
Theme	**Name of Courses**
China’s social development and culture; China’s economic development; China-Africa cooperation	China’s development; Basic Chinese; Security Lecture; Special Economic Zone

5. Cultural and Practical Courses

Cultural and practical courses aim to take participants to China’s traditional and modern scenic spots to enjoy Chinese splendid culture.

Table: 2-7 Module of cultural and practical courses

Cultural and Practical Courses	
Theme	**Name of Courses**
Traditional Chinese Culture; Chinese Natural Landscape;	Chinese Folk Culture Village; Chinese painting and calligraphy; Pearl River visit; Forbidden City; Great Wall; Silk Market;

Chapter 3
Seminar Organization and Implementation

Part 1 Organization and Management

The Seminar was sponsored by Ministry of Commerce of China and jointly organized by Shenzhen Association for Promoting International Economic & Technological Cooperation, Higher Education Research Centre (CHER) of Southern University of Science and Technology (SUSTech), with full support from International Centre for Higher Education Innovation under the auspices of UNESCO (UNESCO-ICHEI).

Shenzhen Association for Promoting International Economic & Technological Cooperation was established in October 2003. It is a social organization led by Economic, Trade, and Information Commission of Shenzhen Municipality. It aims to help Shenzhen enterprises to explore foreign markets and promote Shenzhen's foreign economic and technological cooperation. Members include Huawei, ZTE, Shenzhen Shuguang and many other IT and communication enterprises. In 2004, it began to undertake the foreign aid trainings entrusted by the Ministry of Commerce, mainly in the fields of computer software and hardware, e-government, information management, and communication.

Southern University of Science and Technology (SUSTech) is a public innovative university funded by Shenzhen Municipal Government. Southern University of Science and Technology has 14 departments, 17 undergraduate programs and more than 20 research centers. There are more than 300 faculty members, more than 90% of whom have overseas working experience. The Higher Education Research Center of SUSTech, in cooperation with the UNESCO-ICHEI, actively participates in the national 'Belt and Road' initiative while serving the higher education research of the university, and expands cooperation among higher education institutions along the Maritime Silk Road.

Relying on the advantages of Shenzhen's information and communication technology (ICT) sector and drawing upon China's experience with the massification of its higher education, UNESCO-ICHEI aims to meet the local demand for quality higher education resources and to support Asian and African countries to improve the quality of higher education and promote educational equity. With the above aims, UNESCO-ICHEI has been carrying out higher education cooperative projects with countries along the Maritime Silk Road. Through various forms of knowledge sharing and capacity building, UNESCO-ICHEI exports Shenzhen's ICT products and services to the project countries to provide with them intellectual support and human resources for local industrialization and informatization. Meanwhile, ICHEI also conducts research on education in the countries along the Maritime Silk Road, aiming to become an influential educational think-tank and an international higher education platform for information sharing and communication on innovative thoughts and practices. UNESCO-ICHEI works closely with enterprises, and formed a close industry-university partnership to improve higher education innovation in developing countries.

Higher Education Research Center of SUSTech worked closely with UNESCO-ICHEI and organized several successful seminars on ICT for African and Asian countries, which are 'Seminar on ICT in Higher Education Innovation for African Countries 2017', Seminar on ICT in Higher Eductaion Innovation for Asian Countries 2017', '2018 Seminar on ICT Application in Higher Education for African Countries', '2018 Seminar on ICT Application in Higher Education for Asian and European Countries',etc. These seminars greatly improved ICT capacity of higher education represnetatives from African and Asian countries, which were highly recognized and appreciated by ministries and universities in these countries. It also raised awarness of the potential of ICT to enable higher education innovation among higher education representatives from these countries and effectively established a platform and communication mechanism among higher education practitioners among African countries and Chinese universities and enterprises, which laid a good foundation for higher education cooperation in the future.

Part 2 Courses Implementation

1. Professional Course Teaching

1.1 Analysis of Policy of ICT in Eductaion in China

Development of national higher education informatization in Chad requires government's top-level design. The seminar invited experts to interpret from the perspective of strategy and policy about the achievements, experience and practices that China had during the past 40 years in the field of higher education informatization. Participants were then encouraged to formulate the higher education informatization policy framework for Chad at the national/university/institutional level under the guidance of the lecturer.

Mr. WU Di, Professor of Central China Normal University, analyzed the development and evolution of China's policy on education informatization from five aspects: higher education in China, policy evolution, current situation, latest policies, and development trends.

Different ICT development level could have different impacts on higher education, which requires different countries to develop policies that are suitable to their own development. Chad participants learned the different policies that have guided China's education informatization development in different stages, and this would work as a good reference for them to develop their own education informatization policies. The development process of education informatization in China is shown in Image 3-1.

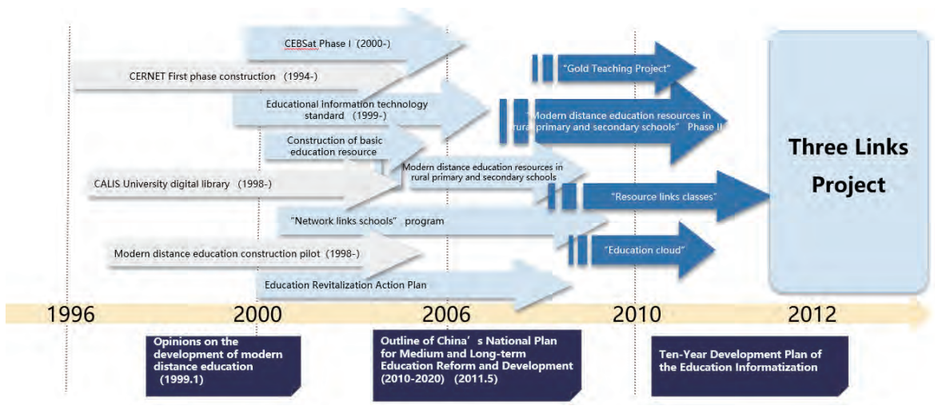


Image 3-1: Development History of China's Education Informatization

The National Center for Education Technology was established in the stage of electric education, which is mainly responsible for the development of multimedia teaching materials; the development of educational resources; the personnel training of national modern distance education project for primary and secondary schools; resources integration and transmission; scientific research support and application guidance, technical support and service work; to organize and carry out research and experiments on the theory and application of education technology; to develop, transform and popularize relevant research results, and to carry out training on educational technologies.

The computer-assisted teaching phase is mainly about providing students with a good personalized learning environment by the comprehensive application of multimedia, hypertext, artificial intelligence, network communication and knowledge base technology.

In the distance education stage, China established China Education and Research Network (CERNET) and the China Education Satellite Broadband Transmission Network CEBsat. In the era of education informatization 1.0, China put forward the policy of “three links and two platforms”, that is, “broadband network for all schools, high-quality resources for all classes, and network learning space for everyone”. The era of education informatization 2.0 is to realize the integration of information technology and education to develop the suitable education informatization for China.

The latest policies formulated by China for the development of educational informatization included: Education Informatization 2.0 Action Plan; Guidance on the public service system of digital education resources; Network Learning Space Construction and Application Guidance; Primary and Secondary School Digital Campus Construction Standards (Trial). MOOC is an important way to achieve high-quality resource sharing and an important trend in the future for development of China’s education informatization.

Image 3-2: Participants in the class

1.2 Reform and Evolution of Higher Education in China

China’s higher education has achieved tremendous growth in the past 40 years. The seminar introduces the development of China’s higher education and aims to help participants understand the reform and development of China’s higher education. It hopes to provide experience and reference for Chad's development of higher education reform.

Mr. SUN Haitao, senior researcher from the Policy Research Office of Tsinghua University introduced the general situation of China’s higher education. He believes that Chinese universities are young and full of energy, and the university scale is the largest in the world. The total number of students enrolled in higher education in China has reached 37.79 million, accounting for one-fifth of the world’s total number of higher education students, ranking first in the world (2017). Chinese universities are the new force of basic research, which not only produces high-level basic research results, but also an important base for the cultivation of research talents.

Participants learned that continuous reform and opening up are the driving force for the continuous development of China’s higher education. By studying the development of China’s higher education, participants believe that the focus of China’s higher education reform, which provides a reference for Chad to carry out higher education reform and higher education informatization development in the future.

In addition, Dr. SUN introduced another important measure for the development of higher education in China, namely the construction of key universities. China currently has “211” and “985” projects as well as international first-class university construction projects. The principle of dual-class construction is to adhere to the goal of first-class, discipline-based, performance-oriented and reform-driven universities. This is also a reference for Chad to develop higher education in their own country, that is, to focus on the construction of key higher education institutions.

1.3 Status and Trends of Distance Higher Education in China

Distance higher education is an important aspect of higher education informatization. China’s distance higher education has experienced correspondence education, multimedia education and Internet education. Professor ZHANG Weiyuan from Beijing Normal University was invited to give a lecture on the development of China’s distance higher education.

Professor ZHANG Weiyuan introduced the background, current status and future trends of China’s distance higher education, which helped participants to fully understand the development of China’s distance higher education.

The participants carefully studied the operation module and professional settings at different stages of China’s distance higher education; the university system, student size, professional settings of The Open University of China; as well as university-enterprise cooperation module of XuetangX.

In addition, participants learned that there are currently 32 MOOC platforms in the world, and China has 6 MOOC platforms. XuetangX is the first Chinese MOOC platform in the world which was developed by Tsinghua University. It enables anyone with access to the Internet in the world to learn courses through this platform.

Image 3-4: Participant communicate with the teacher

1.4 Online Teaching: Curriculum Development and Implementation

Online education can provide a variety of learning resources and learning channels, break through time and space restrictions, achieve long-distance communication and exchange, and help to achieve mobile learning and personalized learning. Therefore, online education is an important way to promote equity in education. The seminar invited experts in online education to present the theory and practice of online teaching to participants, and teach them to experience the process of online education implementation, which allowed them to fully understand online education and effectively apply it to higher education institutions in Chad.

The lecture of 'online education' was conducted from three aspects: "on online education overview", "online classroom design-MOOC 2.0" and "Moodle" by Professor CAO Xiaoming from Shenzhen University.

The online education overview introduces the concept and evolution of online education. Online education, which is also called "e-Learning", "distance education" or "online learning", refers to a network-based learning behavior, it is also a method of content dissemination and rapid learning through the application of ICT. Professor CAO believes that innovation is the theme of future education, and university will become a global exchange network with classrooms as basic units. Online education is still not popular in Chad. This lecture helped participants to understand the basic concepts of online education which would provide them with a theoretical basis for the development of online education in Chad in the future.

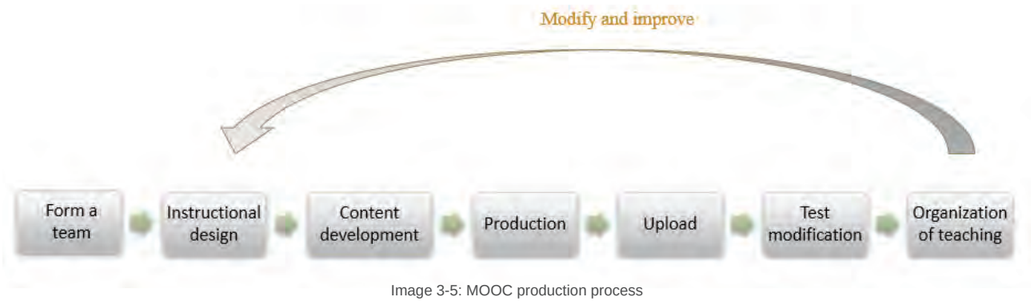


Image 3-5: MOOC production process

Based on the understanding of theory, participants further studied the design and production of online education. "Design of Online Class - MOOC 2.0" taught them how to design and produce a MOOC course. MOOC production is a project of team, which includes: project leader (project manager, project supervisor, producer), teacher team (teachers responsible for preparation of course material, lecturer), video production team, technical team, teaching assistant team and volunteers.

Instructional design is the core of MOOC production. The course textbook design team will design the MOOC course under the guidance of teaching design theory.

MOOC content development involves development of course scripts, PowerPoint and learning materials. In a formal course production process, the shooting team needs to fully communicate with the instructor about form and content of the course, select the appropriate shooting model, and produce the course sample. After finishing the shooting process, the teaching package resources will be uploaded to the MOOC platform, and a series of test modifications are required before a course would be finally completed.

Image 3-6: Participants in the class

conduct online teaching courses. Participants learned about the Moodle platform, and how to build the Moodle platform, and then created a simple Moodle course under the guidance of the instructor.

2. Case Studies Teaching

2.1 ICT application in Southern University of Science and Technology

SUSTech attaches great importance to ICT application in higher education. In 2015, the first phase of the Campus Informatization Project was started. In 2017, the "Open Platform" began its construction. In 2018, the Campus Informatization Project entered the second phase of construction, making consistent optimization to the campus information management.

SUSTech shows a successful practice of higher education management informatization. Accordingly, UNESCO-ICHEI has invited Mr. SUN Qiaoyu, Deputy Director of Network Information Centre of SUSTech, to make a lecture on Informatization of SUSTech, including its basic situation, development and evolution and platforms.

Network Information Centre of SUSTech takes the responsibility for the building, operation and maintenance of campus informatization. Mr. SUN introduced the informatization development plans, annual plans, rules and regulations of the Centre; the construction, operation and management of weak electricity systems and information technology infrastructure, and information security technology support.

Image 3-7: Services of SUSTech information platform

Chad is in need of developing the ICT in higher education institutions By studying the case of SUSTech, Chadian participants learned about the works carried out by the Network Information Centre as a functional department of the university's informatization construction, which provided an important reference for Chad's higher education institutions to establish their own information centres.

The case introduced the information infrastructure of SUSTech, such as the physical network, information points, terminals, Internet export bandwidth, wireless fiber network coverage area, physical server, CPU, storage devices, security system; its basic systems, such as access control system, campus card system, broadcasting system, information release system, video surveillance system, patrol system, burglar-alarm-level emergency rescue system; its business system, such as OA system, financial system, human resources system, educational system, scientific research system, official website and department websites, admissions network, library System, etc.

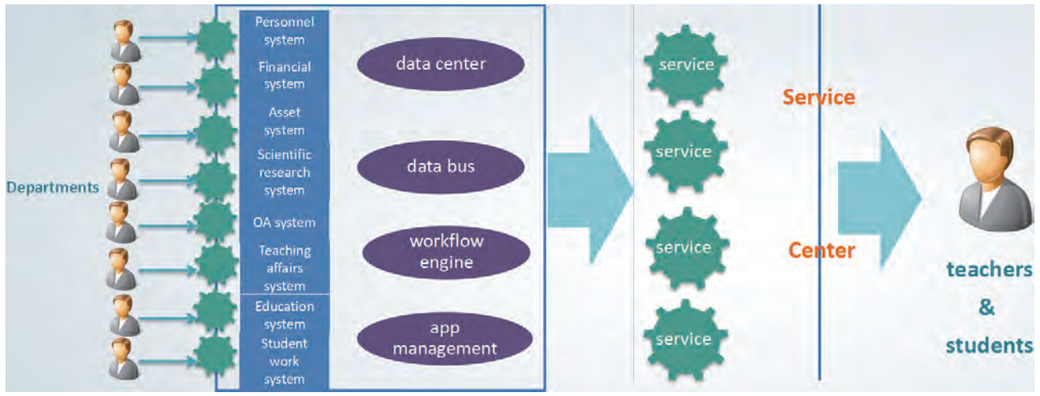


Image 3-8: SUSTech Information Services Plan

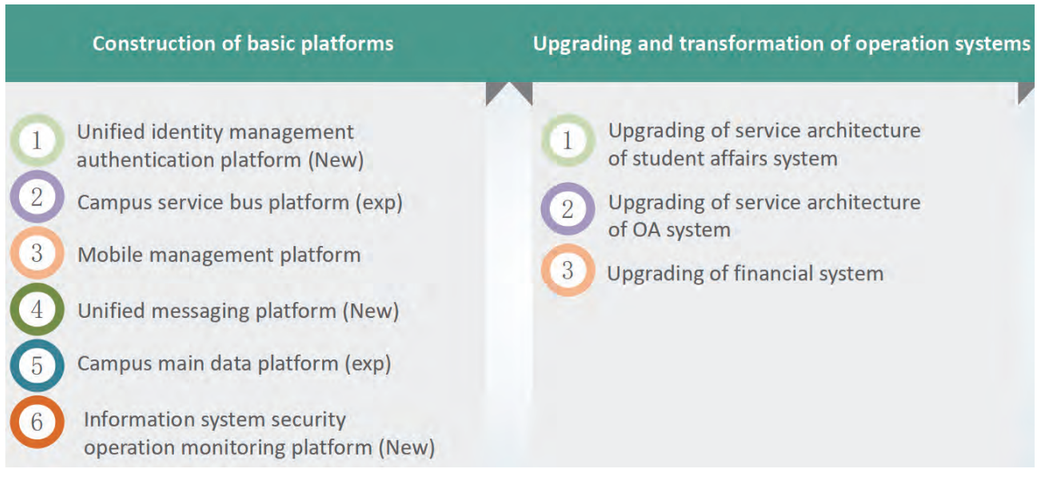


Image 3-9: 2018-2019 SUSTech Informatization Plan

At present, Chadian higher education institutions generally use the traditional methods—using Microsoft Office such as Word and Excel for campus management, which leads to low efficiency. Therefore, universities and colleges urgently need to learn advanced management methods to improve the current ones. Studying the information management system of SUSTech greatly satisfies the needs of the participants to learn about and utilize information technologies in campus management, and provides a significant reference for the reform of higher education management in Chad.

