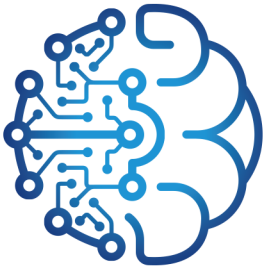
2015

White Paper:

Smart Learning Environments in China 2015

（Executive Summary）



Smart Learning Institute of Beijing Normal University

September 2015, Beijing

Smart Learning Institute of Beijing Normal University

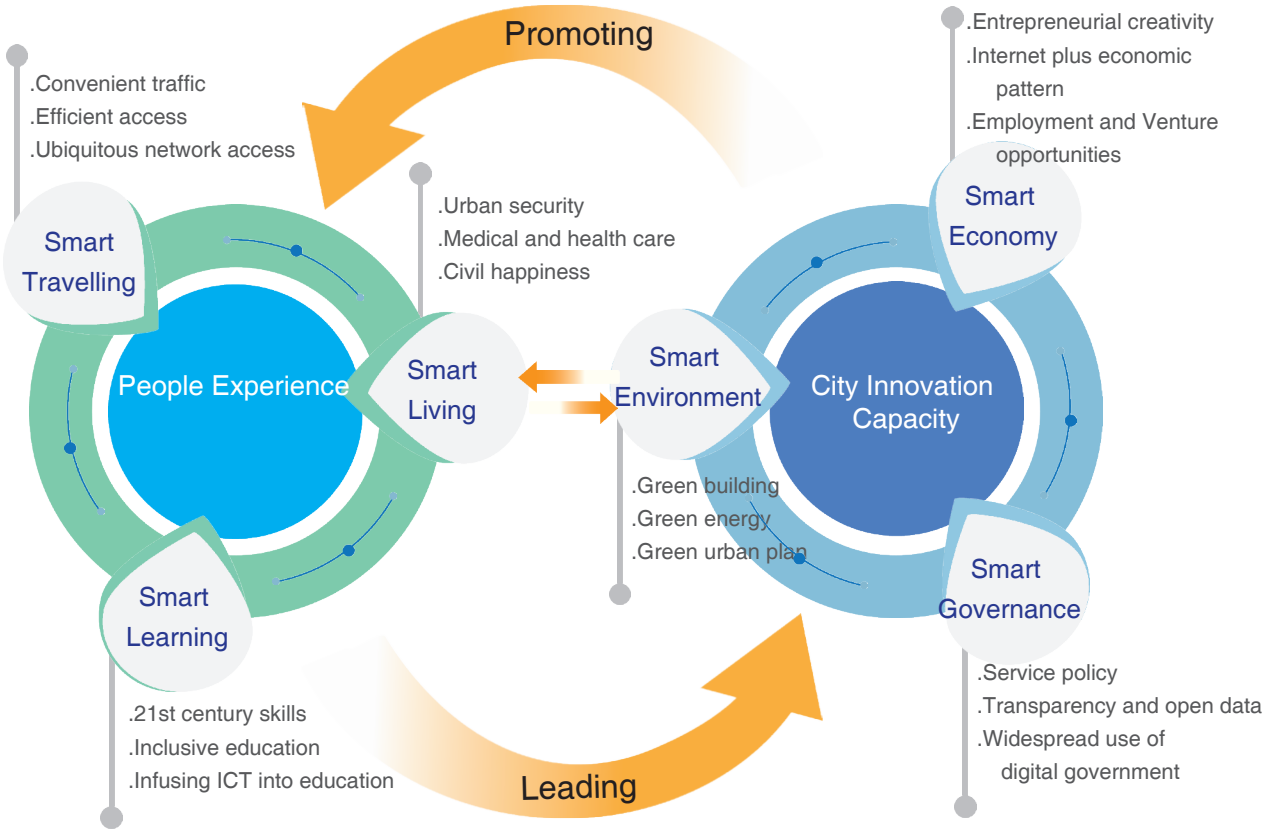
Learning and Smart Learning Environments

“Livability and Innovation”: the Dual-core System of a Smart City

With “People Experience of Smart Living" and **"City Innovation capacity"** as the dual-core, a smart city has the characteristics of **smart travelling, smart living, smart learning, smart economy, smart environment** and **smart governance**.

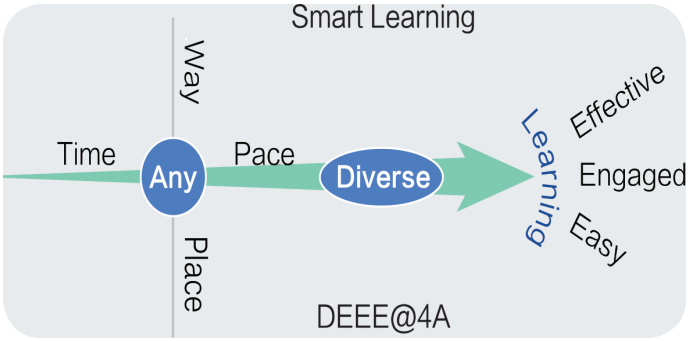
Livability and innovation are fundamental drivers of city development,
core objectives of promoting the city to operate healthily and dynamically,
and efficient ways of solving those difficulties associated with the development of a "Smart City".

"Smart Learning" plays a supportive role in leading city innovation capacity in culture and promoting people experience of smart living with high technology.



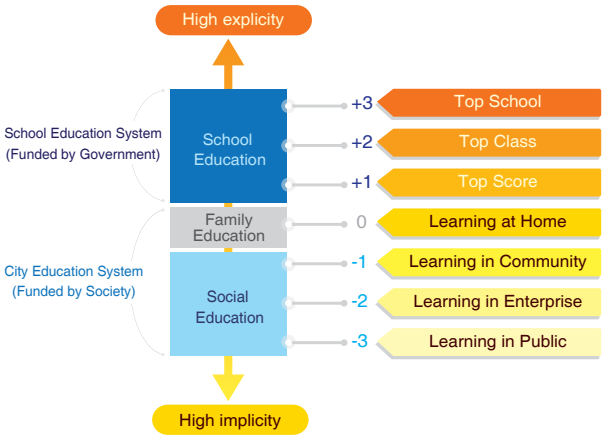
Smart Learning Environments DEEE @ 4A

As a type of learning system, smart learning can perceive learning environments comprehensively and recognize learners' characters, provide suitable learning resources and convenient interactive tools, track learning progress automatically and assess learning outcomes with support of the Internet of Things (IoT), big data systems, artificial intelligence techniques, and other modern high technologies. Smart learning can support learners' lifelong learning, career development and self-actualization effectively.



In a smart learning environment, learners can learn in **Any Time**, **Any Place**, **Any Way**, and at **Any Pace** (4A for short). This kind of learning environment can also support learners with the experience of **Easy**, **Engaged** and **Effective** Learning (3E for short).

Social Cognition for Different Learning Scenarios



There are three types of learning: explicit school education, implicit social education, and family education sitting between them, in perspective of social cognition.

For school education, people generally believe that attending "top school" is the best choice followed by attending "top class" and achieving "top score". For social education setting, learning in community, learning in enterprise and learning in public are important components of learning. However, they are often neglected because of their implicitness. Family has been one of the primary source of learning. Family education is neutral for that some families take learning at home very seriously but others not. Someone also argued that family education is part of social education.

Map of Three Realms of Smart Education System

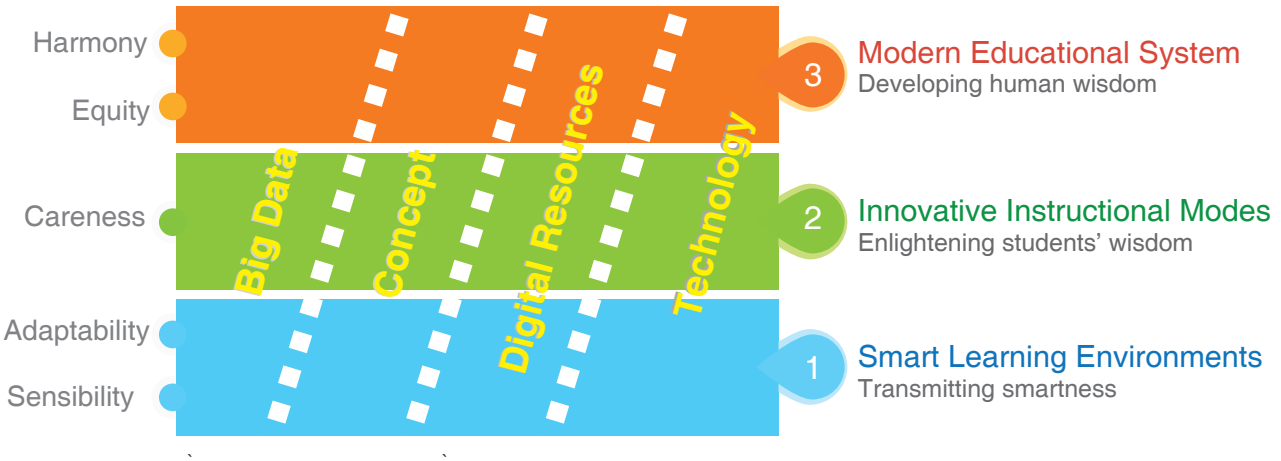
The essential features of smart education are sensibility towards the learning environment, adaptbility of learning content to learners, respect and careness from educators towards students, equal learning opportunities among all learning groups, and orchestration of different elements within education system.

Firstly, sensibility toward the learning environment and adaptability of learning content to learners are the key features of smart learning environments, with which the education system make people experience the SMARTNESS.

Secondly, the personality and diversity of students will be respected under the innovative learning modes, which help students learn in an easy, engaged, and effective way. The core objective is to help to enlighten students' wisdom.

Finally, with the support of big data, we can analyze and simulate the schools' setting in one area, education finance, employment channels, students' selection and other subsystems of the education system, and also the development of their relationships among those subsystems in advance. This kind of information provides evidences for reformation and decision making in teaching system, school administration system, and even the education system at the provincial and national level. The analysis and stimulation with big data can help to innovate the talents cultivation system, and promote educational equity across urban and rural, across regions and schools, which aims to develop a modern education system that supports the development of human wisdom.

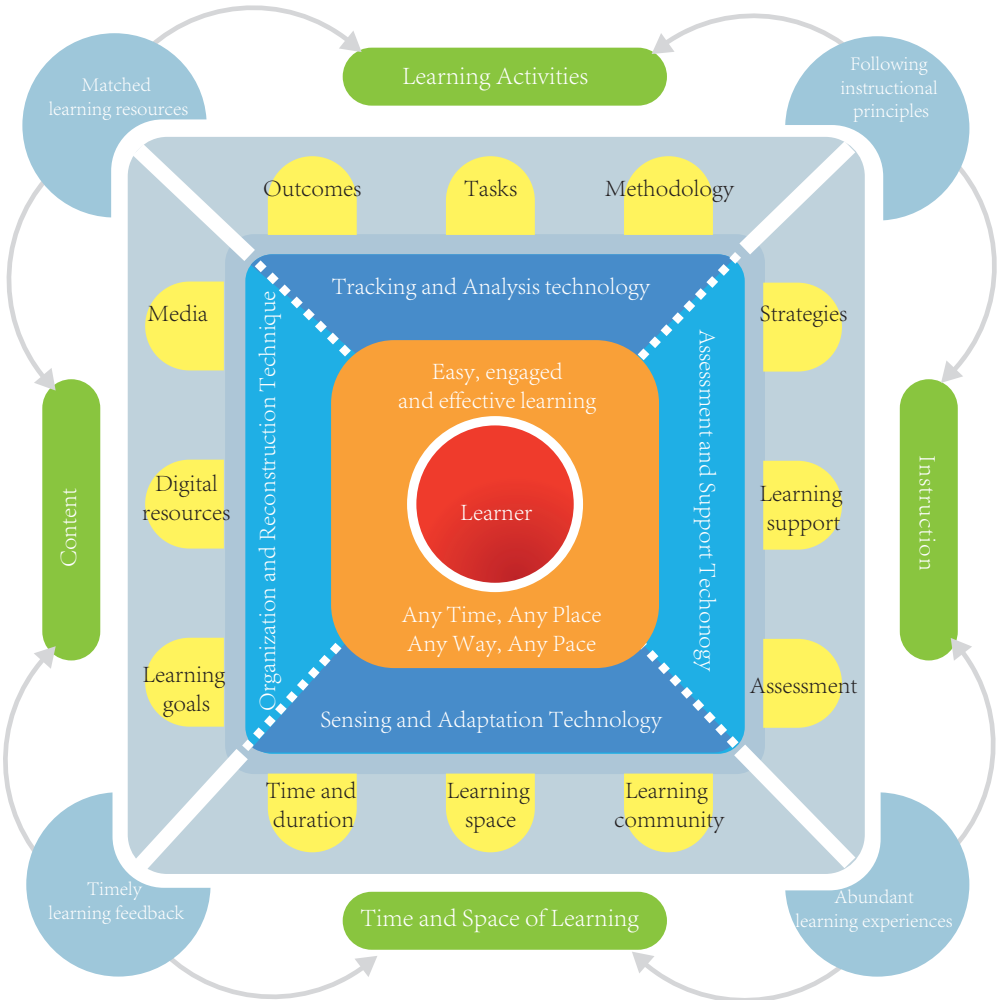
—— Huang, R. (2014). Three realms of smart education: smart learning environment, ICT teaching mode and modern educational system. Modern Distance Education Research, (06), 3-11.



A Framework for Smart Learning

A complete smart learning system, by positioning the learner as the core, can be categorized into four levels from inside out: **learner's experience**, **digital learning support technology**, **key elements of learning scenario** and **teaching and learning logic**. Teaching and learning logic should be followed by four basic principles: **matched learning resources**, **following instructional principles**, **abundant learning experience** and **timely learning feedback**.

There are four types of digital learning support technology: 1) the technique of environmental perception, context sensibility and learning adaptability, oriented towards learning time and space; 2) the technique of teaching assessment and learning support oriented towards teaching activities; 3) the technique of dynamic tracking and learning analysis oriented towards learning activities; 4) the technique of knowledge organizing and reconstructing oriented towards learning contents.