2.2 Construction of Smart City in China

The ICT enabled management is not only applied in the field of higher education, as it can also help to enhance the management of a city. Shenzhen is among the first batch of pilot cities in China's Smart City project. At present, it is committed to building itself into a national benchmark city for the Smart City project and reaching the world-class level. Therefore, ICHEI invited Professor CHEN Dongping, President of Big Data Research Institute of Smart City, Shenzhen to give a lecture on China's initiative in construction of smart cities, to teach participants the case of smart city.

New Practice of China's Smart City, he introduced China's initiatives to develop smart cities from the perspectives of necessity and history.

In order to help Chadian participants better understand smart cities, Prof. CHEN firstly gave introduction of the concept of smart city. He explored the relationship between cities and people, and the achievements of China's ICT development, such as China's mobile payment, the development of trading software, the development of digital economy, etc. He also highlighted the successful practice of Shenzhen in urban construction.

Prof. CHEN analyzed how to use big data to analyze urban population to promote and improve urban management. According to statistics and analysis, among the first-tier cities in China—Beijing, Shanghai and Shenzhen, Shenzhen has a relatively larger population of young labor force, the population of senior citizens and children is relatively small. In conclusion, the population structure of Shenzhen will benefit the future development of the city.

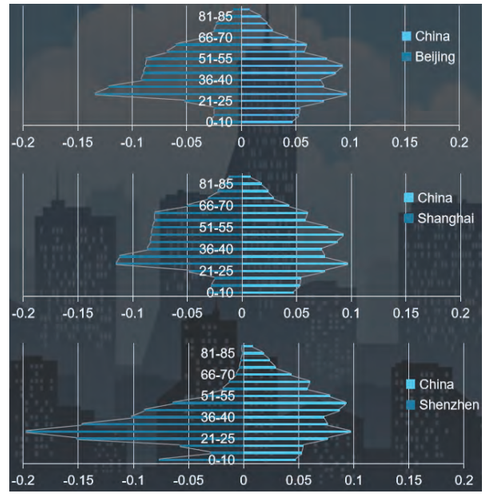


Image 3-10: Age structure predicts future development of a city

Prof. CHEN believed that now we have the ability to perceive people, things, and even the space and time of the universe, and by big data analysis, we can find out the direct or indirect connection between things, and discover the inherent laws of the development of things, thus dynamically adjust the city's planning, management and services, etc. By such an act, the public will have a better sense of participation.

Prof. CHEN then introduced several specific cases of ICT application in the construction of shenzhen, including detailed data analysis and statistics of urban population by Shenzhen Public Basic Information Resource Database.

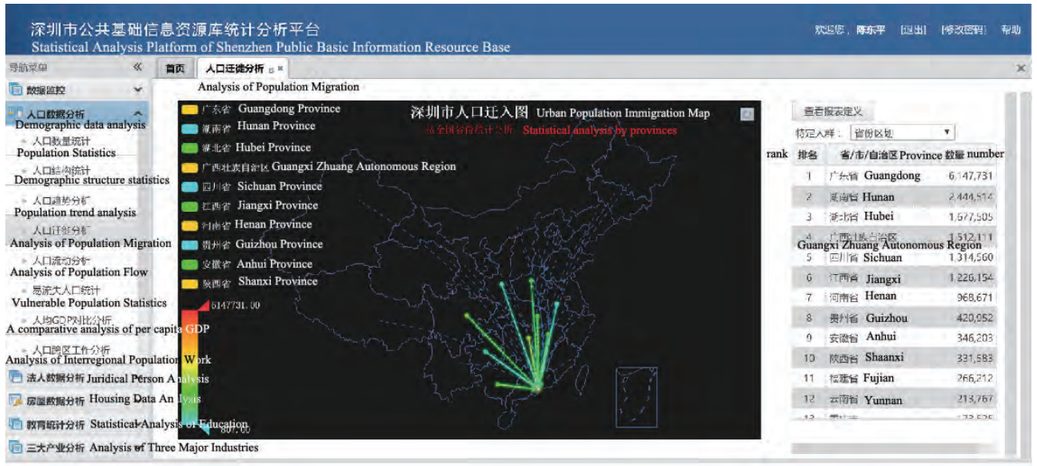


Image 3-11: Population migration map by Shenzhen Public Basic Information Resource Database

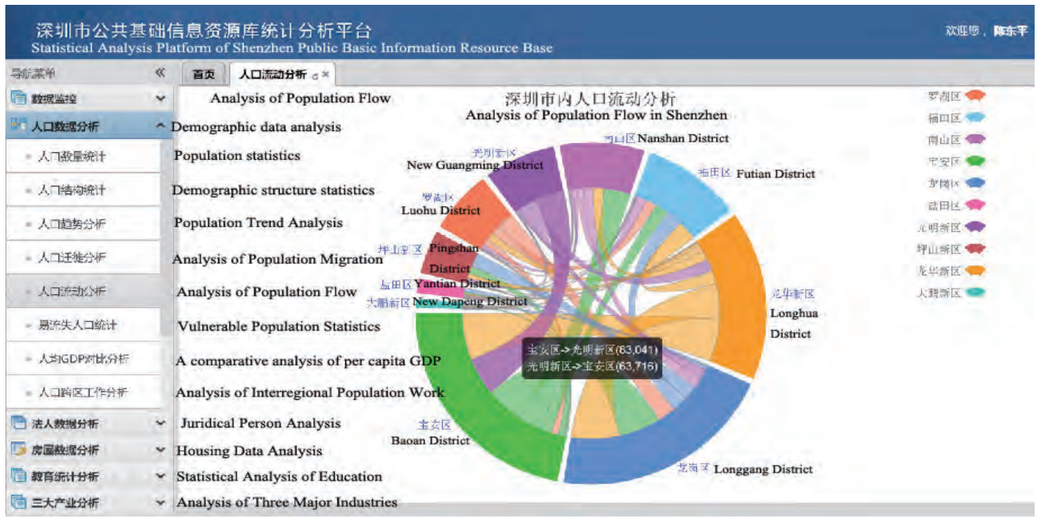


Image 3-12: Population flow analysis by Shenzhen Public Basic Information Resource Database

Prof. CHEN then analyzed the characteristics of smart city construction in the world. He pointed out that the construction of smart city in developped countries has begun earlier and reached a pretty mature level. And the smart city construction in developed countries is more of a natural process, aiming at realizing the wisdom of one or several vertical application areas, and rarely focuses on the overall design of the city. However, China's smart city project is a national initiative and the best way for its future urban development. It is also based on the whole city or even the urban agglomeration, and the top-level design and implementation.

From the perspective of urban management, how to use information technology to achieve efficient management has enriched ICT in management. Chadian participants highly appreciated the smart management of Shenzhen and expressed their hope to submit the ICT construction plan to their municipal governments to imporve the modernization and management of cities. Shenzhen and expressed their hope to submit the information construction plan to their municipal governments to enhance Chad's urban management level and modern development.

2.3 Shenzhen Longgang Public Security Bureau—Smart Policing Project

Image 3-13: The police officer is introducing smart policing project

Shenzhen Longgang Public Security Bureau showed the participants how to use ICT to convert the collected data into smart policing. In 2017, Public Security Large-capacity Cloud Storage Data Centre started to use a full-automatic operation and maintenance platform for system independent testing of professional equipment such as data maintenance, video surveillance and data analysis. At present, the online rate of high-definition video in the whole district has remained above 98.5%. In order to guarantee the security of citizens, Longgang Public Security Bureau has built a video network in the public areas of the city, setting up a total of 7035 first-category HD video monitory points, 1924 second-and-third-category video monitory points, 6927 cameras, 221 license plate recognition points, 655 license plate recognition cameras, 3297 facial recognition monitory points by September 2017. The Centre also set up big screens for campus security and one-button alarm devices for 302 primary and secondary schools and kindergartens.

Cooperating with HUAWEI, Longgang Public Security Bureau is the first one to establish the Public Security Large-capacity Cloud Storage Data Centre, which covers an area of 637.8 m2. Relying on HUAWEI cloud platform and multiple high-performance servers, the Centre applies a series of innovative police information systems such as intelligent police cloud platform, and multi-dimensional analysis. At present, the cloud platform is loaded with more

than 100 virtual machines. Hundreds of millions of data will be transmitted to HUAWEI's big data analysis platform every day. More than 4 terabytes of images are stored in distributed storage platforms, which can conduct the real-time retrieval and analysis for PB-level license plates, people's faces, WIFI etc. This undoubtedly improves the policing efficiency. Longgang police have made breakthroughs in basic information collection, social management and serving for people's daily security, which has won appreciation by the public.

3. General Courses Teaching

In order to help Chad participants better understand the development of Shenzhen and to explore together more cases and modes of China-Africa cooperation, UNESCO-ICHEI invited Professor LIU Rongxin from China Development Institute to deliver a lecture titled "China-Africa Cooperation and the Development of Shenzhen Special Economic Zone in the New Era".

Professor LIU Rongxin firstly introduced the construction of special economic zone from three aspects: China-Africa cooperation in the new era; the development of Shenzhen Special Economic Zone; and the construction of industrial park in Africa. She used plenty of data to analyze the challenges and opportunities of economic and social development in Africa, such as the economic structure in many African countries is relatively simple, in which the mining industry plays a dominant role, and the foundation of manufacturing is relatively weak. Although Africa is rich in natural resources, it faces the vicious circle of "resource curse". Many countries' economy relies heavily on exporting resources such as oil and gas, ore and timber, which are greatly affected by fluctuations in the international market. While at the same time, Africa boasts great prospects of development, and China and Africa are proved to have the huge space for cooperation.

Professor LIU then illustrated 'Shenzhen's experience in establishing Special Economic Zone. Based on research and many years' experience in project development, Professor LIU pointed out that the construction of industrial park in Africa is necessary and important. She also analyzed in detail the development basis and requirements for the construction of industrial parks in Africa. Industrial parks play an important role in accelerating the industrialization, economic diversification and urbanization of underdeveloped economies in Africa. As a cluster of manufacturing, trade logistics, and production, industrial parks will help African countries introduce funds, talents, technology through preferential policies in specific regions.

4. Field Visits

The field visits of the seminar consist of various visits and activities in enterprises and institutions, in which Chadian participants learned about the most advanced information technologies and achievements in the cities of Shenzhen, Beijing and Guangzhou.

4.1 USI Technology (Shenzhen) Company Limited—Multimedia Interactive Cloud Classroom System

USI focuses on the Internet application and information service operations in education, as well as the research of smart terminal products, touch technology products, audio and video recording products, teaching software, cloud platforms, micro-campus and other products. The company is a professional smart education solution provider as well as the leading enterprise in ICT in education in China.

Image 3-16: Ban Ban Tong—Multimedia Interactive Cloud Classroom System

Mr. XU Hongjie, Pre-sale Engineer of Operation Department of USI, introduced the products of USI, including intelligent integrated teaching control unit, intelligent high-definition recording and broadcasting system, portable high-definition recording and broadcasting machine, intelligent electronic student card, teaching assistant software, micro-campus,etc.

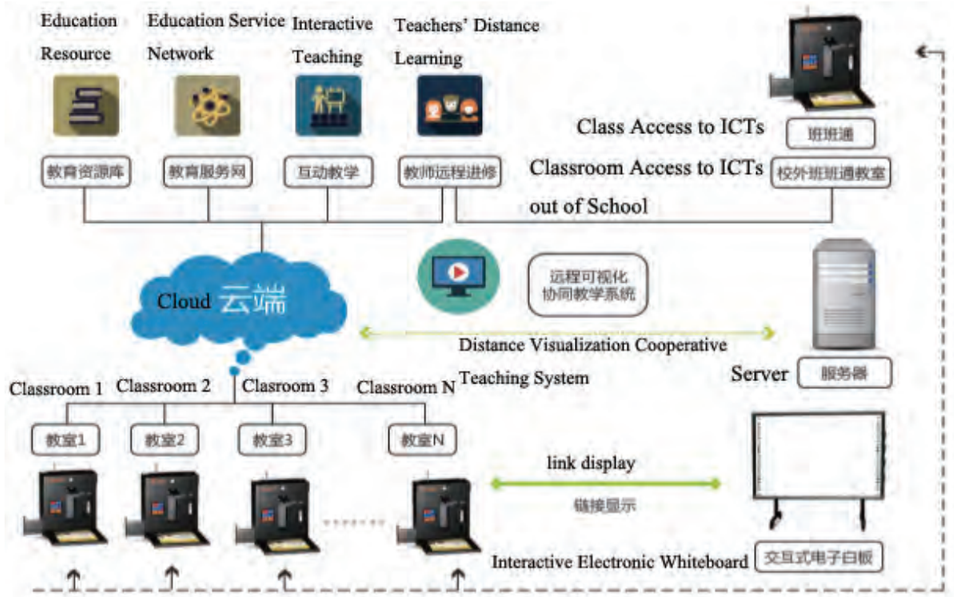


Image 3-17: Long-distance Visual Collaborative Teaching System

USI Multimedia Interactive Cloud Classroom System consists of intelligent integrated teaching control unit, central LCD pushing board, students' PAD, interactive electronic whiteboard software, intelligent HD recording and broadcasting system, audio system and so on. As the terminal of the cloud, the system is interconnected with the education cloud platform, and can receive real-time teaching resources and question bank from the cloud. It can also upload students' assignments, and other information to the cloud in real time. Teachers can use the system to conduct cross-classroom and cross-schools teaching and other new teaching models, and realize the resource sharing of "Three Links and Two Platforms".

4. 2 HUAWEI Technologies Co. Ltd—Traffic Brain of Shenzhen

Image 3-18: Chadian participants gathered at the headquarter of HUAWEI

As one of the global strategic partners of UNESCO-ICHEI, HUAWEI is a leading global provider of ICT infrastructure and smart devices. HUAWEI has integrated solutions across four key domains—telecom networks, IT, smart devices, and cloud services and is committed to bringing digital to every person, home and organization for a fully connected, intelligent world.

Mr. PENG Haitao, Manager of HUAWEI Industry Solution, gave an overview of HUAWEI to Chad participants. He introduced the core technologies with the respect of wireless network, carrier and enterprise network, software, cloud core network, network energy, etc. HUAWEI is committed to translating leading technologies into better and more competitive products and solutions that help our customers succeed. Mr. PENG highlighted HUAWEI's identity of being a "Innovator", who is committed to bringing intelligent innovations to cloud DCs. HUAWEI innovates in the AI, cloud computing, and big data domains together with our customers and partners. HUAWEI also use innovative chip technologies and architectures to promote enterprise digitization and intelligent transformation.

Image 3-18: Chadian participants gathered at the headquarter of HUAWEI

In the exhibition halls, participants learned that HUAWEI released the EI Enterprise Intelligence Platform and launched distributed services based on big data, database and artificial intelligence technology to help enterprises improve production efficiency through data innovation. In public safety, HUAWEI created a "traffic brain" for the city of Shenzhen. The traffic brain intelligently manages traffic lights, improving traffic flow and increasing automated detection efficiency of traffic violations. This reminded the Chadian participants of their visits to the Shenzhen Longgang Public Security Bureau on July 18th, where HUAWEI's technology is applied. They were deeply impressed by the case of cracking the criminal cases through face recognition.

4.3 Guangzhou Createview Education Technology Co., Limited—Smart Teaching System

Guangzhou Createview Education Technology Co., Limited (abbreviation as the Createview) was founded in 2010, it is one of the first-class smart education construction and service provider in China. It now has embraced a complete industry chain including intelligent manufacturing line, education resource creation office, teaching platforms based on Internet and data clouds link to different education processes.