Comparison of Traditional Classroom Learning, Digital Learning and Smart Learning

	Traditional Classroom Learning	Digital Learning	Smart Learning
Learning Outcomes	Knowledge-nibbled learning, in unified forms	Knowledge-connected learning, in diverse form	Knowledge-connected learning,self-adjustment
Learning Tasks	Same tasks	Different tasks	Personalized and differentiated tasks
Learning Methodology	Face to face learning	Blended learning	Seamless learning
Instructional Strategies	Lecturing with questioning and discussing	Multiple strategies	Guiding toward personalized learning
Learning Support	Q&A after class	Online support	Communicating in Multiple ways and supporting with intelligent system
Assessment	Standardized tests	Online assessment	Adaptive assessment
Learning Community	Groups and classes arranged by school	Virtual community in themes, participating with approval	Virtual community in themes, recommended and matched automatically
Learning Space	Physical space	Physical and virtual space	Intelligent learning space
Learning Pace and Sequence	Unified	Flexible	Unlimited
Learning Goal	Unified	Diverse	Personalized
Learning Resources	Printed Textbooks, arranged by schools	E-textbooks and online resources, recommended by teachers	Multiple types of digital resources, accessed easily and pushed intelligently
Media	Paper media	Paper media + online media	Across devices, rich media

Digital Campus and Smart Learning

The Development of Project which Connects Schools with Broadband Network

Broadband network access conditions in addition to software and hardware facilities are provided for each school in order to establish the basic digital teaching and learning environment to integrate ICT into education. They include: They include:

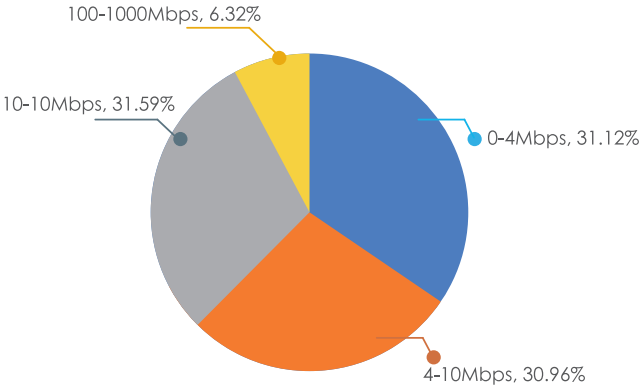
- Providing necessary broadband network access conditions for each school;
- Providing necessary facilities, software and resources for each classroom;
- Equipping each teacher with the basic teaching abilities which supports them while working in the ICT-based environment.

The Current State of Digital Campus Development

The broadband Internet access in K-12 schools

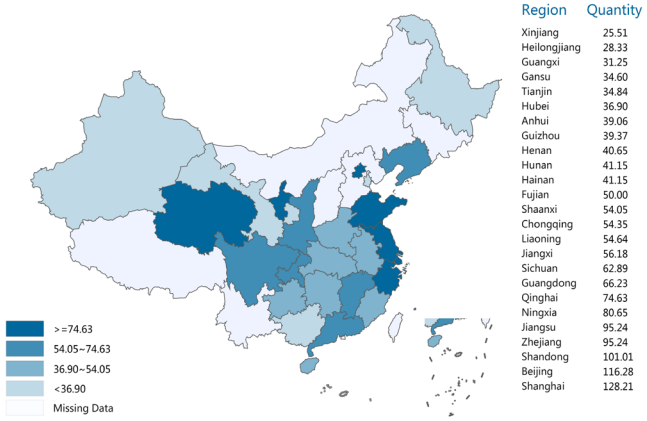
By the end of 2014, more than 37 percent of K-12 schools have broadband internet access with a speed of 10Mbps and above, whereas 31.1 percent of the total have a speed of 4Mbps and below. 6.3 percent of the total has a speed of 100Mbps and above.

Data Source: Report on ICT in Education in China (2014)



The Bandwidth of Broadband Internet Access in K-12 Schools

The number of computers per hundred teachers possessed in K-12 Education



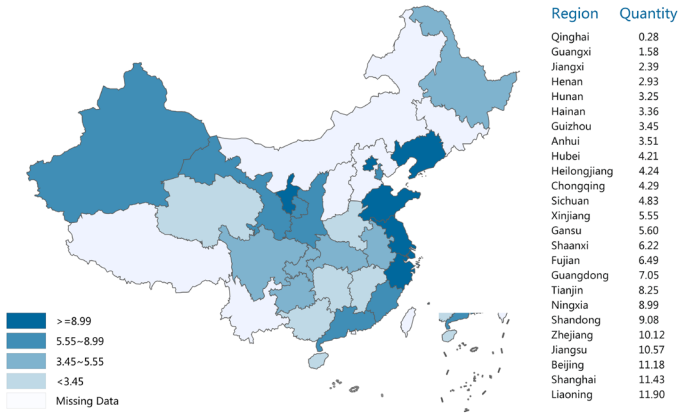
Region	Quantity
Xinjiang	25.51
Heilongjiang	28.33
Guangxi	31.25
Gansu	34.60
Tianjin	34.84
Hubei	36.90
Anhui	39.06
Guizhou	39.37
Henan	40.65
Hunan	41.15
Hainan	41.15
Fujian	50.00
Shaanxi	54.05
Chongqing	54.35
Liaoning	54.64
Jiangxi	56.18
Sichuan	62.89
Guangdong	66.23
Qinghai	74.63
Ningxia	80.65
Jiangsu	95.24
Zhejiang	95.24
Shandong	101.01
Beijing	116.28
Shanghai	128.21

Number of Computers per Hundred Teachers Possessed in K-12 Education in Different Regions

In Shandong, Beijing, and Shanghai the number of computers per hundred teachers possessed has reached 100 and above. However, this ratio is lower in Xinjiang, Heilongjiang, Guangxi, Gansu and some other provinces.

Data Source: 2014 Statistics from Ministry of Education, China

The number of computers per hundred students possessed in K-12 Education



Region	Quantity
Qinghai	0.28
Guangxi	1.58
Jiangxi	2.39
Henan	2.93
Hunan	3.25
Hainan	3.36
Guizhou	3.45
Anhui	3.51
Hubei	4.21
Heilongjiang	4.24
Chongqing	4.29
Sichuan	4.83
Xinjiang	5.55
Gansu	5.60
Shaanxi	6.22
Fujian	6.49
Guangdong	7.05
Tianjin	8.25
Ningxia	8.99
Shandong	9.08
Zhejiang	10.12
Jiangsu	10.57
Beijing	11.18
Shanghai	11.43
Liaoning	11.90

In Beijing, Shanghai, Liaoning, Jiangsu, Zhejiang, Shandong, Ningxia and some other provinces, the number of computers per hundred students have almost reached the Student-Computer ratio required by the national regulation. But, in Qinghai, Guangxi, Jiangxi, Henan and some other provinces, this number is far lower than what is required.

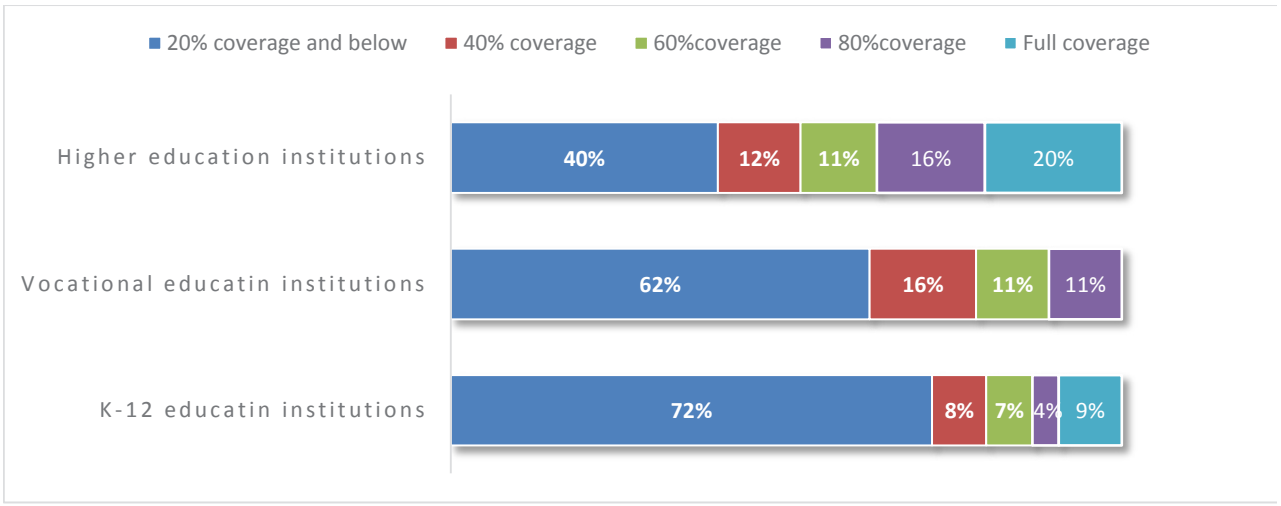
Data Source: 2014 Statistics from Ministry of Education, China

The Number of Computers per Hundred Students Possessed in K-12 Education in Different Regions

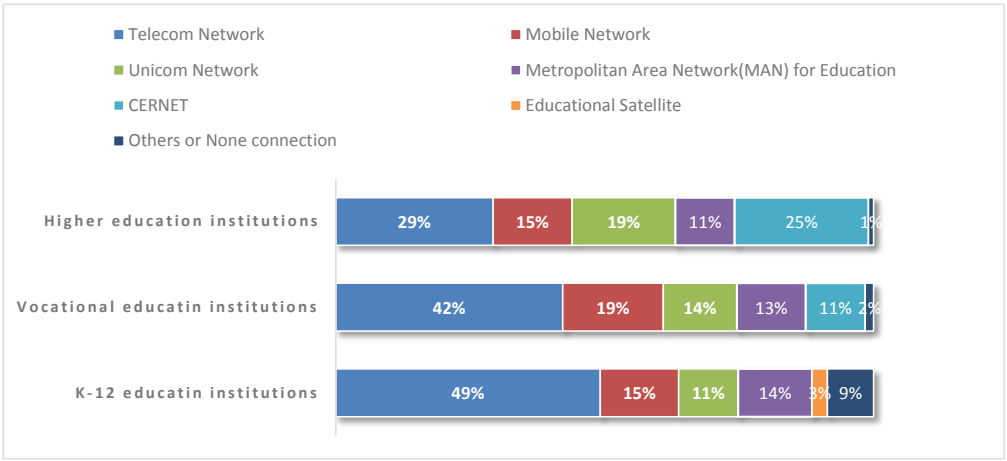
Campus wireless network coverage among different levels of schools

Among all schools that participated in this survey, 20 percent of the higher education institutions and 9 percent of the K-12 education schools achieved full wireless network coverage. In contrast, none of the vocational education institutions have full coverage.

Data Source: Report on ICT in Education in China (2014)



Campus wireless network coverage among different levels of schools



Type of network campus network used among different levels of schools

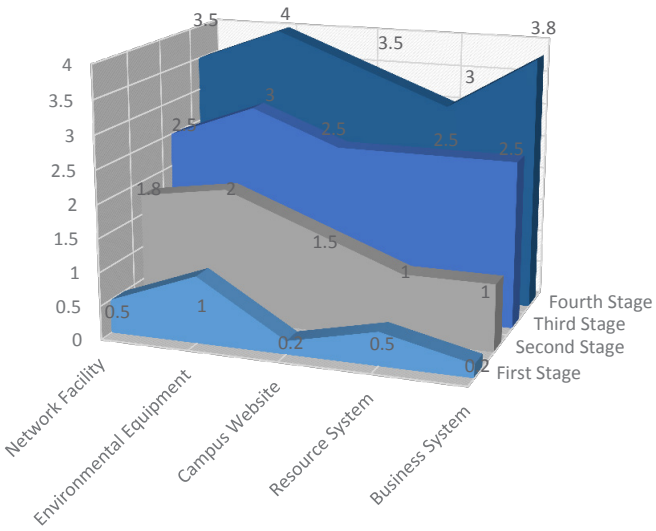
Among selected K-12 education schools, vocational, and higher education institutions, the main type of network used in their campus network is the Telecommunication network. Apart from this, CERNET is another common network type used in vocational and higher education institutions, but not in K-12 schools.

Data Source: Report on ICT in Education in China (2014)

Digital Campus

Digital campus aims to support student learning effectively, and promote innovation in teaching modes. With providing service as its basic concept, Digital campus creates an ICT-based campus environment which has abundant digital resources, diverse application systems and highly integrated related business. The objectives of Digital campus are to expand time and space dimensions of the campus, enrich school culture and optimize process of teaching, research, management, service, and so forth.

The development of Digital campus can be divided into four stages. At the moment, most of our national Digital campus are at the early phase of the third stage, whereas some regions and schools have already shown a tendency of transition from the third stage to the fourth stage. The fourth generation of Digital campus can be considered as the "Smart Campus". "Smart Campus" is the ultimate aim of the Digital campus development.

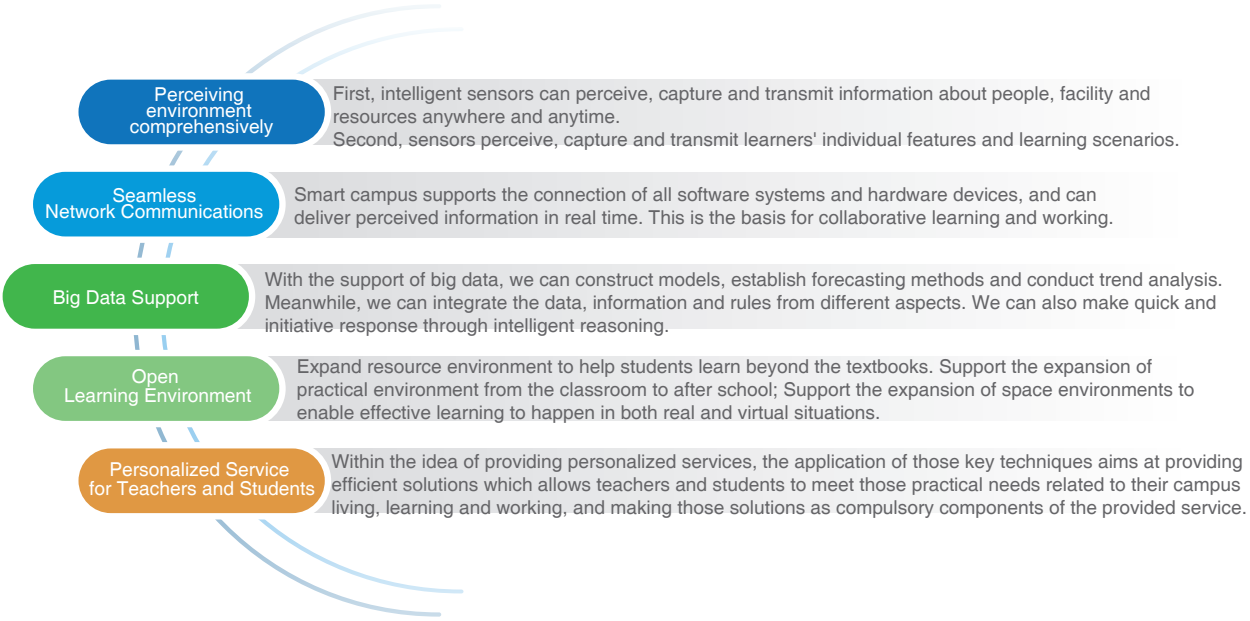


The Development Stages of Digital Campus

Smart Campus

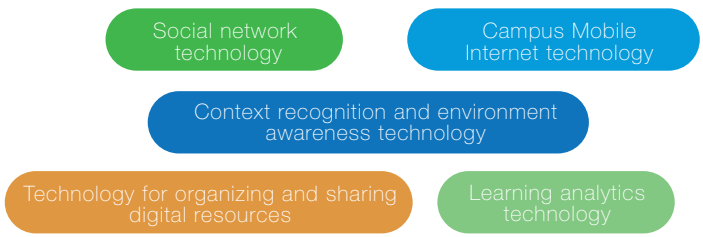
As one kind of typical smart learning environments, Smart Campus takes the idea of providing personalized service to teachers and students as its main aim. Smart Campus is an open education environment , also a convenient and comfortable living environment, which can perceive the physical environment comprehensively, recognize learners' individual features and learning scenario, provide seamless and interconnected network communications, and provide efficient support to the analysis of teaching procedures, assessment and intelligent decision making process.