Image 3-20: Chadian participants are in Smart Teaching Classroom

Chadian participants learned about Createview's Smart Teaching System. Smart Teaching System presents students' writing content in the teachers' computer screen at the same time through the digital technology of paper and pens, which helps teachers know about students' learning patterns, as well as improves teaching effectiveness and teaching atmosphere in accordance with their aptitude. The features of Smart Teaching System are:

(1) Traditional writing style: Createview still retain traditional writing experience that students can write on the paper. It can make a promise to students' eyes protection without screen and help them develop a good habit to writing;

(2) Retain handwriting: It will record students every letter done one stroke at a time, like a video to reappear the writing progress;

(3) Class interaction: Without preparation before the class, teachers can make a close interaction with students with exercise from text book and PPT;

(4) Class recording: After the class, teacher will get a report on the class at once that is able to help teachers teach students based on their ability;

4.4 Beijing INCO Company Limited—"Immersive" Smart Classroom Integrated Solution

Image 3-21: Introduction of INCO

Founded in 2008, Beijing INCO Electronics Co., Ltd. (abbreviation as INCO) is a high-tech enterprise engaged in the rapid development of information technology in the education industry. With the tenet of application software product development, system integration and information technology services, the company adheres to the concept of integrity, innovation, cooperation and sharing, delving into the teaching business, combining teaching reform ideas and management experience to provide excellent educational products overall ICT in education solution for educational institutions at home and abroad.

Image 3-22: Mrs. ZHANG introduces Smart Teaching Environment

Mrs. ZHANG Lijuan, General Manager of INCO, took "Smart Teaching Environment" as an example, to introduce the application of information technology of INCO. She then focused on INCO's "Immersive" Smart Classroom Integrated Solution, which covers the following area:

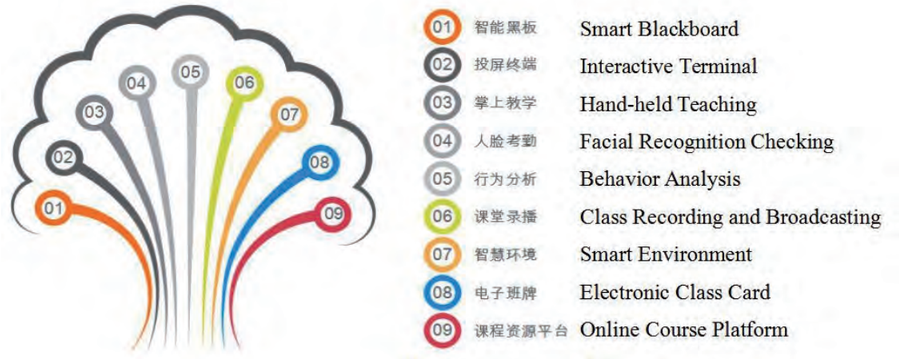


Image 3-23: "Immersive" Smart Classroom Integrated Solution System

Image 3-24: INCO's Smart Blackboard

The product of smart blackboard supports one-click class, electronic whiteboard, screening control, hand-held teaching, facial recognition checking, smart environment control and other functions. Secondly, it is possible to comprehensively collect and analyze students' learning curriculum, activities, assignment quality, and course production level, and create a variety of evaluation weight models to match different course requirements and course directions. The participants also learned more about the other products.

4.5 Shenzhen GTA Education Tech Ltd—VRinClass Smart Education Solutions

Shenzhen GTA Education Tech Ltd. (abbreviation as GTA) was founded in 2000, it is an integrated solutions provider of smart education with a focus on promoting innovative educational reform adaptive to human development. It offers integrated solutions to educational institutions, which range from those focused on early childhood education to college and university as well as vocational education.

Image 3-25: Group Photo in GTAFE

Mrs. HUANG Huiqing, Associate Vice President of GTA, introduced the core solutions provided by GTA and GTA's services covers the following domains:

(1) Educational Services:

a. College and University Education;

b. Vocational Education;

c. Primary and Secondary Education;

d. Early Childhood Education.

(2) Fintech Services: The Big Fintech Solution offers three application modules and related value-added services with a focus on financial data services, aiming to develop financial research and trading technology to meet the international standard in order to increase the international competitiveness of financial institutions.

(3) Data Services: With more than a decade of experience in database construction, empirical research, and big data services, GTA insists on meeting international standards, placing an emphasis on depth of research, and cooperating with research institutions in the industry to design big data solutions.

Participants learned about the "VRinClass" Smart Education Solutions. As a leading enterprise in the development of education innovation and vocational education, GTA takes the lead in integrating VR technology with vocational education, relying on desktop, helmet and somatosensory VR hardware devices. A series of VR teaching software and curriculum resources have been launched, and comprehensive solutions such as VR Smart Classroom, VR Smart Training Room, and VR Public Application and Development Centre have been built to promote the transformation of teaching modes. The participants experienced the VR technology in teaching. They put on VR glasses and held a stylus, which can truly restore the realistic operation process of animal anatomy and mechanical parts assembly.

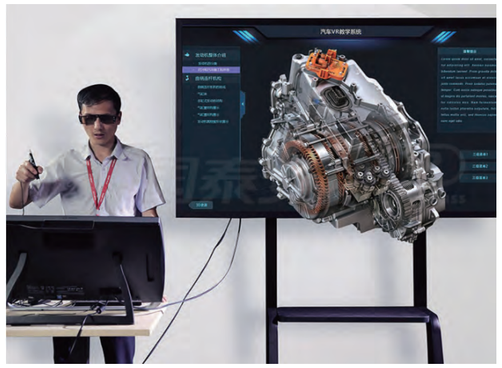


Image 3-26: VR Teaching products

Image 3-26: VR Teaching products

4.6 South China Normal University—MOOC Classroom

The MOOC Classroom of South China Normal University has an experimental room with the area of 2120 m2, and the total value of the equipment is about 19.61 million RMB. At present, Panasonic has established the "High-definition Imaging Laboratory in South China", and Korean-funded enterprises have invested more than 6 million devices in the center to carry out industry-university-research cooperation. In 2008, the University invested 400,000 RMB to build a media resource management system. And in 2009, it invested 1 million RMB to improve the digital resources on the central portal network, upgrade the experimental reservation system, and realize the information management of experimental teaching, experimental equipment and laboratory security.

Participants visited the MOOC classroom. They learned the recording of MOOC courses in the virtual studio. They believed that the popularity of MOOC is an important indicator of measuring ICT progress of higher education for a country.

Image 3-28: Participants listened to Mr. CHEN's introduction to MOOC

Image 3-29: Virtual Studio of South China Normal University

4.7 Network Security Monitoring Center of CERNET—National Academic Computer Internet

The China Education and Research Network (abbreviation as CERNET) is the first nationwide education and research computer network in China. The CERNET project is funded by the Chinese government and directly managed by the Chinese Ministry of Education. It is constructed and operated by Tsinghua University and the other leading Chinese universities. CERNET has a four-layer hierarchy: the nationwide backbone, regional networks, provincial networks and campus networks. CERNET National Center is located in Tsinghua University, which is responsible for operation and management of CERNET backbone nationwide.

Mr. CHEN Zhiwen, Editor-in-Chief of China Online Education Group, introduced CERNET by the following data. By the end of 2000, bandwidth of CERNET backbone has been up to 2.5 Gbit/s. CERNET has 12 global and regional channels connected with the United States, Canada, the UK, Germany, Japan and Hong Kong, the international gateway bandwidth over 250 Mbit/s. The transmission rate of the regional networks has reached 155 Mbit/s. More than 2,000 education and research institutions, 1.2 million PCs and 20 million end users have connected to CERNET.

Image 3-30: Mr. CHEN introduces CERNET

CERNET 2 is the biggest core network and national academic network of China Next Generation Internet (abbreviated as CNGI). This project is a five-year plan initiated by the Chinese government with the purpose of gaining a significant position in the future development of the Internet through the early adoption of IPv6. According to a brochure entitled "CNGI-CERNET2/61X", the CNGI effort's key tasks were as follows:

(1) Construction of China's next generation Internet backbones;

(2) Development of key network technology and major applications for the next generation Internet;

(3) Promotion of industrialization and application development of next generation Internet equipment and software;

(4) Participation in international organizations, and playing an important role in standards setting.

IPv6 was selected as key technology. The United States has almost one third of the theoretical maximum IPv4 addresses (about 4.3 billion), while China has more high-speed Internet users than IP addresses and the largest Internet user base of any country. With the implementation of IPv6, China planned to avoid imminent problems of IPv4 address exhaustion.

4.8 The Smart Learning Institute of Beijing Normal University + National Engineering Laboratory for Cyberlearning and Intelligent Technology

Image 3-31: Group photo in SLIBNU

The Smart Learning Institute of Beijing Normal University (SLIBNU) is a comprehensive experimental platform involving scientific research, technology development and instructional teaching. SLIBNU is established by Beijing Normal University and jointly constructed with Elernity. SLIBNU focuses on doing research on learning patterns under ICT background to create smart learning environment and platforms for lifelong learning, which will support diversified, personalized and differential learning needs for digital learners.

National Engineering Laboratory for Cyberlearning and Intelligent Technology was organized by Beijing Normal University and jointly constructed by Tsinghua University, China Mobile Communications Corporation (CMCC), Elernity and iFLYTEK Co.Ltd.

The participants gained a detailed knowledge of the research of the two institutions from the aspects of virtual reality application, education cloud computing, educational Internet of things, knowledge technology, information teaching, and education big data. The organizers also arranged for the participants to visit the 3D printer laboratory, VR laboratory, etc.

Image 3-32: Participants plays the VR products

5. Cultural Visits

China boasts a long history of over 5,000 years and splendid culture. In addition to professional courses, courses of cases, general courses, visits of companies (practical courses), ICHEI has also arranged a variety of cultural experience activities for the participants.

5.1 Shenzhen

Image 3-33: Participants in the Cultural Village

Chinese Folk Culture Village is the first large-scale cultural tourist area in China that gathers folk art, folk customs and residential buildings in one garden. It covers an area of 200,000 m2. In the Chinese Folk Culture Village, there are Yunnan Shilin, Hainan Coconut Grove, Nanbin Ancient Banyan Tree, Qianshou Qianyan Guanyin, and Huizhou Archway. In the evening, the large-scale square art gala “Dragon and Phoenix Dancing in China” was staged in the theater. The wonderful performances made the participants feel like walking in the history of China.

5.2 Guangzhou

Guangzhou, also known as Canton, is the capital and most populous city of the province of Guangdong. Located in southern China on the Pearl River about 120 km north-northwest of Hong Kong and 145 km north of Macau, Guangzhou has a history of over 2,200 years and was a major terminus of the maritime Silk Road and continues to serve as a major port and transportation hub today, as well as one of China’s three largest cities. Within China, the culture of the Cantonese people is a subset of the larger “Southern” or “Lingnan” cultural areas.

The Guangzhou Opera House & Symphony Orchestra also perform classical Western music and Chinese compositions in their style. Participants visited the Guangzhou Opera House, and learned Chinese painting and calligraphy.

Image 3-34: Participants’ Works

Image 3-35: Sightseeing on Pearl River

5.3 Beijing

Beijing, formerly romanized as Peking, is the capital of the People’s Republic of China, the world’s third most populous city proper, and most populous capital city. The city, located in northern China, is governed as a municipality under the direct administration of central government with 16 urban, suburban, and rural districts.

Image 3-36 Group photo in the Olympic Park

The Forbidden City is a palace complex in central Beijing, and it is also the former Chinese imperial palace from the Ming dynasty to the end of the Qing dynasty (the years 1420 to 1912), it now houses the Palace Museum. The Forbidden City served as the home of emperors and their households as well as the ceremonial and political center of Chinese government for almost 500 years. It was declared a World Heritage Site in 1987, and is listed by UNESCO as the largest collection of preserved ancient wooden structures in the world.

Image 3-37: Participants in the Great Wall and the Forbidden City

Badaling is the site of the most visited section of the Great Wall of China, approximately 80 km northwest of urban Beijing city in Yanqing District, which is within the Beijing municipality. Badaling Great Wall was built in the Ming Dynasty (1505) to occupy a commanding and strategic position for protecting the Juyongguan Pass (Juyongguan section of the Great Wall) on its south, further protecting the city of Beijing.

Chapter 4
Case Analysis

In order to better evaluate the outcomes of participants' study and to deepen the understanding of ICT in higher education in Chad, the seminar organized a session of final presentation.

The participants are divided into different groups based on their professional backgrounds, namely group of Ministry of Higher Education, Research and Innovation, Group of University, Group of Higher Education College, and Group of Higher Education Institutions. Members of each group selected one representative to make the presentation, and each member also had the opportunity to present their own department or university, college and institution.

Table 4-1: Group division for final presentation

Group	Members
Ministry(4)	**Garsouk SIDJIM** Director of Studies, Statistics and Information System, Ministry of Higher Education, Research and Innovation（MESRI）; **Mahamat Ramadane Amine** Head of Human Resources Division, MESRI; **Mahamat Saleh Ahmat Oumar** Deputy Head of SIGASPE, MESRI; **Zakaria Brahim Bachir (presenter)** Deputy Head of Accounting and Finance Division, MESRI
University(8)	**Ahmat Mahamat Zene Djouma** General Director of Research and Cooperation, University of N'Djamena; **Al-Hadjhamid Zagalo** Secretary General, Ati University of Science and Technology; **Djibrine Adef Arakhaîsse** Secretary General, University of Doba; **Haroun Heloua (presenter)** Secretary General of Adam Barka University of ABECHE; **Ibrahim Bourma Ahmat** Director of Human Resources, King Faisal University of Chad; **Korey Youssouf Issa** Head of Department of Administrative Affairs and Academic Affairs, Mongo Polytechnic University; **Mahamat Youssouf Mahamat Nile** Director of Academic Affairs and Scolarity, University of Sarh; **Aissa Gadji Sintal** Researcher and teacher, Moundou University
College(5)	**Abdal Karim Sanoussi** Accounting Assistant, Normal College of Abeche; **Abdelhalim Mahamat Bahar** Head of ICT Service, Normal College of N'Djamena; **Madjyadji Blaise (presenter)** Head of ICT Service, Nomal Technical College of Sarh; **Lizina Kongue** Teacher Researcher at Department of Chemistry Physics, Head of Department of Education, Bongor Normal College; **Mahamout Mahamat Baraka** Teacher-researcher, head of the central service of schooling and examinations, National Higher Institute of Science and Technology of Abéché
Institutions(3)	**Cherif Ouchar** Chief of IT, National Examination and Higher Education Competitions Office; **Djetounako Clarisse (presenter)** Deputy Director General, National Research Center for Development of N'djamena; **Hapsita Djibrine Assali** Head of Collection Service, National Center for University Works

Part 1 Case: Plan of ICT in higher education in Chad

1. Background

1.1 Government attaches importance to construction of ICT infrastructure in Chad.

In recent years, the Chadian government attached great importance to improve ICT infrastructure in Chad and carried out some international cooperation project. A fibre-optic backbone network running along oil pipelines to Cameroon was completed in 2012 and there are two other projects to extend fibre-optic backbones. The CAB project was sponsored by World Bank and would link Chad to neighbouring countries. The African Development Bank is sponsoring the Trans-Sahara Optic Fibre Backbone Project, which would lay fibre-optic cable along the Trans-Sahara Highway connecting Chad to Algeria via Niger, as well as Chad to Nigeria. Meanwhile, Chad continues to rely on satellite for a substantial portion of its international Internet bandwidth.

1.2 The government formulated a policy to develop ICT.

The Ministry of Posts and New Information Technologies is responsible for the sector policy and overseeing the national agencies responsible for various aspects of ICTs. The Ministry's Action Plan for ICT Development has seven strategic axes: (a) development of infrastructure, with an emphasis on the national backbone; (b) ICT for poverty reduction; (c) reinforcing the legal and regulatory framework; (d) content development; (e) reinforcing human capacity; (f) e-Government; and (g) enhancing ICT access for vulnerable groups.

It shows that the Chadian government values a lot about ICT development and actively seeks opportunities of international cooperation and assistance to develop its ICT infrastructure and already took actions to support it from the policy level. However, the ICT construction in Chad has just started, and it faces many challenges like: inadequate ICT infrastructure, lack of ICT talents, relying a lot on International aid.

2. Content of the Plan

The Ministry of Higher Education, Research and Innovation is responsible for higher education in Chad. Its main mission is to train, research and innovation.

According to statistics from the Ministry of Higher Education, Research and Innovation, the Internet penetration rate in Chad is still below 1%, and the country is lagging behind in integrating ICT into teaching process. Therefore, government is actively seeking to take actions to improve the situation. The newly established virtual university, as well as the National Advanced Examinations and Competition Office and the University of N'Djamena are working closely to promote ICT application in higher education.

There are four representatives from the Ministry of Higher Education, Research and Innovation, and they had worked together to formulate a national plan of ICT in higher education. The formulation of the plan was based on lessons that they have learned from the Seminar while taking into full consideration of the development level and needs in Chad. They also expressed wishes that China could fully participate in the developmebt of ICT in higher education in Chad. The contents of the plan are as follows:

(1) To improve ICT infrastructure;

(2) To train students and teachers to apply new technologies in teaching and learning;

(3) To provide students and teachers with access to educational software;

(4) To improve Internet access of students and teachers for them to make full use of online educational resources, and conduct online and distance learning;

(5) Establish online management platform in higher education institutions to improve management efficiency;

(6) Construction of MOOC Center in Chad's higher education institutions.

3. Comments

3.1 Chad's ICT infrastructure is being improved.

The Plan made by representatives from Ministry of Higher Education, Research and Innovation emphasized the need to improve ICT infrastructure. The government of Chad recognizes that improving ICT infrastructure is the basis for development of ICT and is therefore working to improve it. At present, HUAWEI and several operators in Chad are working together to build 2G, 3G and 4G communication networks, which will greatly improve Chad's network speed and quality.

3.2 Chad should strengthen international cooperation to promote its ICT development.

Chad is still in the initial stage of ICT construction and faces many challenges, and it is important and necessary to cooperate with foreign countries and companies to facilitate this process. Recently, Chad signed a contract with China's International Cooperation Agency to for national ICT development. In addition, the Ministry of Communications of Chad is working with HUAWEI to build a national data center in Chad. The data center will serve as a carrier of complex application development and basis of data processing for government and enterprises. The establishment of the National Data Center will serve as an important platform for Chad's ICT development by benefiting from China's support and experiences, and will also promote training of Chad's ICT talents.

3.3 The Plan will serve as an important reference for the development of ICT in higher education in Chad.

Given the time limit, the plan made by representatives of the Ministry is still quite simple. However, it covers many specific aspects and was based on the good understanding of challenges faced by Chad. It will serve as an important reference for related departments department in Chad to make more concrete national development plans in the future.

Part 2 Case: Vision of ICT development in Universities

1. Background

The higher education graduates in Chad are mainly from public institutions. Public higher education institutions include: 10 universities, 6 colleges and 4 higher education schools.

In this seminar there are eight participants from eight universities in Chad. Mr. HAROUN HELOUA, Secretary General of Adam Baka Abéché University, made the presentation on behalf of the university group. Besides, eight representatives made a presentation of their respective university. Presentations made by university group shows that:

1.1 Universities in Chad are relatively small in scale.

Universities in Chad are generally led by university president, with assistance of vice president and secretary-general. Most universities have administrative and financial autonomy.

Universities in Chad are mostly young, and are small in numbers and scales. Among them, the University of N'Djamena was the most famous and the largest university, which was founded in 1971, with 12,000 students and 613 teachers.

Table 4-2: General information of 8 universities

	Name of University	Founded in	Number of Students（Year 2017-2018）	Number of Faculty Members
1	Adam Barka University of ABECHE	2003	6720	122
2	King Faisal University of Chad	1991	More than 5000	150
3	Ati University of Science and Technology	2008	1376	32
4	Mongo Polytechnic University	2002	460	50
5	University of N'Djamena	1971	12000	613
6	University of Sarh	1997	3101	74
7	Moundou University	2008	More than 3000	62
8	University of Doba	2011	2198	55

1.2 Universities should strengthen the construction of faculties.

Through presentations made by the University Group, it could be seen that. Universities in Chad don't have enough faculties to support the development of talents needed by the country. The faculties are mainly focused in the domain of humanities and social sciences, and there is a lack of subjects/disciplines in science and technology.

Among these universities, only the University of N'Djamena and the Mongo Polytechnic University are able to provide ICT related courses and training. In addition, National Higher Institute of Science and Technology of Abéché (INSTA) and the National Institute of Information and Communication Technology (ENASTIC) could also offer some ICT related courses.

Table 4-3: Faculties in 8 universities

Name of University	Faculties
Adam Barka University of ABECHE	Faculty of Sciences and Technology, Faculty of Health Sciences, Faculty of Humanities, Arts and Social Sciences, Faculty of Law and Economics (4)
King Faisal University of Chad	Faculty of Humanities and Communication, Faculty of CHARIQHA for Sciences of Education, Qatar Faculty for Economics and Administration Sciences, Faculty of Graduate Studies, Faculty of Computer Engineering, Faculty Idriss Deby Itno of Law and Political Science (6)
Ati University of Science and Technology	Faculty of Sciences of Life, Earth and Spatial Planning; Faculty of Agropastoral and Food Sciences
Mongo Polytechnic University	Department of Mechanic Engineering, Department of Geology, Department of industrial maintenance, Department of Civil Engineering (4)
University of N'Djamena	Faculty of Exact and Applied Sciences; Faculty of Human Health Sciences; Faculty of Humanities and Social Sciences; Faculty of Legal and Political Sciences; Faculty of Education Sciences; Faculty of Languages, Letters, Arts and Communication; Faculty of Economics and Management (7)
University of Sarh	Faculty of Agricultural Sciences and Environment, Faculty of Science and Technology, Faculty of Arts and Humanities, Faculty of Law and Economics (4)
University of Doba	Faculty of Humanities and Social Sciences, Faculty of Law, Faculty of Earth Sciences and Biology (3)

The lack of enough and updated disciplines in universities in Chad has led to the insufficient cultivation of talents. There are only four universities and colleges in Chad that can provide ICT talent training programs, and each university/college could produce only about 30 talents every year, which is far from meeting the needs of national ICT development.

1.3 ICT application in universities in Chad is limited.

ICT application in Chad universities is relatively low. In the above-mentioned eight universities, the ICT application is limited to using Microsoft Excel for employee management and student data processing. Some universities use video projectors to provide courses, and some have a basic multimedia classroom. The Internet connection speed in universities is slow and most students cannot have access to the Internet.

2. Content of the Vision

University Participants generally believe that experiences learned from the seminar is very useful. However, in view of the current development level in Chad, participants thought that it would be difficult to put the knowledge learned in the seminar into use in Chad immediately. Therefore, university representatives hope to carry out cooperation with China and achieve a win-win situation.

Based on the needs of universities in Chad, and by taking full advantage of what they have learned in the seminar, representatives of eight universities proposed the vision for development of ICT in university. The contents are as follows:

(1) Electrification of all universities in Chad;

(2) Conduct ICT capacity training for university staff;

(3) Provide Internet access for universities;

(4) Build a well-equipped MOOC center;

(5) Establish a digital library.

3. Comments

3.1 Universities need to improve awarness of ICT in higher education.

University leaders need to have a comprehensive understanding of how to apply ICT in higher education and to promote university development. The application of ICT in Universities in Chad is more about using ICT tools and software to improve management efficiency.

Through the Seminar, university leaders have improved their understanding of how to use ICT to promote higher education transformation. Based on the study, the university representatives put forward a vision for the development of ICT in university. This is of great significance to the reform and innovation of the universities in Chad.

3.2 Universities should undertake the responsibility of ICT talents Cultivation.

Talents are of crucial importance to achieve national development, and universities are supposed to play an active role in cultivation of talents. It is necessary for universities in Chad to strengthen their capability in ICT talents cultivation to provide backup forces for the national ICT construction. their capability in cultivation of ICT talents to provide backup forces for the national ICT construction. For universities with ICT related majors, they should further improve and strengthen the quality of ICT education. For universities without ICT related majors, it is supposed to establish related department and invite qualified faculty members to conduct related courses.

3.3 Universities should strengthen international cooperation in talents cultivation.

At present, HUAWEI is developing a talent development cooperation project with universities in Chad. The project intends to select students from three universities in Chad to come to China for a HUAWEI-funded ICT training.

Students will have the opportunity to take an internship in HUAWEI for six months after the training. After the completion of internship, qualified students will be selected to work at HUAWEI. This project will help promote the development of ICT talents in Chad. In addition, universities in Chad should actively seek cooperation with foreign universities to make use of resources abroad for their talents development.

3.4 Universities should make better use of online education.

During the Seminar, participants visited the MOOC center in Southern University of Science and Technology and the MOOC Classroom in South China Normal University. They all showed a strong desire to establish a MOOC center in their universities. Universities in Chad lack educational resources and they should make full use of online education, like MOOC to solve the challenges.

ICHEI can mobilize its network of cooperative enterprises and establish a cooperation platform between universities in Chad and enterprises for the establishment MOOC centers in Chad.

Part 3 Case: Vision of ICT development in Colleges

1. General Introduction

1.1 Colleges play an important role in personnel training.

The main mission of Higher education colleges is to provide basic and continuing training, and vocational and technical training for teachers. Colleges offer courses in different disciplines, and students can obtain an undergraduate certificate in vocational and technical education upon completion. Some colleges can grant a master's degree. Compared with universities, although the scale of the college is smaller, they also play an important role in the cultivation of talents.

Image 4-1: Pictures of colleges in Chad

Table 4-4: General information of 5 colleges				
	Name of College	**Founded in**	**Number of Students（Year 2017-18）**	**Number of Faculty Members**
1	National Institute of Science and Technology for Abeche	1997	1205	97
2	Bongor Normal Superior School	2003	1800	54
3	Normal Superior School of N'djamena	2011	1513	118
4	Normal Superior School of Abeche	2011	-	-
5	Normal Superior Technical Education School of Sarah	2011	732	26

1.2 Colleges should strengthen the construction of disciplines.

Compared with universities, the structure of colleges is more simple, but the proportion of disciplines in science and engineering is higher than that of universities.

Most colleges have majors in natural sciences and engineering.

Table 4-5: Departments in 5 colleges	
Name of College	**Departments**
National Institute of Science and Technology for Abeche	Department of Mechanical Engineering; Department of Energy Engineering; Department of Electrical Engineering; Department of Computer Engineering; Department of Animal Science and Technology; Department of Biomedical and Pharmaceutical Sciences; Department of Telecommunications and Multimedia（7）
Bongor Normal Superior School	Department of Mathematics and Computer Science; Department of Physical Chemistry; Department of Life and Earth Sciences; Department of History; Department of Geography; Department of French; Department of Internship and Continuing Education;（8）
Normal Superior School of N'djamena	French Department; Arabic Department; English Department; Department of Life and Science; Department of Mathematics-Computer Science; Department of Physics-Chemology; Department of History; Department of Geography;（9）
Normal Superior School of Abeche	Department of History; Department of Geography; Arabic; French; Life and Earth (5) (Physical, Chemical, and Counting Systems to be established)
Normal Superior Technical Education School of Sarah	Department of Business Science and Technology (Functional); Department of Industrial Science and Technology (Functional); Department of Internship and Continuing Education (Functional); Department of Agriculture and Animal Husbandry (Non-functional); Department of Art and Professional Development (non-functional) (5)

1.3 The number and qualification of teachers in colleges need to be improved.

Colleges are generally faced with problems of insufficient teaching staffing and the needs to improve their Professional competency. Normal Superior School of N’djamena has only 9 teachers in engineering related majors, accounting for 7.6% of the number of teachers in the college.

Table 4-6: Faculty levels in Normal Superior School of N'djamena						
	Department	**Total**	**Faculty Number**			
			Assistant Master	**University Assistant**	**Assistant**	**Professor**
1	French	7	0	1	6	0
2	Arabic	13	0	6	7	0
3	English	7	0	3	4	0
4	Life and Science	17	0	3	14	0
5	Mathematics-Computer Science	9	1	1	8	0
6	Physics-Chemology	8	1	1	5	1
7	History	20	0	7	12	1
8	Geography	13	2	1	10	0
9	Education Science	24	0	5	19	0
Total		118	4	28	85	2

As shown in the table, in Normal Superior School of N’djamena there are only 2 professors, accounting for 1.7% of the total number of teachers; the vast majority (85) are assistants, accounting for 72% of the total number of teachers.

National Institute of Science and Technology for Abéché faces the same problem. It has a total of 97 teaching staff, of which there are no professors, and the vast majority is at assistant level, accounting for 72% of the total number of teachers. The lack of enough teachers and their qualifications has affected the cultivation of talents in the country. For example, National Institute of Science and Technology for Abéché was established in 1997, but it only produced 2,596 graduates, 35 of whom have master’s degrees.

1.4 The ICT level of colleges needs to be improved.

The ICT level of colleges is still basic. In terms of infrastructure, colleges generally do not have network. Some colleges have a classroom equipped with some computers for training beginners in computer science.

In terms of ICT application, colleges don’t have official websites, and most staff do not have the ability to use computer databases, as well as administrative and academic software. The ICT tools used by colleges are Microsoft Word and Excel, and teaching is still conducted in the most traditional way.

Image 4-1: Image 4-2: Pictures of computer classrooms in Chad

2. Content of the Vision

At conclusion of the seminar, representatives from colleges jointly developed a vision for development of ICT in colleges. The details are as follows:

(1) Raise awareness of the importance of ICT in colleges;

(2) Build capacity of teachers to enable them to conduct courses in the form of PPT;

(3) Develop a plan of ICT application for administrative and academic activities in colleges (information hardware, database and specific software) and submit it to school leaders for decision-making;

(4) Establish a college website;

(5) Build the MOOC classroom.

3. Comments

College representatives jointly developed a vision for development of ICT, and will submit it to colleges for reference. This exhibits their strong desire to use ICT to improve efficiency of administrative and academic activities in the colleges.

Colleges want to improve their ICT level, however, due to the lack of professional capacity and experts, they hope to seek cooperation with partners to make specific assessment of their situations and help to formulate more feasible development plans. ICHEI would like to provide a paltform for communication between Chinese enterprises and Chad to faciliate the development of ICT in colleges in Chad.

Part 4 Case: Vision of ICT development in higher education institutions in Chad

Representaives from the National Center for University Works, National Advanced Examinations and Competition Office, National Research Center for Development participated in the Seminar and they had all formulated plans for development or improvement of ICT in their respective institutions.

1. Plan of ICT in National Advanced Examinations and Competition Office

The National Advanced Examinations and Competition Office is a public institution with legal personality and administrative and financial autonomy. It is placed under the supervision of the ministry in charge of higher education. It has a nine-year history and its mission is to organize examinations and entrance examinations for all higher education institutions, in collaboration with relevant institutions and many other external partner institutions. The office is also responsible for the certification of all higher education degrees.

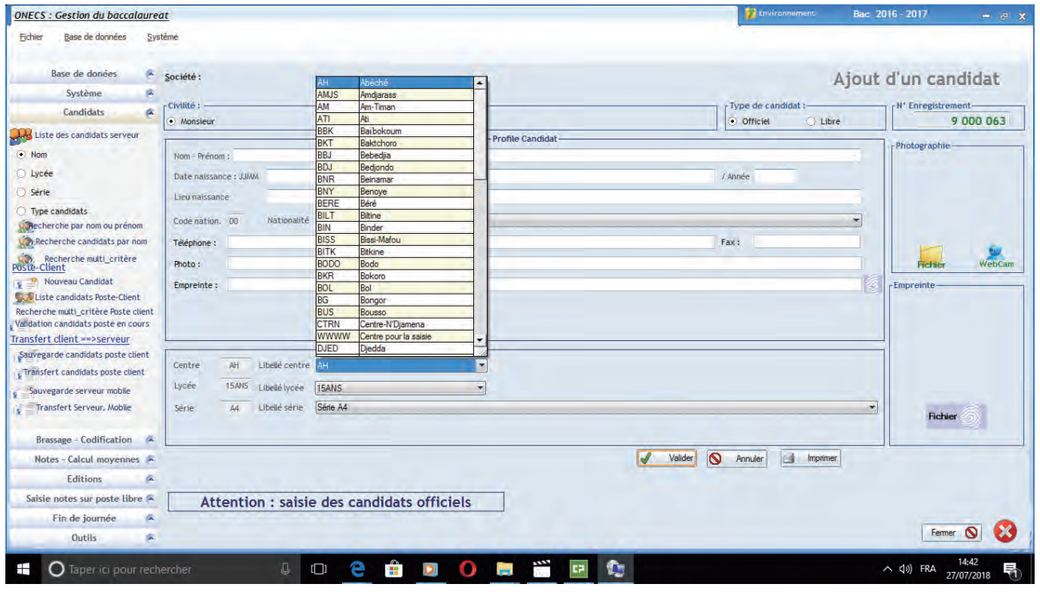


Image 4-3: National Advanced Examinations and Competition Office's Online Students Management Platform

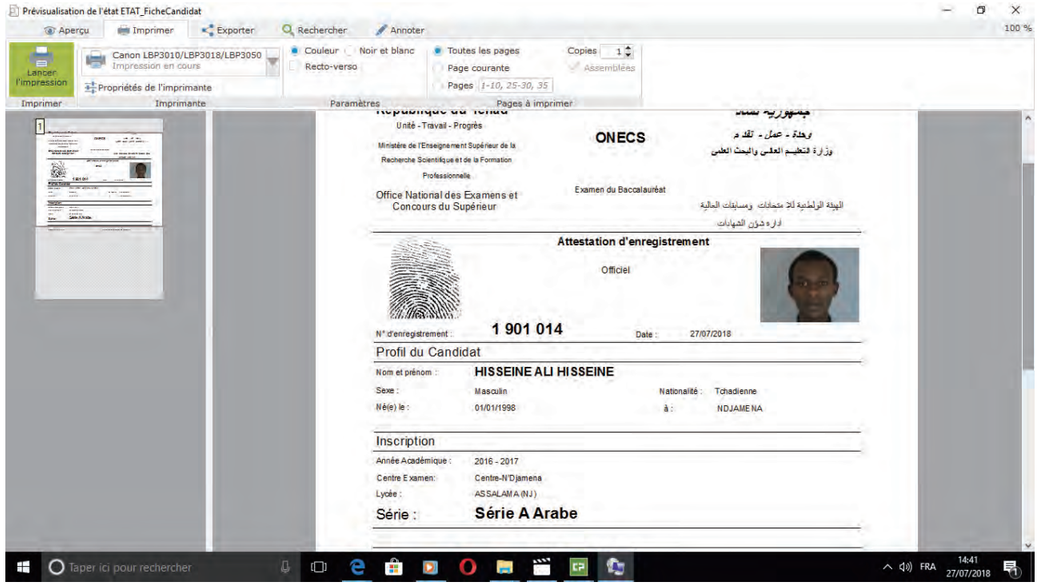


Image 4-4: Student Profile of National Advanced Examinations and Competition Office's Online Students Management Platform

The National Advanced Examinations and Competition Office has a online platform for students management, and representatives from the office formulated a plan to imrpove ICT application of the Office. The details are as follows:

Establish an comprehensive online management platform for National Advanced Examinations and Competition Office. The platform should facilitate the online management of all business, such as: to use software to manage examinations and competitions, to establish the function for students online registration,and database management, accounting Management, personnel management, document management, etc.