Features of Smart Campus



Five intelligence techniques facilitating the development of digital campus

The current development of Digital campus lays the foundation for future smart campus. There are mainly five intelligence techniques that can facilitate the development of smart campus:



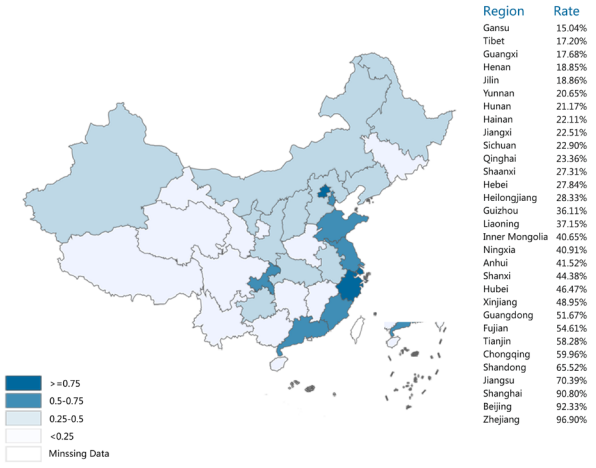
Classroom Environments and Smart Learning

The Project of Providing Each Class with Quality Digital Learning Resources

- Extend the coverage of quality education resources through the use of ICT-based methods
- Improve the quality and efficacy of classroom teaching through the use of ICT-based methods
- Innovate classroom teaching and support the transformation of instructional models and learning through the use of ICT-based methods.

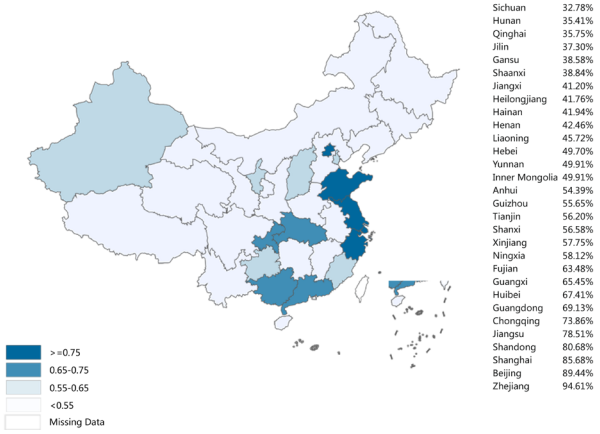
The Current State of Classroom Development

Multimedia Classroom



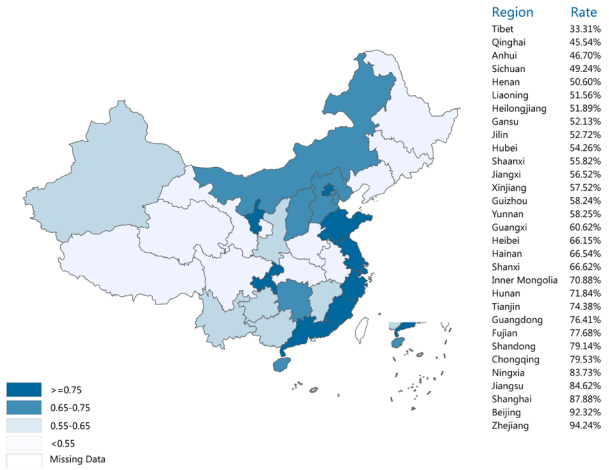
Region	Rate
Gansu	15.04%
Tibet	17.20%
Guangxi	17.68%
Henan	18.85%
Jilin	18.86%
Yunnan	20.65%
Hunan	21.17%
Hainan	22.11%
Jiangxi	22.51%
Sichuan	22.90%
Qinghai	23.36%
Shaanxi	27.31%
Hebei	27.84%
Heilongjiang	28.33%
Guizhou	36.11%
Liaoning	37.15%
Inner Mongolia	40.65%
Ningxia	40.91%
Anhui	41.52%
Shanxi	44.38%
Hubei	46.47%
Xinjiang	48.95%
Guangdong	51.67%
Fujian	54.61%
Tianjin	58.28%
Chongqing	59.96%
Shandong	65.52%
Jiangsu	70.39%
Shanghai	90.80%
Beijing	92.33%
Zhejiang	96.90%

The coverage rate of multimedia classroom in primary schools in China
Data Source: 2014 Statistics from Ministry of Education, China



Region	Rate
Tibet	21.54%
Sichuan	32.78%
Hunan	35.41%
Qinghai	35.75%
Jilin	37.30%
Gansu	38.58%
Shaanxi	38.84%
Jiangxi	41.20%
Heilongjiang	41.76%
Hainan	41.94%
Henan	42.46%
Liaoning	45.72%
Hebei	49.70%
Yunnan	49.91%
Inner Mongolia	49.91%
Anhui	54.39%
Guizhou	55.65%
Tianjin	56.20%
Shanxi	56.58%
Xinjiang	57.75%
Ningxia	58.12%
Fujian	63.48%
Guangxi	65.45%
Huibei	67.41%
Guangdong	69.13%
Chongqing	73.86%
Jiangsu	78.51%
Shandong	80.68%
Shanghai	85.68%
Beijing	89.44%
Zhejiang	94.61%

The coverage rate of multimedia classroom in junior high schools in China
Data Source: 2014 Statistics from Ministry of Education, China



Region	Rate
Tibet	33.31%
Qinghai	45.54%
Anhui	46.70%
Sichuan	49.24%
Henan	50.60%
Liaoning	51.56%
Heilongjiang	51.89%
Gansu	52.13%
Jilin	52.72%
Hubei	54.26%
Shaanxi	55.82%
Jiangxi	56.52%
Xinjiang	57.52%
Guizhou	58.24%
Yunnan	58.25%
Guangxi	60.62%
Heibei	66.15%
Hainan	66.54%
Shanxi	66.62%
Inner Mongolia	70.88%
Hunan	71.84%
Tianjin	74.38%
Guangdong	76.41%
Fujian	77.68%
Shandong	79.14%
Chongqing	79.53%
Ningxia	83.73%
Jiangsu	84.62%
Shanghai	87.88%
Beijing	92.32%
Zhejiang	94.24%

The coverage rate of multimedia classroom in high schools in China
Data Source: 2014 Statistics from Ministry of Education, China

	City	Town	Countryside
Primary School	70.85%	44.14%	18.75%
Junior High School	71.88%	53.56%	39.68%
High School	73.07%	57.26%	53.32%

The coverage rate of multimedia classroom in primary and secondary schools in different areas
Data Source: 2014 Statistics from Ministry of Education, China

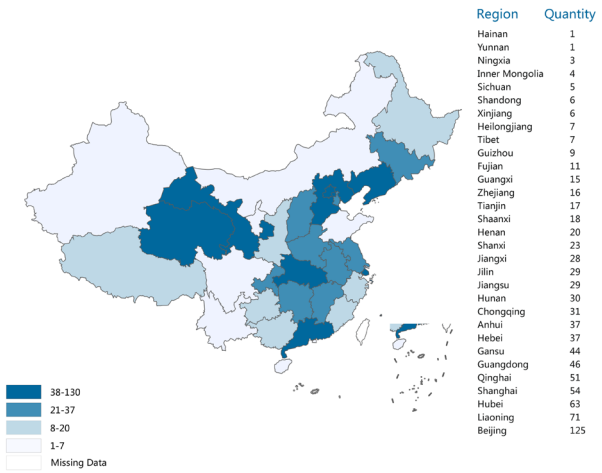
Computer Labs

In Jiangsu, Shanxi, and Ningxia, the possessed area of computer labs per millions of primary students is 1900m^2~2100m^2 , larger than that in other regions. In Xinjiang, Shanghai and Jiangsu, the possessed area of computer labs per millions of junior high school students is 3000m^2~4300m^2, larger than that in other regions. In Jiangsu, Shanghai and Beijing, the possessed area of computer labs per millions of high students is 5500m2~7500m2, larger than that in other regions.