2. Plan of ICT in National Center for University Works

The National Center for University Work was established in 2008. Its mission is to support students through aspects of transportation, health, housing, social activities, culture, sports and recreational activities, and to manage scholarships and financial assistance. In the 2017-2018 academic year, the National Center for University Work manages over 41000 students.

The specific objectives of the Center are to facilitate students' access to accommodation, to improve students' health; to help with students' nutrition; to guarantee students' transportation; and to improve students' living conditions.

After the seminar, representative of the National Center for University Work formulated a plan of ICT application, hoping to realize online management of all activities of the center, such as: creating website, utilizing specific administrative software (accounting database, personnel management, document management), online students management in terms of catering, accommodation, and transportation, etc.

3. Plan of ICT in National Research Center for Development

The National Research Centre for Development was established in 1991. Its mission is to collect, centralize and update scientific and technological documents at home and abroad (it gathers all scientific achievements in Chad); to establish databases of human and financial resources in the field of research; to support the training of teachers and researchers; to edit and disseminate achievements of Chadian researchers; and to support scientific research and technology innovation; to provide support for higher education institutions and research institutions.

The representative of National Research Center for Development formulated a plan for ICT development. The plan includes: creating a management platform for administration and research projects; to establish GIS for paleontology; and to establish a platform for exchange and research resources sharing among teachers and researchers.

4. Comments

Three organizations formulated specific ICT development plan according to their respective missions and development needs.

The National Advanced Examinations and Competition Office hopes to upgrade its management on the basis of the existing online management platform to achieve more comprehensive and efficient online management; the National University Work Center hopes to use specialized personnel management software to manage the large students database. The National Research Center for Development hopes to establish an online management platform for research projects, which could not only improve the management efficiency, but also facilitate sharing of scientific research achievements among university teachers and researchers, and thus promote the development of scientific research in Chad.

The plans formulated by them reflect that the participants had a better understanding and vision of how to use ICT to faciliate construction of their respective institutions. And it would be appropriate for Chad government to cooperate actively with foreign enterprises which could provide these institutions with customized solutions.

Part 5 Conclusion

The Chad government need objectively analyze the current situation and needs of the country and formulate reasonable plans to develop their ICT in higher education.

1. To further improve ICT infrastructure

Chad faces many challenges like: poor electricity supply, limited fixed broadband connections, high fixed and mobile broadband prices and inadequate Internet access. The government should continue to strengthen its ICT infrastructure to improve the electricity and network supply and encourage foreign enterprises to participate in the development of ICT in higher education in Chad.

2. To raise awareness of ICT literacy in Chad

Chad is aware of the importance of ICT in higher education and it is necessary to improve the ICT literacy of government officials and university leaders.Chad government should offer more training opportunities to improve the ICT capacity of related staff and professionals.

3. To strengthen the construction of ICT related disciplines in higher education institutions

ICT talents are the foundation for a country to achieve ICT development. Higher education institutions in Chad should better undertake its function in ICT talents cultivation.

3.1 Increase ICT related majors in higher education institutions

Chad's higher education institutions were in serious lack of ICT teachers and thus are not capable to produce enough ICT graduates and talents. There are only four public universities/colleges in Chad that can provide ICT related courses, and the number of graduates from these universities and colleges each year are not enough.

The ICT talents in Chad mainly worked in HUAWEI and the two Chadian telecommunication operators and these talents are mostly graduates from foreign universities. In recent years, HUAWEI and the two operators have trained many middle-level ICT talents and network engineers for Chad. Therefore, higher education institutions in Chad should strengthen the construction of ICT disciplines/majors and produce more ICT talents.

3.2 Strengthen competency of faculty members in universities and colleges

According to statistics from the Ministry of Higher Education, Research and Innovation, Chad only has 1,346 permanent teachers in total, 986 temporary employees and 1,338 administrative staff. What makes it even worse is that many of these teaching staff are not fully qualified to undertake research and teaching activities. Among them, professors only account for 2% of the total number of teaching staff, and most of the teaching staff are assistants, accounting for 59% of the total number. It is urgent to strengthen the professional competency of teachers so as to produced better qualified graduates.

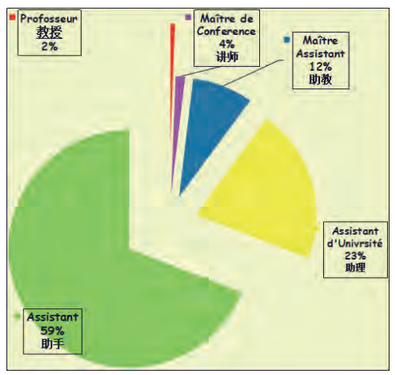


Image 4-5: Level of faculty members in higher education institutions in Chad

4. Improve international higher education cooperation

Chad is in lack of international cooperation which is reflected in the fact that there is not a department for international cooperation in higher education institutions. Universities in Chad should strengthen international cooperation with universities abroad, which will improve flow of faculty members and exchange of students.

5. Strengthen the cooperation with enterprises

The construction of ICT is an endeavor that needs participation from all sectors, which include governments, universities and also enterprises.In terms of talents cultivation, the supply of ICT graduates by universities and colleges cannot meet the needs in Chad. The government should actively encourage university-enterprise cooperation to make use of the resources offered by enterprises in personnel training, and to make universities and colleges become the base for ICT talents cultivation.

HUAWEI is carrying out the "Future Seeds" project globally. Launched by Huawei in 2008, the project aims to help local ICT talents promote knowledge transfer, increase people's understanding and interest in the ICT industry, and encourage countries to participate in the establishment of digital communities. As of 2017, HUAWEI's future seed project has already carried out cooperation projects with the Ministry of Education and universities in 23 countries in Africa. HUAWEI is negotiating with university in Chad about future seed projects, and plans to select students at local universities to participate in ICT trainings in China.

Therefore, it is important to make use of the resources of enterprises and work closely with them to carry out talents cultivation and ICT construction in Chad.

Chapter 5
Satisfaction Analysis

In order to analyze the seminar more comprehensively, we distributed two questionnaires to 20 participants, which are the questionnaire for the overall evaluation of the seminar and the questionnaire for evaluation of the course.

Part 1 Overall Satisfaction Analysis

From the perspective of management, the seminar includes training, management and effects. The three first-level indicators have a total of 20 second-level indicators to analyze the satisfaction of participants on the overall arrangement of the seminar.

1. Overall Satisfaction of Participants

The overall evaluation of the participants during the training period was 100 points in maximum. The highest score among the participants was 97 points, the lowest was 82 points, and the average score was 86.95 points. That is to say, the overall satisfaction was 86.95%, as shown in Figure 5-1.

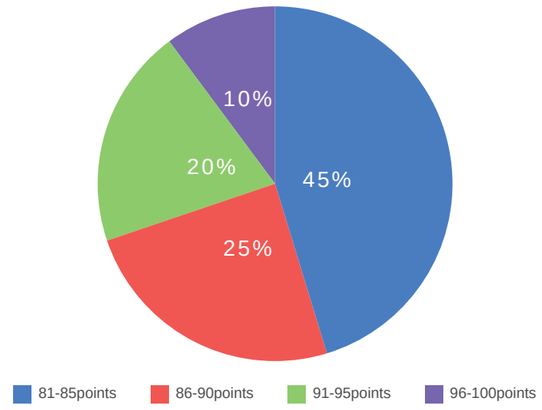


Figure 5-1: The overall evaluation of the training arrangement

2. Satisfaction of Courses

The satisfaction of participants towards the courses is mainly evaluated from nine dimensions which are: course content, course quality, capacity of lecturers, organizational capacity, course materials, relevance of visits to theme of the Seminar, difficulty level of the courses, and classroom and hardware.

This part has a total score of 45 points and participants gave an average score of 43.55 points, which means the participants' satisfaction with the training content is 90.88%. The score distribution of each dimension is shown in Figure 5-2.

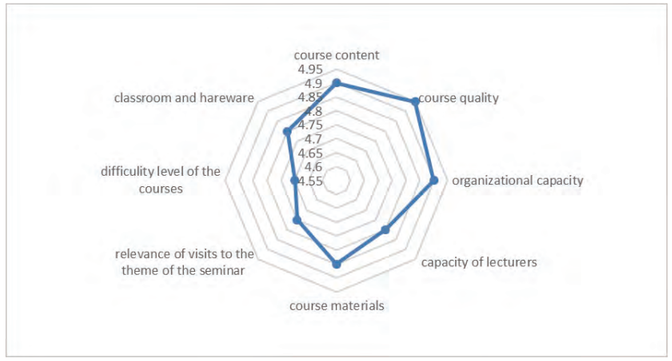


Figure 5-2: Training average scores for different dimensions

3. Satisfaction of Organizational Management

Participants' evaluation of organizational management is mainly conducted from seven dimensions: accommodation, airport transition, organization of opening ceremony and closing ceremony, organization of culture and extracurricular activities, attitude of Chinese organizers, the French communication skills of the Chinese organizers. This part has a total score of 35 points and an average score of 28.85 was given, which means that the student's satisfaction rate with organizational management is 82.4%. The student's evaluation of the different dimensions of organizational management is shown in Figure 5-3.

Figure 5-3: Average score of participants' evaluation of organizational management

4. Participants' Overall Satisfaction of the Seminar

The overall evaluation for the seminar is mainly conducted from the dimension of training course duration, the impact of the training on future work of the participants, the impact of training on strengthening cooperation between two countries in relevant fields, and comprehensive evaluation. The total score of this part of evaluation is 20 points, and the average score of the evaluation is 17.2 points, that is, the satisfaction of participants in the effects of the seminar is 86%. The scores of the participants' evaluation of the different dimensions of the seminar are shown in Figure 5-4.

The training has the highest average score on the dimension of the impact on strengthening cooperation between two countries in relevant fields, indicating that participants believe that the seminar will help promote cooperation between the two countries in higher education informatization.

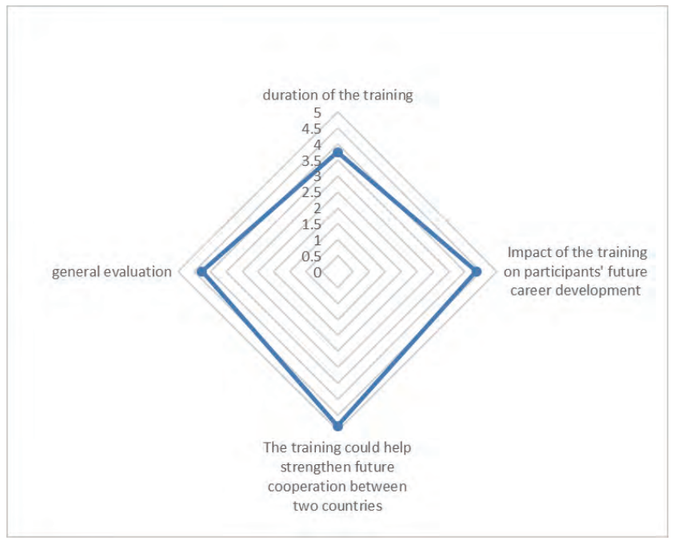


Figure 5-4: Average score of the students' comprehensive evaluation of the seminar

After a 20-day training, participants believes that China is a country with warm hospitality and high level of ICT, and expressed their hope to promote China-Chad friendship and organize more similar seminars.

Part 2 Course Satisfaction Analysis

1. Participants are overall satisfied with the general courses.

The module of general course includes four themes, which arelectures on the general situation of China, the basics of Chinese language, Conference on security in China, and Conference on the Construction of Special Economic Zones in Africa. Each topic is evaluated from four dimensions: impact on participants career, difficulty of the course, qualification of lecturers, and overall evaluation, as shown in Figure 5-5.

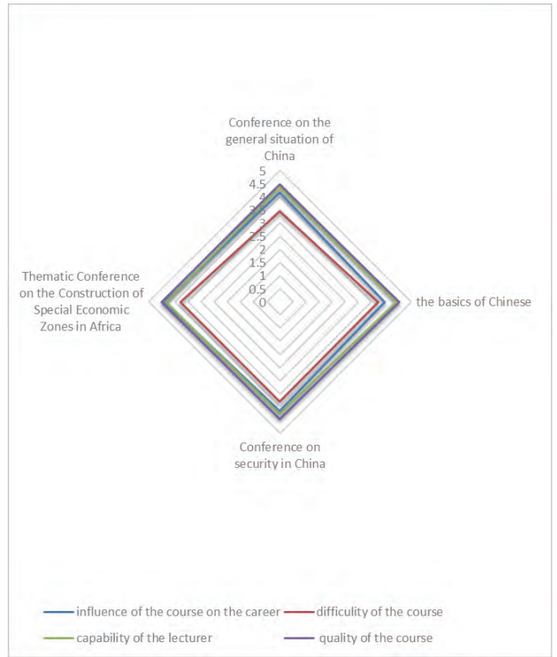


Figure 5-5: Feedback from the general course

2. Participants' Evaluation of Professional Courses

The average score for professional courses is greater than 3, indicating that students recognized these courses. It also shows that "China's distance higher education" has great effect on participants' career development; while "online teaching: curriculum development and organization" is considered to be the most difficult course. The details are shown in Figure 5-6.

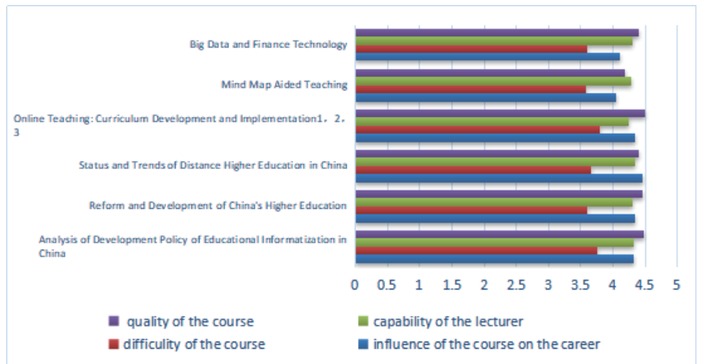


Figure 5-6: Feedback from the professional courses

3. Participants have higher evaluation of case studies.

The case studies is a major feature of the seminar and it includes: SUSTech Smart Campus, Smart City in China, and Smart Policing. The participants' evaluation of the case course is shown in Figure 5-7.

95% of the participants in the seminar believe that the SUSTech Smart Campus has a greater impact on the career of the participants. Because Chadian participants are not familiar with topics of smart campus, intelligent city and smart policing, they find them a little difficult. Besides, they spoke highly of the course content on smart city construction, indicating their greater interests in the urban construction issue.

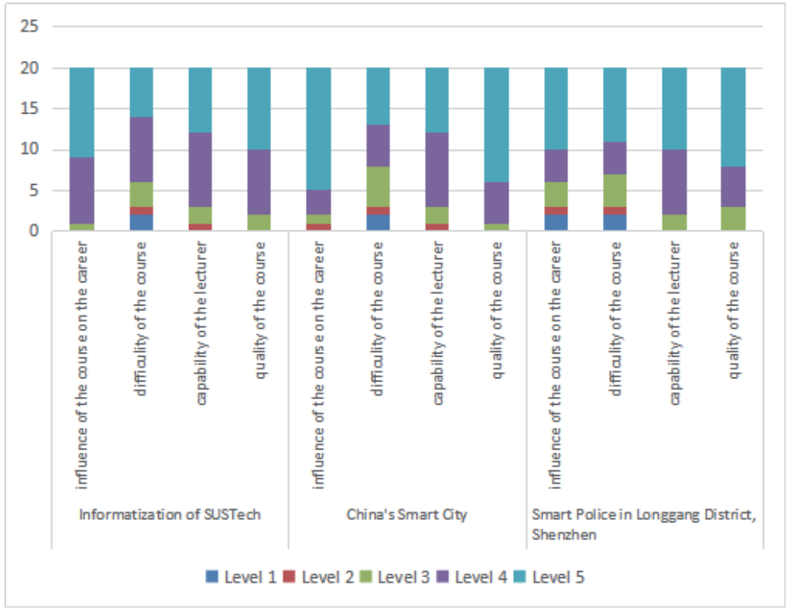


Figure 5-7: Evaluation of the participants' professional courses

4. Corporate and Institution Visits

The seminar organized visits to enterprises of USI, UBTECH, HUAWEI, Createview, INCO, CERNET, GTA, and institutions such as SUSTech Materials Characterization Centre, SUSTech MOOC Centre, SUSTech Library, the Normal University of South China MOOC Classroom. The evaluation of the visits are shown in Figure 5-8 and Figure 5-9.

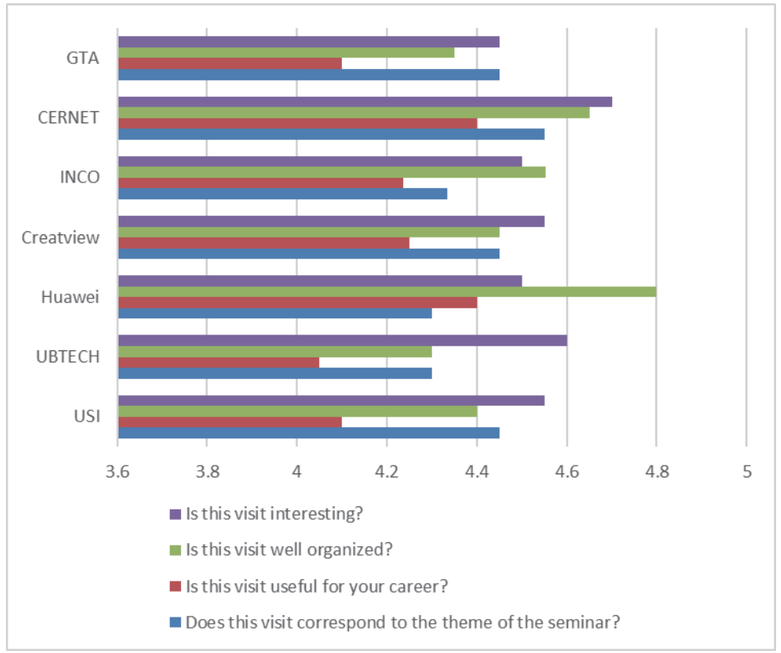


Figure 5-8: Evaluation of the visiting companies

The participants believe that the enterprise visits are very useful, and they learned how enterprises could participate in the promotion of ICT in higher education.

Besides, participants think the visits to SUSTech MOOC Centre and the Normal University of South China MOOC Classroom are very relevant to the theme of the seminar and they have learned a lot about MOOC production which will greatly help their work in the future.

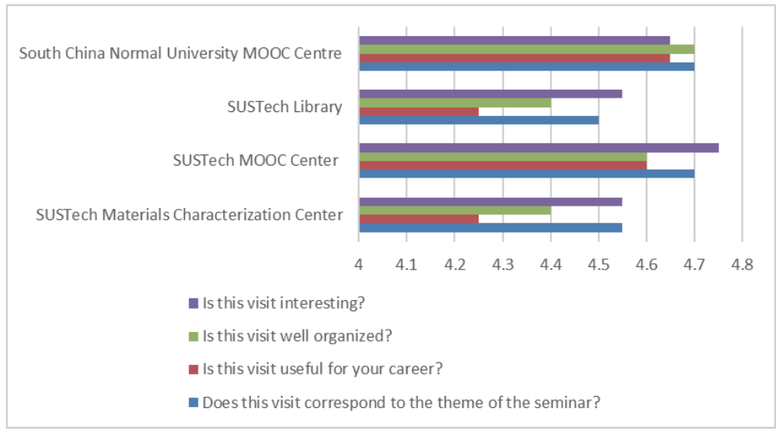


Figure 5-9: Evaluation of the visiting institutions

5. Cultural and Practical Courses

Participants believe that the cultural and practical courses are very helpful for understanding China and the visits are impressive and interesting.

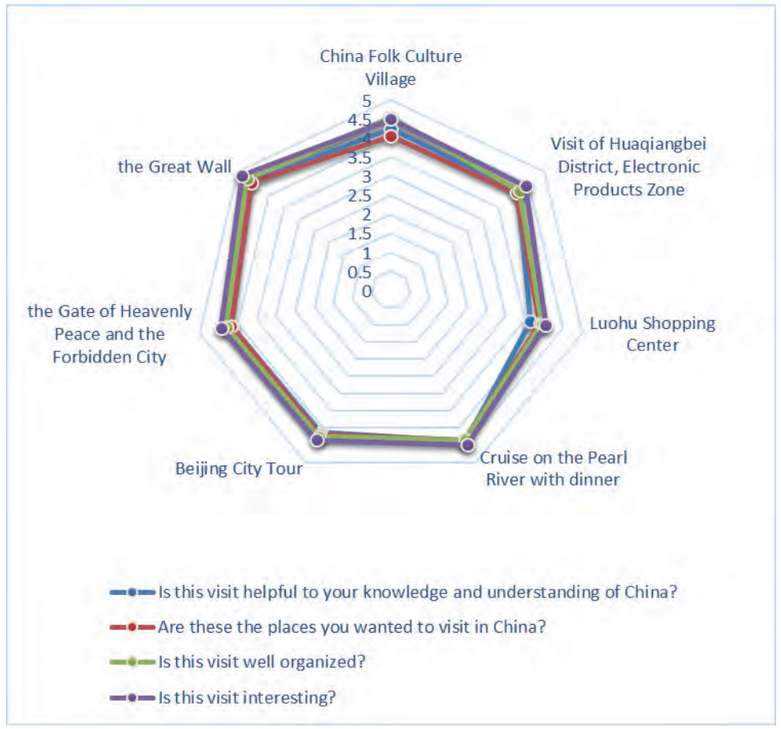


Figure 5-10: Evaluation of the cultural experience course

Chapter 6
Outcomes and Outlooks

Part 1 Outcomes

1. The seminar improved the ICT literacy of higher education practitioners in Chad.

Chadian participants obtained a wholistic view of ICT in higher education, enriched their knowledge about China's higher education and reform, and improved their ICT literacy and capacity. Based on China's experience and practices in the development of higher education and ICT application in higher education, while taking into full consideration of situation in Chad, participants formulated plans for ICT application in their respective institutions, which would serve as an important reference in the development of ICT in higher education in Chad.

2. The seminar helped to promote global digital equity.

The seminar established an effective platform and mechanism for communication and cooperation between China and higher education practitioners in Chad. This could help Chad to find necessary resources and partners to develop their higher education and ICT development, which will finally help to promote the digital equity in the world.

3. The seminar enriched research on higher education in Chad.

There are few research and comprehensive analysis about higher education and especially ICT application in education in Chad, which to some extent hinders Chad's higher education development and innovation. The smeinar provided an opportunity for Chadian higher education practitioners to learn from others' experiences and at the same time think about their own problems and analyze their challenge, which will effectively help the higher education development in the future.

4. The seminar broadened Chad's international higher education cooperation.

The seminar showcased the latest development of ICT in higher education in China and in the world. It helped establish a platform for Chinese and Chadian higher education practitioners to exchange views and learn from each other, which will effectively strengthen higher education cooperation between the two sides. This constitutes an important action for Chad's international cooperation in higher education.

Part 2 Outlooks

1. ICHEI should further develop its training system on ICT in higher education.

1.1 Enhancing ICHEI's advantages on short-term training

Based on ICHEI's expertise and by fully exploiting its resources in the domain of higher education and ICT, ICHEI had developped a training system focused on ICT application in higher education. ICHEI had organized a series of trainings with the theme of online learning, big data and cloud computing, ICT in higher education management for officials from Ministry of Higher Education and university leaders in African countries and trained altogether around 100 high level higher education practitioners from 17 African countries. All seminar participants had worked closely with ICHEI in higher education cooperation between ICHEI and their respective universities.

1.2 Developing long-term training programmes

Many participants had expressed their willingness to pursue studies in China after the Seminar and hope to have cooperation with ICHEI and SUSTech. ICHEI would like to work with partner universities in China to provide long-term training programmes. Besides, ICHEI planned to integrate educational resources in the MOOC platform in China and abroad and worked with ICT enterprises to establish an International Institute of Online Education to provide degree courses for people in Africa countries and other regions.

1.3 Compiling and publishing reports of ICT in higher education in African countries.

During the Seminar, ICHEI conducted intensive exchanges and communication with higher education practitioners from African countries and studies the higher education and ICT development in their countries. ICHEI had produced several outcome documents based on these seminars and would like to further compile data and research of higher education to produce reports on ICT in higher education from the country and regional level in Africa.

1.4 Diversifying the teaching modes of seminars.

In order to make more people have access to and benefit from the trainings, ICHEI intended to diversify its training modes, such as by integrating the blended laerning, MOOC and other forms of online learning.

2. ICHEI should further deepen cooperation with UNESCO.

As a Category II Centre, ICHEI enjoyed much support from UNESCO in terms of techinical guidance, resource sharing and netwroking and had been actively seeking further cooperation with UNESCO headquater, UNESCO Category I Institutes, regional offices and other Category 2 Centres. ICHEI would like to work closely with UNESCO system to participate in programmes in the field of higher education and ICT.

3. ICHEI should upgrade its cooperation with enterprises.

ICHEI attaches great importance to the cooperation with enterprises and established a strong and long-term enterprises network. Based on the good cooperation between ICHEI and ICT enterprises, ICHEI would like to further explore the cooperation mode with UNESCO, Chinese enterprises and African universities and to develop more programmes under this cooperation framework. For example, ICHEI cooperated with HUAWEI in ICT talents training projects in African countries, and worked with smart education enterprises to provide solutions and services of ICT in education for African universities.

4. ICHEI should develop more specific cooperation programmes with different African countries.

There are differences in the economic and educational development in African countries which caused different needs and priorities. ICHEI should fully considerate the specific situation of different countries and develop more customized cooperation programmes.

Appendices

Appendix 1 Lecturers Introduction

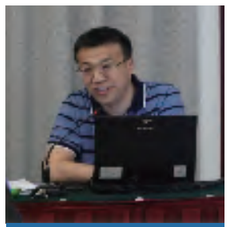
WU Di

Position:

Doctor
Professor of Central China Normal University
Deputy Director of China's National Engineering Research Center for E-Learning

Professional domain:

Development strategy and policy making of education informatization;
Core indicators and performance evaluation of education informatization;
Leadership analysis and evaluation education informatization;
Standards and applications of education informatization



SUN Haitao

Position:

Deputy Director of Office of Policy Research, Tsinghua University
Deputy Researcher

Professional domain:

Higher education management and policy analysis;
University evaluation and strategic planning;
Projects of National Office for Education Sciences Planning;
Projects of Ministry of Education of the PRC

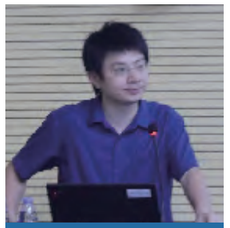
ZHANG Weiyuan

Position and education background:

Bachelor, Master, East China Normal University;
Doctor, University of Edinburgh;
Post-doctor, University of Hong Kong;
Director of Capital Institute for Learning Society at Beijing Normal University;
Former Head and Chief Researcher at the Centre for Research in Continuing Education and Lifelong Learning;
Head of the Centre for Cyber Learning;
Chief Editor of the International Journal of Continuing Education and Lifelong Learning, School of Professional and Continuing Education at the University of Hong Kong;
Advisory Professor at East China Normal University;
Honorary Director of Chongqing Institute of Research in Big Data Application in Vocational Education;
Honorary Dean of College of Education at City University of Macau;
Honorary Director of Lifelong Education Institute of Zhejiang Open University
Winner of 2018 AAOU Meritorious Service Award (Asian Association of Open Universities)
The recipient of three institutional, four national, one regional, and seven international awards for Distinguished Achievements/ Best Papers Awards.

Professional domain:

Prof. ZHANG has been on the editorial board of a number of academic journals in the field of open education, e-learning and lifelong learning in Commonwealth of Learning, China, UK, Japan, Korea, Malaysia, Canada, and Turkey. He has written or edited 22 books and published over 200 articles in scholarly journals and conference proceedings.



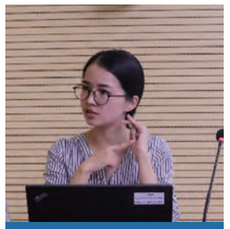
CAO Xiaoming

Position:

Doctor
Master Tutor
Director of Maker Education Lab
Researcher of Online Education Research Center

Professional domain:

Smart education
Creative education



TANG Xiaolan

Position:

Course Designer in Makeblock Co., Ltd., Shenzhen.

Professional domain:

Analyzing foreign competition courses (e.g., Micro:bit, Dash & Dot, Little Bit, code.org, etc.)
Analyzing designing courses (e.g., scratch, sensors, python, IOT, AI, laser cutting, aircraft, physical construction and 3D modeling)

LUO Zongwei

Position:

Doctor
Associate professor, researcher in Department of Computer Science and Engineering, SUSTech.

Professional domain:

Big data and FinTech; Internet of things; Cloud computing, with over 100 papers appearing in high impact international journals and conferences.
Dr. LUO has extensive industrial and managerial experiences in high tech R&D, project execution and management. His team is consistently looking for strong candidates of PhD students and research assistants.

SUN Qiaoyu

Position:

Deputy Director of Network Information Centre of SUSTech

Professional domain:

Graduated from College of Electronic and Technology of Shenzhen University
He has been working on the research of informatization for 22 years and has the experience of informatization planning, management and application.

CHEN Dongping

Position:

President of Shenzhen Big Data Research Institute of Smart City;
Former Vice Director-General of Social Development Committee of Shenzhen Municipality;
He also plays important role as Senior Adviser of Beijing government, Chief Councilor of Huawei, Fuzhong Group, China Electronics Technology Group, Sense Time and Leador Spatial in the fields of Smart City solution. And he is a quite well-known visiting professor of universities such as Tsinghua University, Beijing Normal University, Shenzhen University, etc.

Professional domain:

As the prime designer and overall planning executor of Shenzhen Smart City, Mr. Chen concentrates on using Big Data philosophy and information technological methods to modernize and improve city administrative system and ability. Through driving the development of Smart City to reconstruct workflow of Shenzhen government sector, he successfully pushes forward transformation of local government functions, promotes the efficiency of the government operation and enhances the precision of government service and administration. His definition in the concept and frame system of new Smart City has been widely adopted by companies such as Huawei, China Electronics and Technology Group as their core idea in Smart City solution.

Liu Rongxin

Position:

Doctor
Professor
Senior researcher
Economic Consultant of Asian Development Bank
General Director of Department of Regional Development Planning, China Development Institute, which is one of the top think tanks in China.

Professional domain:

Dr. LIU has worked for the China Development Institute for around 30 years and has conducted more than 100 research projects involving regional development, industrial economy, industrial policy, and industrial park planning to support public policy making. In addition, she has provided research and consultation on industrial planning, investment feasibility and legislative advice for many countries' special economic zones and industrial parks, including Ethiopia, the Republic of the Congo, Kenya, Cote d'Ivoire, Pakistan, Sri Lanka and other countries. These projects are highly appraised by World Bank, Asian Development Bank and the host country government.