Interactive Whiteboard Classroom

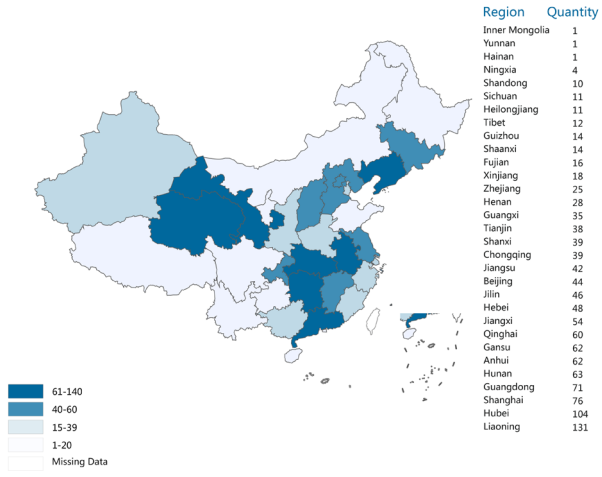
Classrooms that are equipped with interactive whiteboards represent around 1/3 of multimedia classrooms.

Tablet PC based Classroom



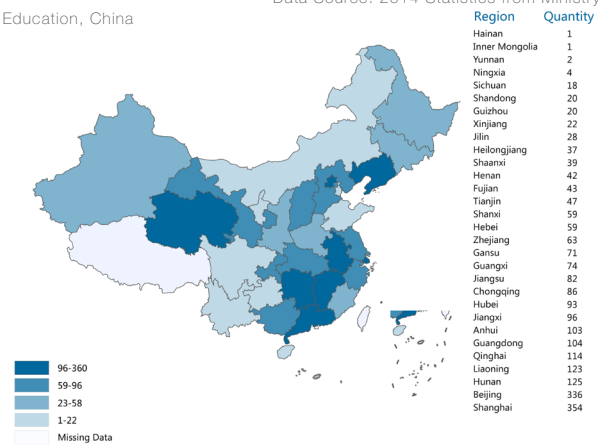
Region	Quantity
Hainan	1
Yunnan	1
Ningxia	3
Inner Mongolia	4
Sichuan	5
Shandong	6
Xinjiang	6
Heilongjiang	7
Tibet	7
Guizhou	9
Fujian	11
Guangxi	15
Zhejiang	16
Tianjin	17
Shaanxi	18
Henan	20
Shanxi	23
Jiangxi	28
Jilin	29
Jiangsu	29
Hunan	30
Chongqing	31
Anhui	37
Hebei	37
Gansu	44
Guangdong	46
Qinghai	51
Shanghai	54
Hubei	63
Liaoning	71
Beijing	125

The number of Tablet PC per 10,000 students possessed in primary schools in China
Data Source: 2014 Statistics from Ministry of Education, China



Region	Quantity
Inner Mongolia	1
Yunnan	1
Hainan	1
Ningxia	4
Shandong	10
Sichuan	11
Heilongjiang	11
Tibet	12
Guizhou	14
Shaanxi	14
Fujian	16
Xinjiang	18
Zhejiang	25
Henan	28
Guangxi	35
Tianjin	38
Shanxi	39
Chongqing	39
Jiangsu	42
Beijing	44
Jilin	46
Hebei	48
Jiangxi	54
Qinghai	60
Gansu	62
Anhui	62
Hunan	63
Guangdong	71
Shanghai	76
Hubei	104
Liaoning	131

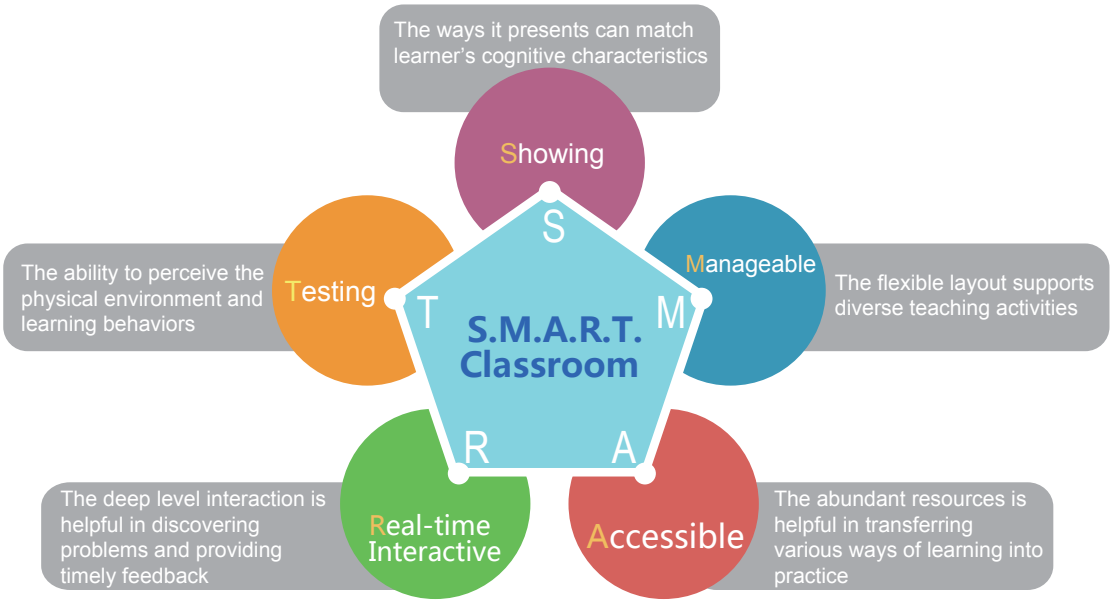
The number of Tablet PC per 10,000 students possessed in junior high schools in China
Data Source: 2014 Statistics from Ministry of Education, China



Region	Quantity
Hainan	1
Inner Mongolia	1
Yunnan	2
Ningxia	4
Sichuan	18
Shandong	20
Guizhou	20
Xinjiang	22
Jilin	28
Heilongjiang	37
Shaanxi	39
Henan	42
Fujian	43
Tianjin	47
Shanxi	59
Hebei	59
Zhejiang	63
Gansu	71
Guangxi	74
Jiangsu	82
Chongqing	86
Hubei	93
Jiangxi	96
Anhui	103
Guangdong	104
Qinghai	114
Liaoning	123
Hunan	125
Beijing	336
Shanghai	354

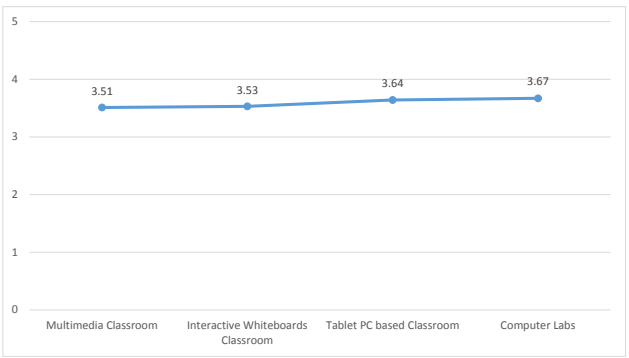
The number of Tablet PC per 10,000 students possessed in high schools in China
Data Source: 2014 Statistics from Ministry of Education, China

"SMART" Conceptual Model of Smart Classroom

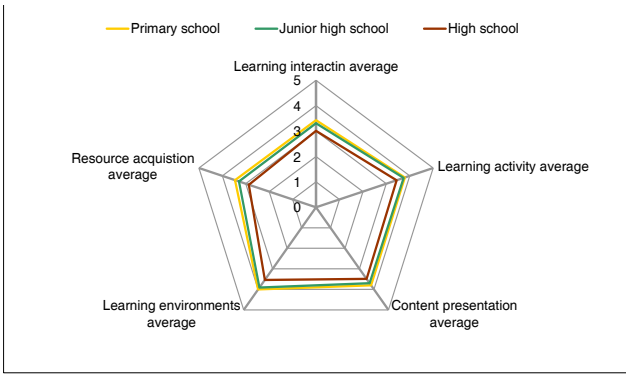


Results from the "Survey of Student's Learning Experience with Classroom Environments" by Our Team

Students' learning experience varies according to different types of classroom environments and different learning stages.



General situation of students' learning experience in different types of classroom environments



Students' learning experience in different learning stages

The List of Devices Allocated for New Generation of Multimedia Classroom

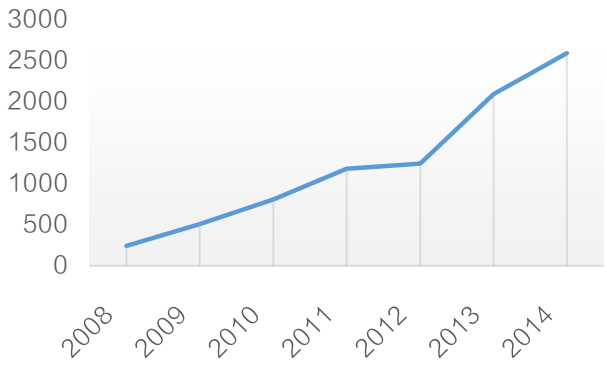
Devices	Traditional Multimedia Classroom	New Generation of Multimedia Classroom
Projector + Screen	√	√
Computer used for teaching purpose	√	√
Multimedia console table	√	√
High-speed wireless network		√
Omnidirectional tracking high-definition camera		○
Multiple display screens		√
Cloud service platform		√
Intelligent sensor		○
Open-source teaching platform		√
Chairs that can be moved and assembled easily		√
Interactive feedback device		○
Tablet PC used for teaching purpose		√
Virtual simulation device		○

Note: √ represents for essential devices, and ○ represents for optional devices

Corporate University and Smart Learning

Development Status of Corporate University

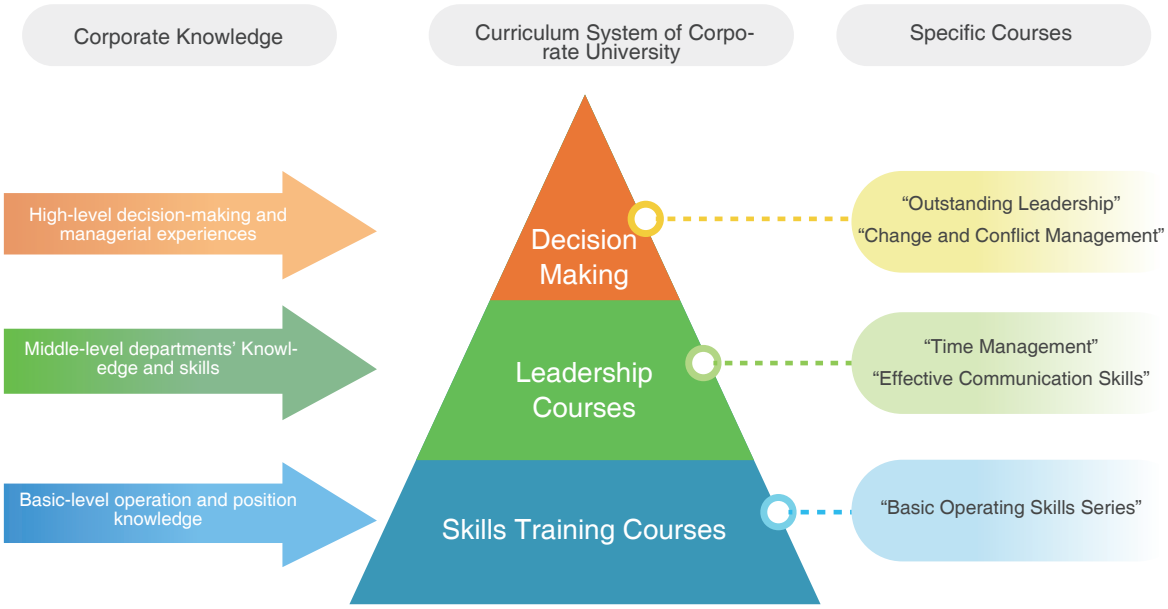
In 1993, MOTOROLA first introduced the concept of corporate university into China. By the end of 2012, the number of Chinese corporate universities reached 1186. Later, the number grew at a rate of more than 800 per year. In light of such expansion, there will be more than 2500 corporate universities by 2014.



The Trend of Growth for Number of Corporate Universities established from 2008 to 2014

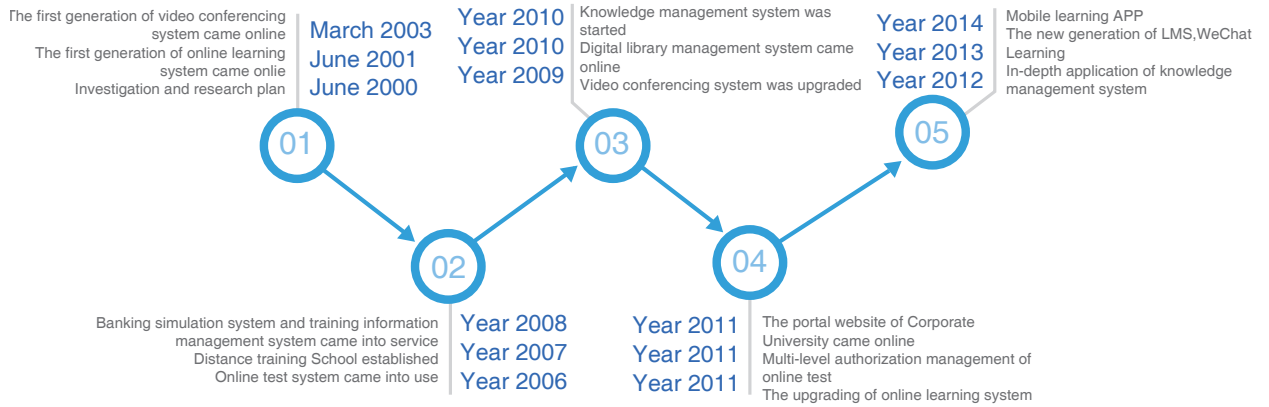
The curriculum of a corporate university is composed of unique knowledge of each position and common knowledge within the whole corporate.

Offered course could be divided into 3 types: general, professional/technical and managerial.



Corresponding Relations between Corporate Knowledge and Corporate University Curriculum System

A bank corporate university began to develop their learning platform in 2001. It is one of the pioneers who first introduced distance training into their program. This corporate university has experienced three stages: establishing, developing and deepening stage.