Appendix 2 Introduction of Visited Companies and Institutions

Visited Companies

1. USI Technology (Shenzhen) Company Limited

USI 深圳市优视技术有限公司
USI Technology (Shenzhen) Company Limited

USI Technology (Shenzhen) Co., Ltd is located in Shenzhen Industrial Part, Nanshan District, Shenzhen City. It is a national high-tech enterprise and a dual-soft certificated enterprise. For many years, the company has focused on the Internet application and information service operations in education, as well as the research and sales of smart terminal products, touch technology products, audio and video recording products, teaching software, cloud platforms, micro-campus and other products. The company is a professional smart education solution provider as well as a leading enterprise in China's education information field.

The company independently developed intelligent integrated teaching control unit, intelligent high-definition recording and broadcasting system, portable high-definition recording and broadcasting machine, intelligent electronic student card, teaching assistant software, micro-campus and other products for the education market. The USI smart classroom solution includes short-throw projector, interactive whiteboard, touch integrated machine, audio, campus broadcasting system, recording and broadcasting system, and electronic whiteboard software, etc. The solution is characterized by modularization, miniaturization, networking and intelligent of functions, which makes them easy to install, use and repair. The digital campus construction program integrates the three functions of management, teaching and learning, including more than 20 subsystems such as electronic student ID card, school portal network, office system, recording and broadcasting system, security monitoring, teleconferencing system, integrated card, broadcasting system, data center and so on, which make it possible to build a real digital campus. USI is currently the most professional and comprehensive "Three Links and Two Platforms" solution provider in China. The company's audio and video systems, large-screen display system solutions serve in the field of corporate, culture, scientific research, medicine, command, entertainment and family.

Company Website: http://www.usisz.com/
Headquarters telephone: 86-755-86363833
E-mail: sales@usisz.com
Address: Room 401, Block 19, Zhiheng Industrial Part, HU BIN ZHONG LU, Nanshan District, Shenzhen city.

2. UBTECH (Shenzhen)

UBTECH
Dream With Robots

USI Technology (Shenzhen) Co., Ltd is located in Shenzhen Industrial Part, Nanshan District, Shenzhen City. It is a national high-tech enterprise and a dual-soft certificated enterprise. For many years, the company has focused on the Internet application and information service operations in education, as well as the research and sales of smart

terminal products, touch technology products, audio and video recording products, teaching software, cloud platforms, micro-campus and other products. The company is a professional smart education solution provider as well as a leading enterprise in China's education information field.

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Website：https://www.ubtrobot.com/cn/
E-mail: sales@ubtrobot.com
Tel: 0755-83474428
Address: floor 16,22,24,25, C1 building, Nanshan Zhiyuan, Xue Yuan Da Dao, Nanshan District, Shenzhen City
Contact person：SONG Wenjie tracy.song@ubtrobot.com

3. HUAWEI Technologies Co. Ltd

HUAWEI is a leading global provider of information and communications technology (ICT) infrastructure and smart devices. With integrated solutions across four key domains – telecom networks, IT, smart devices, and cloud services – we are committed to bringing digital to every person, home and organization for a fully connected, intelligent world. HUAWEI's end-to-end portfolio of products, solutions and services are both competitive and secure. Through open collaboration with ecosystem partners, we create lasting value for our customers, working to empower people, enrich home life, and inspire innovation in organizations of all shapes and sizes.

At HUAWEI, innovation focuses on customer needs. We invest heavily in basic research, concentrating on technological breakthroughs that drive the world forward. We have more than 180,000 employees, and we operate in more than 170 countries and regions. Founded in 1987, HUAWEI is a private company fully owned by its employees.

The HUAWEI Authorized Information and Network Academy (short for the HUAWEI ICT Academy) is a not-for-profit partnership program that authorizes academic institution to deliver HUAWEI Certification training to their students. The purpose of this program is to not only cultivate ICT talent and help students become employment ready but also aid in filling the global ICT talent gap by creating a bridge between Academy and industry.

The HUAWEI ICT Academy program provides a comprehensive range of training courses that are essential and relevant for employment in the ICT industry for today and the foreseeable future. The HUAWEI ICT Academy program aims to provide the essential knowledge and skills set that employers require and increase job opportunities for young people.

The HUAWEI Academy course offer is divided into three main areas: Enterprise Networks, Information Technology and IT Management and each area of discipline consist of a range of learning pathways and courses.

The HUAWEI Academy's web based Online Learning Environment support the teaching ＆learning process as well as the academy management process, providing a single point of access for academy administrators, teachers and students. This portal can be used to create and manage accounts for academies, instructors as well as provide a medium for delivering web based online learning materials, exams and automate exam marking.The company independently developed intelligent integrated teaching control unit, intelligent high-definition recording and broadcasting system, portable high-definition recording and broadcasting machine, intelligent electronic student card, teaching assistant software, micro-campus and other products for the education market. The USI smart classroom solution includes short-throw projector, interactive whiteboard, touch integrated machine, audio, campus broadcasting system, recording and broadcasting system, and electronic whiteboard software, etc. The solution is characterized by modularization, miniaturization, networking and intelligent of functions, which makes them easy to install, use and repair. The digital campus construction program integrates the three functions of management, teaching and learning, including more than 20 subsystems such as electronic student ID card, school portal network, office system, recording and broadcasting system, security monitoring, teleconferencing system, integrated card, broadcasting system, data center and so on, which make it possible to build a real digital campus. USI is currently the most professional and comprehensive "Three Links and Two Platforms" solution provider in China. The company's audio and video systems, large-screen display system solutions serve in the field of corporate, culture, scientific research, medicine, command, entertainment and family.

Website：https://www.huawei.com/cn/
Address：Putian HUAWEI Base, Longgang District, Shenzhen
Tel：+86-755-28780808

4. Creativeview Edu-Tech

Guangzhou Createview Education Technology Co., Limited (abbreviation as the Createview) is one of the first-class smart education construction and service provider in China. It now has embraced a complete industry chain which including intelligent manufacturing line, education resource creation office, teaching platforms based on Internet and data clouds link to different education processes. Now, Createview has 151 software copyrights, 45 new types of practical patents, 29 patents for innovation, 96 corporation qualification, 28 certificates of corporation reputation, and 16 certificates of solution.

In the past 5 years, the Createview has found industrial-academic-research cooperation relationships with more than 100 universities in China. The newly built international smart education research and development center has more than 300 professional researchers, and more than one fourth of them held a master and above degree. This

research center takes a leading role in more than 30 smart education researches of key projects of national and provincial level each year. The cooperative universities include Peking University, Tsinghua University, Southern University of Science and Technology and South China Normal University and so on.

The Createview business scope covers the following fields, mainly including: doing researches on and producing various of smart education products, developing and providing professional information technology trainings for teachers, developing educating software and creating plenty of educating resources of micro lecture and MOOCs for university and operating and managing smart education value-added services for customers.

The main service includes:

(1) Smart school based on smart education cloud service platform;

(2) Smart classroom based on interactive personal computer;

(3) Smart studying tools based on E-schoolbag;

(4) Teacher cultivation and education study platform solution based on micro lecturer cording and broadcasting system.

Website：http://www.createview.com.cn/
Address: 3F, Building 16, Tian'an Technology Zone, No. 555. Panyu North Road, Guangzhou, China
E-mail: createview@gmail.com
Tel: +86-18122304733

5. Beijing INCO Company Limited

Founded in 2008, Beijing INCO Electronics Co., Ltd. is a high-tech enterprise engaged in the rapid development of information technology in the education industry. With the tenet of application software product development, system integration and information technology services, the company adheres to the service concept of integrity, innovation, cooperation and sharing. It is committed to teaching business, combining teaching reform ideas and management experience to provide excellent educational products and education informatization overall solution for educational institutions at home and abroad.

The company utilizes modern management mode to integrate the most advanced products and technologies, and perfect and unique service cooperation spirit into the business philosophy. Besides, it provides a full range of services that include first-class domestic IT technical consultation, system planning, system design, system development, system implementation and system maintenance software and hardware product sales, and technical support. ICON's products mainly include the following aspects:

(1) Overall solution: unified portal platform, unified identity authentication platform, statistical decision-making platform, metadata management platform and etc.;

(2) Teaching resources: test paper file management system, textbook management system, classroom management system and etc.;

(3) Teaching business: integrated educational management system, postgraduate educational management system, teaching evaluation management system and etc.;

(4) Teaching Project: Innovation and Entrepreneurship Management System, Discipline Competition Management System, Teaching Competition Management System and etc.;

(5) Teaching aids: station group management system, online MOOC platform, teaching assistant management system and etc.

Website：http://www.incons.com.cn/
Address：Room 402, 502, Yuandu A Building number7, Bei Tu Cheng Xi Lu, Chaoyang District, Beijing City
Tel：010-82887279 82886006
Fax：010-82887279-801
E-mail：incon@incons.com.cn
Contact person：MA Guoying 470659118@qq.com +86-15810836520

6. CERNET Company Limited

CERNET was established in December 2000. Approved by the Ministry of Education, it is responsible for the operation and management of CERNET, a Chinese education and scientific research computer network which provides users with a full range of services including network access, network technology, and network information.

CERNET builds a safe and unobstructed network, extensively carries out network technology services such as network integration, construction, operation and maintenance, as well as diverse network information service such as educational information and online training, promoting the development of educational informatization comprehensively and contributes to the informatization in education.

Committed to providing users with the best network services and solutions, CERNET has set up 29 branches nationwide and established a comprehensive quality assurance system and a marketing system that can quickly respond to market changes. The company actively promotes cooperation with world-class technologies and the latest applications, and has a number of subsidiaries.

Website：http://www.cernet.com/
CERNET Co., Ltd. (Headquarters)
Tel：（010）62603366
Fax：（010）62701898
Address：Building 8B CERNET Building, Tsinghua Technology Part, Zhong Guan Cun Dong Lu NO.1, Beijing City
E-mail：contact@cernet.com
Contact person：CHEN Shuo +86-15811074131

7. Shenzhen GTA Education Tech Ltd.

Shenzhen GTA Education Tech Ltd. (abbreviation as GTA) is now an integrated solutions provider of smart education with a focus on promoting innovative educational reform adaptive to human development. It offers integrated

solutions to educational institutions, which range from those focused on early childhood education to college and university as well as vocational education. Such solutions incorporate top-down design, educational informatization, teaching and training simulation software, modern educational equipment, educational resources, and value-added services. GTA provides not only O2O education services, which include vocational skills training to the public, but also integrated solutions, such as data application, financial research, and trading, to financial and investment institutions. Honors and qualifications of GTA are as follows:

★ National High-Tech Enterprise

★ Key Software Enterprise in the National Plan

★ Key High-Tech Enterprise of the China Torch Programme

·2015 Best Marketing for the Education Equipment Industry

·2015 China Excellent Smart Campus Construction Solution

·2015 Chinese Best Service Offer of Smart Education

△ CMMI Level 4 Certificate

△ Computer System Integration Qualification Level III

△ Executive Member of the China Federation of Logistics & Purchasing

△ Member of the China Education Equipment Industry Association

△ National Good Example Enterprise of Quality and Credibility

△ Enterprise of Observing Contracts and Valuing Credit in Guangdong

△ Postdoctoral Innovation Practice Base

Website：http://www.gtafe.com/

Tel：400-609-6665

Fax：0755-83940070

Headquarter Address：Nanshan Zhiyuan A4, Xue Yuan Da Dao No.1101, Nanshan District, Shenzhen City

E-mail：market@gtafe.com

Contact person：YANG Cui　+86-13570890261

Visited Institutions

1. Material Characterization and Preparation Center of Southern University of Science and Technology

南方科技大学 · 分析测试中心
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY　Materials Characterization and Preparation Center

(1) Micro/Nano Processing Platform

Micro/nano processing platform has a total area of 1600 square meters, thousands of clean rooms, more than 20 advanced micro/nano processing equipment and their technology, and a mature 7-person engineering and technical team to provide micro/nano processing technology services and support for the school's scientific research and teaching work. The platform equipment is advanced and complete, and the technical strength is strong. Process menu libraries including thin film deposition, lithography, etching and integration process are established. The professional team carries out routine maintenance on the equipment to ensure stable and reliable equipment and processes, and continuously develops new process technologies according to the platform's medium and long-term technology development roadmap for customers to choose. The equipment and technology of this platform can be used for (1) research and development of advanced electronic devices on micro/nano scale; (2) various types of sensors and MEMS processing; (3) development of third-generation semiconductor power devices; (4) atomic-scale growth and preparation of new low-dimensional electronic materials and so on.

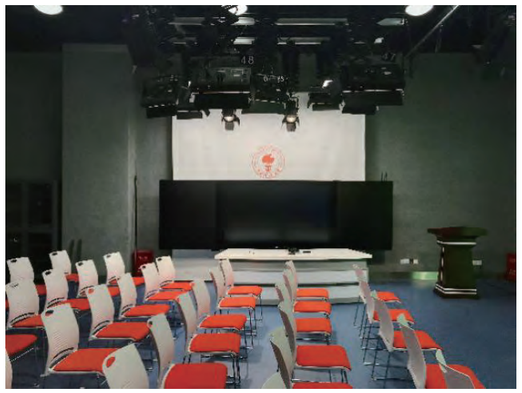
(2) Physical and Chemical Platform

The existing instruments of physical and chemical platform cover many fields such as characterization of material structure, spectral characterization, composition analysis and physical property measurement, and material structure performance simulation. There are more than 30 large-scale equipment on the platform, which are mainly used in the research of frontier subjects in the fields of physics, chemistry, materials and biomedicine, and undergraduate teaching. There are 9 engineers and 2 lab assistants on the platform. Professor Chen Lang, the head of the platform, is a professor of physics at Southern University of Science and Technology, a Ph.D. from the University of Maryland, the fourth batch of Thousand Youth Talents Plan, and the winner of the Shenzhen Peacock Program.

Website：http://www.sustc.edu.cn/research_2_4_7

2. MOOC Centre of Southern University of Science and Technology

The MOOC Centre of Southern University of Science and Technology is supported by UNESCO-ICHEI, Office of Teaching Affairs, Logistics Support Department and Office of Communications & Public Relations of Southern University of Science and Technology. It was officially established on May 7, 2018, supporting the future MOOC production and online education training for the South University of Science and Technology and ICHEI. The centre is located on the first floor of the second teaching building of SUSTech. It covers an area of 210 m2 and consists of a virtual-real-life studio, control room, post-editing room and two micro-classrooms. It can simultaneously serve the three teachers' video recording work.



MOOC Centre is a professional facility that integrates video recording, post-editing and production. It has the following functions: (1) It can be used for online course development; (2) It can be used for multi-scene applications such as conferences, events, and performance recording; (3) The studio recording equipment configuration adopts a unified system to realize all functions including multi-camera broadcast, stunt subtitle superposition, multi-camera recording, in-chip end-of-chip overlay, post-production and so on; (4) It can meet the requirements of recording and broadcasting of video program production, quality class recording, micro-course production, campus conference activities, and training course recording; (5) When recording conferences and course videos, the studio can achieve a certain degree of unattended operation; (6) The recorded content can be imported into the non-linear editing, and the secondary editing can be realized quickly.

The centre's MOOC studio can meet the needs of a series of course recordings including MOB production, quality course recording, campus studio construction, campus conference activities, micro-teaching, and training course recording. At present, a total of 12 courses in the departments of materials, electronics, mathematics, marine, finance, biology and physics, as well as the language center, and the higher education research center are registered to in the course production, of which 3 courses have already been recorded, and six are being recorded and the remaining three are about to start.

Contact person：Tang Xiangzheng　+86-755-88010940　tangxz@ichei.org

3. Library of Southern University of Science and Technology

SUSTech Library

Opened in 2013, the current library is a three-story building of 10,000 square meters with a modern exterior design. Though its focus is on science and technology programs, the library is also developing a core collection on Arts, Social Sciences and Humanities in order to meet the demands by the university to develop a whole-person education model. By the end of December 2016, the library's print collection included 210,170 books (166,165 in Chinese and 44,005 in foreign languages), 123 newspapers and magazines (79 Chinese and 44 foreign), and 100 databases which hold 433,264 electronic books and 52,885 electronic journals. Moreover, by using CALIS, NSTL and Shenzhen Document Network, faculty and students of the university can have access to a variety of resources hosted by other institutions across China as well as within the city of Shenzhen itself where SUSTech is located.

The library provides both on-site and virtual services, such as loans, references, citation query, and workshops on information literacy. In order to improve the efficiency and quality of the services, the library envisions making itself a place where advanced technologies and facilities are applied. Examples of such endeavors include the so-called "New Generation" cloud-based ILS, a Google-like discovery system to enhance the experience of finding information, multi-functional large screens for students in their group work, and a variety of social media to connect the library and its users.

Website：http://lib.sustc.edu.cn/　Tel: 0755-88010800　Fax: 0755-88010804

4. Network and Information Technology Center of Sun Yat-Sen University

中山大學 SUN YAT-SEN UNIVERSITY　网络与信息技术中心 NETWORK AND INFORMATION TECHNOLOGY CENTER

The Network and Information Technology Center of Sun Yat-Sen University (referred to as the Center) was established in 1994 and is a directly controlled organ of Sun Yat-Sen University. It is an important part of the school's service support system. The center currently implements a sub-center management model with four sub-centers: network sub-center, information sub-center, education technology sub-center, high-performance and grid computing sub-center; four direct departments: general office, North Campus IT Service, Zhuhai Campus IT Service Department, East Campus IT Service Department. There are nearly 90 employees, including 14 with titles of a senior professional post, and 4 doctoral degrees.

The main functions of the center are: (1) planning and implementation of the digital campus construction; (2) campus network construction and management; (3) planning, research, promotion and application of educational technologies and postgraduate training; (4) planning and production of online educational resources and operation management of online education platform; (5) school's high performance and grid computing application planning, platform management, operation and service work; (6)school's information management system and medical information sharing platform planning and construction implementation; (7) school's information planning, information standardization and related system construction; and (8) the technical support of information security and technical support and service work for IT applications throughout the school.

Website：http://inc.sysu.edu.cn/　Contact person：Yan Dao　+86-13660586542

5. Center of Experimental Teaching Demonstration of South China Normal University

教育信息技术学院
School of Information Technology in Education

The experimental teaching conditions and the environment of the center are excellent, and the experimental room usable area is 2120 square meters. The total value of equipment is increased to 19.61 million. The center established the "High-definition Imaging Laboratory in South China" with Panasonic, and Korean-funded enterprises invested more than 6 million devices in the center to carry out industry-university-research cooperation. In the past two years, the Guangzhou Science and Technology Communication Society and the Guangzhou Information

Communication and Cultural and Creative Industry Key Research Base have been established, further expanding the center's practice and research platform. In 2008, the university invested 400,000 yuan in the center to build media resource management systems which is rare among domestic universities. In 2009, it invested 1 million yuan to improve the digital resources on the central portal network, upgrade the experimental reservation system, and realize experimental teaching and experimental equipment, and the information management of laboratory security.

Website：http://site.scnu.edu.cn/bkspy/syjxsfzx/

Contact person：Chen Haixiang　+86-18922710335

Liao Zhuihui　+86-13570345584

6. National Engineering Laboratory for Cyberlearning Intelligent Technology

Aimed at the issues such as uneven distribution of high-quality educational resources, inadequate capacity of personalized learning services and so on, National Engineering Laboratory for Cyberlearning Intelligent Technology focuses on the sharing of high-quality educational resources and the urgent need of intelligent educational resources to construct a research platform for cyberlearning intelligent technology. It will support Interactive System for Distance Education, Knowledge Modeling and Analysis, Learner Modeling and Learning Analytics, Design and Assessment of Learning Environment, Systematic Education Governance as well as other technological R&D and engineering.

Website：http://e.bnu.edu.cn/

Contact person：Li Ping　liping@bnu.edu.cn　+86-15801379518

Address: 3&12F, Block A, Jingshi Technology Building, No. 12 Xueyuan South Road, Haidian District, Beijing, China

7. The Smart Learning Institute of Beijing Normal University

The Smart Learning Institute of Beijing Normal University (SLIBNU) is a comprehensive experimental platform involving scientific research, technology development and instructional teaching. SLIBNU is established by Beijing Normal University and jointly constructed with Elernity. SLIBNU focuses on doing research on learning patterns under ICT background to create smart learning environment and platforms for lifelong learning, which will support diversified, personalized and differential learning needs for digital learners.

(1) Research on the methods of design, optimization and evaluation for learning environment as well as developing the key technologies for learning environment engineering aims at providing a widely spread solution for promoting smart learning;

(2) Constructing the theory of smart learning and exploring the approaches of integrating ICT with Education aims at offering an international exchange and cooperation platform to smart learning research;

(3) Study on the characteristics and patterns of schooling, family education, community education, enterprise learning and public learning aims at providing support for constructing a learning-oriented society and smart city;

(4) Expanding the experimental areas and schools for smart learning as well as exploring the characteristics of ICT-based instruction and the models of future schools aims at promoting educational transformation and innovation.

Website：http://sli.bnu.edu.cn/

Contact person：LI Ping　liping@bnu.edu.cn　+86-15801379518

Address: 12F, Block A, Jingshi Technology Building, No. 12 Xueyuan South Road,Haidian District, Beijing, China

Tel：（8610）58807219

E-mail：smartlearning@bnu.edu.cn

8. Network Security Monitoring Center of CERNET

The China Education and Research Network (abbreviation as CERNET) is the first nationwide education and research computer network in China. The CERNET project is funded by the Chinese government and directly managed by the Chinese Ministry of Education. It is constructed and operated by Tsinghua University and the other leading Chinese universities. CERNET has a four-layer hierarchy: the nationwide backbone, regional networks, provincial networks and campus networks. CERNET National Center is located in Tsinghua University, which is responsible for operation and management of CERNET backbone nationwide.

CERNET: China Education and Research Network CERNET is a nation-wide academic computer internet network whose construction is under the charge of state investment. The Ministry of Education is responsible for its management, and Tsinghua University and other higher education institutions undertakes its construction and operation. It is the nation's largest public-interest computer internet network and also the world's largest national academic Internet.

By the end of 2007, the backbone optical fiber of the CERNET network had exceeded 30,000 kilometers, and a network structure based on 160*10G dense wavelength division multiplexing (DWDM) had been established. The DWDM and SDH self-healing ring networks were service bearing platforms. The CERNET backbone network has a transmission rate of 2.5G/10Gbps. It is connected to 38 CERNET master nodes in all provinces across the country, and has nearly 13 million CERNET IP addresses. It is China's largest public-interest computer network and is the major component of China's information foundation.

Tel: (010) 62603366

Fax: (010) 62701898

Address: CERNET Building, Tsinghua Science Park Building 8 Block B, Beijing Zhongguancun East Road No. 1, Beijing

E-mail: contact@cernet.com

Website：http://www.edu.cn/

Contact Person：Chen Shuo　+86-15811074131

Appendix 3 Introduction of Participants

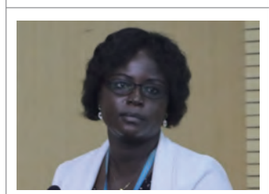
Photo	Name	Date of Birth	Institution	Position
	AHMAT MAHAMAT ZENE DJOUMA	10-06-1976	University of N'Djamena	General Director of Research and Cooperation
	ABDAL KARIM SANOUSSI	25-09-1986	Normal College of Abeche	Accounting Assistant
	ABDELHALIM MAHAMAT BAHAR	15-10-1980	Normal College of N'Djamena	Head of ICT Service
	MAHAMAT YOUSSOUF MAHAMAT NILE		University of Sarh	Director of Academic Affairs and Scolarity
	CHERIF OUCHAR CHERIF	23-02-1983	National Examination and Higher Education Competitions Office	Chief of IT
	DJETOUNAKO CLARISSE	09-12-1975	National Research Center for Development of N'djamena	Deputy Director General

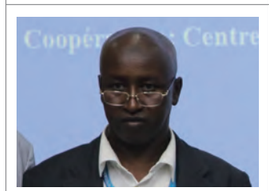
Photo	Name	Date of Birth	Institution	Position
	D JHAMID ZAGALO	X-05-1989	Ati University of Science and Technology	Secretary General
	DJIBRINE ADEF ARAKHAISSE	01-01-1974	University of Doba	Secretary General
	HAROUN HELOUA	01-01-1980	Adam Barka University of ABECHE	Secretary General
	GARSOUK SIDJIM	27-01-1984	Ministry of Higher Education, Research and Innovation(MESRI)	Director of Studies, Statistics and Information System
	HAPSITA DJIBRINE ASSALI	04-04-1988	National Center for University Works	Head of Collection Service
	IBRAHIM BOURMA AHMAT	16-09-1981	King Faisal University of Chad	Director of Human Resources
	KOREY YOUSSOUF ISSA	01-01-1974	Mongo Polytechnic University	Head of Department of Administrative Affairs and Academic Affairs

Photo	Name	Date of Birth	Institution	Position
	LIZINA KONGUE	X-X-1983	Bongor Normal College	Teacher Researcher at Department of Chemistry Physics, Head of Department of Education
	MAHAMAT RAMADANE AMINE	13-08-1990	MESRI	Head of Human Resources Division
	MAHAMAT SALEH AHMAT OUMAR	01-01-1989	MESRI	Deputy Head of SIGASPE
	MADJYADJI BLAISE	23-12-1975	Head of ICT Service	Nomal Technical College of Sarh
	MAHAMOUT MAHAMAT BARAKA	01-01-1986	National Higher Institute of Science and Technology of Abéché	Teacher, researcher, head of the central service of schooling and examinations
	ZAKARIA BRAHIM BACHIR	01-01-1981	MESRI	Deputy Head of Accounting and Finance Division
	AISSA GADJI SINTAL	30-04-1984	Moundou University	Researcher and teacher

Appendix 4 Agenda of the Seminar

Arrival	12 July, Thursday	
	Registration	Registration
Day 1	13 July, Friday	
09:00 - 10:00	**Ice-breaking**	Introduction of the seminar
10:00 - 10:15	**Coffee break**	
10:15- 12:00	**General course**	China's national condition (Nancy Kang, APIETC)
	General course	Basic Chinese speaking (Sunnie Xiao, APIETC)
12:00 - 14:00	**Lunch, Cafeteria of SUStech**	
14:00 - 16:00	**Opening ceremony**	1. Playing videos of SUStech, UNESCO-ICHEI; 2. Speech from Mr. FAN Xiangdong, Vice President of APIETC; 3. Speech from Prof. LI Fengliang, Vice Chairperson of University Council of SUSTech; 4. Speech from Prof. Li Ming, Director of the Center for Higher Education Research; 5. Speech from Chadian representative; 6. Group photo
16:20 - 17:00	**General course**	Safety Briefing (Shenzhen Public Security Bureau)
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 2	14 July, Saturday	
10:00 - 11:30	**Company visit** USI	Visit USI
12:00 - 14:00	**Lunch, Proud Way Hotel**	
14:00 - 17:00	**Cultural visit**	Visit the Cultural Village
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 3	15 July, Sunday	
Morning	**Free**	
12:00 - 14:00	**Lunch, Proud Way Hotel**	
Afternoon	**Cultural visit**	Huaqiang North Commercial Area
18:00 - 19:30	**Dinner, Proud Way Hotel**	

Day 4	16 July, Monday	
09:00 - 12:00	**Professional course**	Policy Analysis of Development of ICT in Education in China (Prof. WU Di, Central China Normal University, Deputy Director of China's National Engineering Research Center)
12:00 - 14:00	**Lunch, Cafeteria of SUStech**	
14:00 - 17:00	**Case study**	ICT application in SUSTech (Mr. SUN Qiaoyu, Deputy Director of Network Information Centre of SUSTech)
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 5	17 July, Tuesday	
09:00 - 11:00	**General course**	Recent China-Africa Cooperation and the development of Shenzhen Special Economic Zone (Dr. LIU Rongxin, Executive Director, Institute of Regional Development Planning Research, China Development Institute)
11:15 - 12:00	**Institution visit**	Materials Testing Center, SUSTech
12:00 - 14:00	**Lunch, Cafeteria of SUStech**	
14:30 - 17:00	**Company visit**	UBTECH
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 6	18 July, Wednesday	
09:00 - 11:00	**Case study**	Smart City Construction (Prof. CHEN Dongping, Dean of Big Data Research Institute of Smart City Shenzhen)
11:15 - 12:00	**Institution visit**	MOOC Centre, SUSTech (Mr.TANG Xiangzheng, UNESCO-ICHEI)
12:00 - 13:30	**Lunch, Cafeteria of SUStech**	
13:30 - 15:00	**Institution visit**	Library, SUSteh
15:40 - 17:00	**Case study**	Smart Policing in Longgang
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 7	19 July,Thursday	
09:00 - 11:00	**Professional course**	Big Data and Finance Technology (Prof. LUO Zongwei, Department of Computer Science and Engineering, SUSTech)
11:15 - 12:00	**Institution visit**	Lab of UVA, AR/VR, Mixed reality, SUSTech
12:00 - 14:00	**Lunch, Cafeteria of SUStech**	
14:00 - 17:00	**Company visit**	HUAWEI Venue: Headquarter of HUAWEI, Shenzhen
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 8	20 July, Friday	
上午	**Going to Guangzhou**	
12:00 - 14:00	**Lunch, Vienna Hotel**	
14:00 - 16:00	**Case study**	Smart Teaching Environment of Sun Yat-Sen University (Mrs. DAO Yan, Deputy Director of Network and Information Technology Center)
16:20 - 17:30	**Institution visit**	MOOC Classroom, South China Normal University
18:00 - 19:30	**Dinner, Vienna Hotel**	
Day 9	21 July, Saturday	
09:00 - 12:00	**Company visit**	Createview
12:00 - 14:00	**Lunch, Vienna Hotel**	
14:00 - 17:00	**Cultural visit**	Chinese traditional painting and calligraphy
18:00 - 20:00	**Cultural visit**	Pearl River
Day 10	22 July, Sunday	
上午	**Flying to Beijing**	
中午	**Lunch, Academy for International Business Officials (AIBO)**	
下午	**Cultural visit**	City tour of Beijing
18:00 - 19:30	**Dinner, AIBO**	
Day 11	23 July, Monday	
10:00 - 12:00	**Institution visit**	Smart Learning Institute of Beijing Normal University National Engineering Laboratory for Cyberlearning and Intelligent Technology
12:00 - 14:00	**Lunch, AIBO**	
14:00 - 17:00	**Company visit**	INCO
18:00 - 19:30	**Dinner, AIBO**	
Day 12	24 July, Tuesday	
08:30 - 10:00	**Professional course**	Reform and Development of China's Higher Education (Mr. SUN Haitao, Deputy Researcher of Office of Policy Research, Tsinghua University)

10:15 - 12:30	**Professional course**	Status and Trends of Distance Higher Education in China (Prof. ZHAN Weiyuan，Faculty of Education, Beijing Normal University)
12:00 - 14:00	**Lunch, AIBO**	
14:00 - 17:00	**Company visit** 赛尔网络 CERNET	CERNET
18:00 - 19:30	**Dinner, AIBO**	
Day 13	25 July, Wednesday	
09:00 - 12:00	**Cultural visit**	Forbidden City
12:00 - 14:00	**Lunch, AIBO**	
14:00 - 17:00	**Cultural visit**	Silk Market
18:00 - 19:30	**Dinner, AIBO**	
Day 14	26 July, Thursday	
08:00 - 14:00	**Cultural visit**	Great Wall
下午	**Back to Shenzhen**	
晚上	**Dinner, Proud Way Hotel**	
Day 15	22 July, Sunday	
09:00 - 12:00	**Professional course**	Online Teaching: Curriculum Development and Implementation 1 (Prof. CAO Xiaoming, Shenzhen University)
12:00 - 14:00	**Lunch, Cafeteria of SUStech**	
14:00 - 17:00	**Professional course**	Online Teaching: Curriculum Development and Implementation 2 (Prof. CAO Xiaoming, Shenzhen University)
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 16	28 July, Saturday	
09:00 - 12:00	**Professional course**	Online Teaching: Curriculum Development and Implementation 3 (Prof. CAO Xiaoming, Shenzhen University)
12:00 - 14:00	**Lunch, Cafeteria of SUStech**	
14:00 - 17:00	**Professional course**	Mind Mapping Aided Teaching (Dr. TANG Xiaolan, Course Designer, Makeblock)
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 17	29 July, Sunday	
上午	**Free**	
12:00 - 14:00	**Lunch, Proud Way Hotel**	
下午	**Cultural visit**	Luohu Commercial City
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 18	30 July, Monday	
09:00 - 12:00	**Company visit** 国泰安 让教育更智慧!	GTA
12:00 - 14:00	**Lunch, Proud Way Hotel**	
14:00 - 17:00	**Company visit** KANDAO	GTA
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 19	31 July, Tuesday	
08:30 - 10:50	**Presentation and evaluation**	Group Presentation
11:00 - 12:00	**Closing Ceremony**	1. Speech from Mr. FAN Xiangdong, Vice President of APIETC; 2. Speech from Prof. Li Ming, Director of the Center for Higher Education Research; 3. Speech from Chadian representative; 4. Director Li Ming presents certificates of completion of the seminar 5. Play completion video; 6. Group photo Venue: International Conference Hall, SUStech
12:00 - 14:00	**Lunch, Cafeteria of SUStech**	
下午	**Free**	
18:00 - 19:30	**Dinner, Proud Way Hotel**	
Day 20	1 August, Wednesday	
All day	**Check out and Departure**	