The development Stages of a Bank Corporate University's Learning Platform

Corporate university should be established after the mature stage of the corporation, providing it with learning services. The establishment of corporate university shows the continuing upgrades of the corporation's managerial departments and the expansion of their service objects.

Data Source: Corporate universities implementation tool set, Jing Tao, 2009.

Development Stages	Establishing Stage	Developing Stage		Maturing Stage	Sustainable Development	
Evolution of Learning Service Organization	-Administrative department -Personnel department	-Human resources department -Training department	-Training center -Learning & Development Center -Human resource development center	Internal-oriented corporate university	External-oriented corporate university serving for supply chain	External-oriented corporate university serving for society
Features	-There is no professional training position or clear training plan, but emergency training. -It will gradually transit to human resources department	-Professional training positions aiming at designing annual training plan were set up. It selects courses and builds training systems according to the demand of organization growth and requirements of positions. -Set up training departments which belong to human resources department.	-Relatively well-developed training system has been built. It focuses on employees' career plan, customized internal training courses, and establishment of the faculty system. -A training institute that is independent from the human resources department, which became an early format of corporate University.	-By taking the hardware into account,, it has independent training base station and advanced teaching facilities. -From the perspective of software, it has well-developed training system and management system.	Service objects have been extended to suppliers, clients and cooperative partners. It supports the integration of supply chain and business development.	-It has advantaged training resources and brand influence. -Serving objects have been extended to the whole society. It helps the corporate improve their public image and profit.
Service objects	Internal middle and basic level employees		Internal middle and senior level employees	Internal employees	The whole supply chain	The whole society

The Stages and Features of Corporate Learning

Smart Learning in Corporate University

Corporate university's smart learning is one form of the learning organization evolution. It means that the corporate has the ability of continuing learning and can bring staff's creative thinking into full play. This creates an atmosphere that encourage knowledge sharing and interaction. Corporate university smart learning has become a necessary trend for future corporate development because of its intelligence and adaptability.

Corporate university	Dimensions of Smart Learning Features	Status of learning that Corporate University needs to reach for the future
Technological support	Tracking and analysis technique	With the support of tracking and analysis techniques, statistics of staffs' learning behavior, such as number of times staff logged into the system, time they spent online and comments they made publicly, could be captured. Thus, staff's learning state could be learnt and appropriate assistance could be provided timely according to their learning state.
	Assessment and Support technique	With the support of rich learning resources and learning activity management system, digital textbooks are used and act as the supplement for traditional paper textbooks.
	Perceiving and adaptation technique	Based on the innovative idea of deploying interactive information technology a complete set of teaching equipment include Smart phones, Tablet PCs and whiteboard Display are used. This enables the integration of excellent and abundant teaching resources and the emergence of the network learning environment that supports the human-computer interaction and real-time interaction.
	Organizing and reconstruction technique	Enrich learning methods through high technologies. For example, it uses CD to achieve human-computer interaction and self-learning, uses terminal technology and Internet to provide long distance training in large-scale, and so forth. This allows radical change of training and education modes.
Learning system	Staff learning content	In future, the main learning methods will be the fragmentation learning. Corporate university learning has characteristic of short term, content focused, meeting future employees' instant needs of searching, learning, and applying. The scope of learning content can be extended to case and experience sharing, some standard work regulations, and so forth.
	Staff learning activity	It can provide employee with both face-to-face teaching and online teaching It does not only support collective learning, but also individualized learning.
	Corporate learning time and space	Employees can extend the corporate learning activity from the corporate environment to social living environment through the use of virtual classroom, instant messaging and micro world techniques.
	Training and instructional activities	Training and teaching activities occurs in many formats, such as group discussion, asking questions in online chat rooms. This can help employees reduce the feeling of uninteresting and anxiety that come along with the training process. In addition, classroom teaching can also use smart teaching environment to capture employees' demands timely. This allows instructors adjust their teaching contents according to the actual situation.

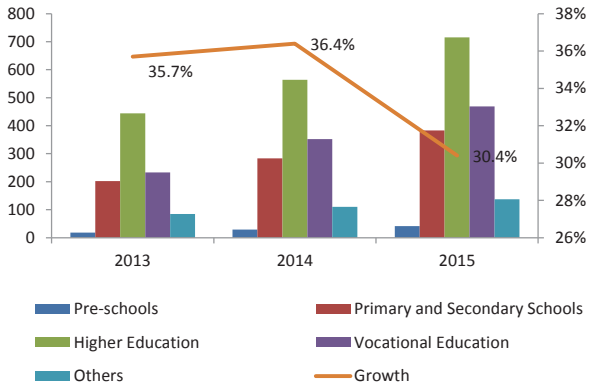
The Features of Corporate University Smart Learning

Industrial Growth and Pattern of Smart Learning

The Current State of Industry Development

Industries covers areas of lifelong learning. Industries involve pre-school education, primary and secondary school education, colleges and universities, vocational universities, corporate, governments, personal development, and so forth. Both government online education and corporate online education receive attention from the public. The growth of the online education market is evident, increasing at the rate of more than 30% per year.

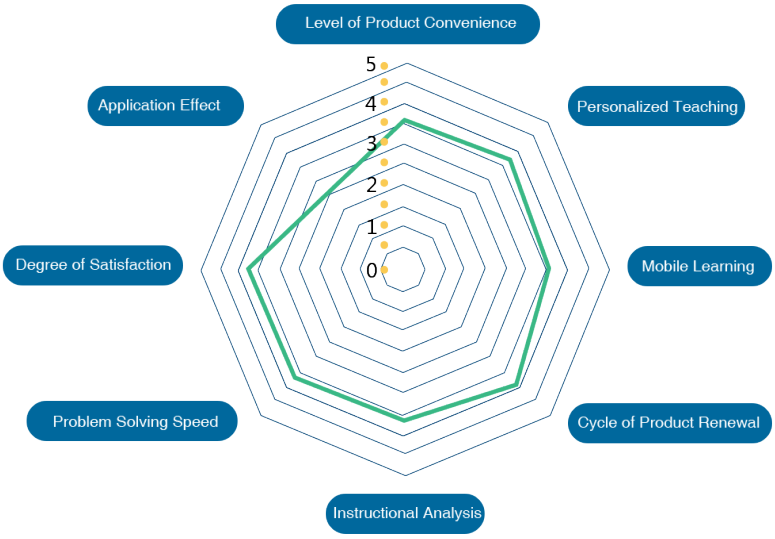
Data Source: Chinese Preschool Education Development Research and Investment Prospect Forecast Report (2013-2018), 2013.



Online Education Market Scale Growth from 2013 to 2015

The application effect is the weakness of the whole smart learning industry. On one hand, the online education industry is limited by the lack of interaction, lack of learning motivation, and lack of enthusiasm. On the other hand, this industry is still in its infancy stage and wider adoption of its applications is required.

Data resource: Specific survey launched by the project team

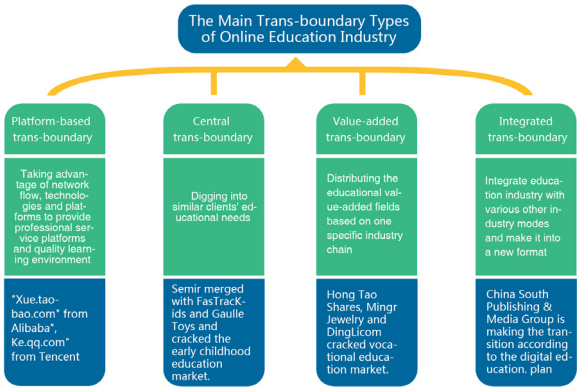


Current Status of Learning Industry Evolution

The Framework of Industrialization

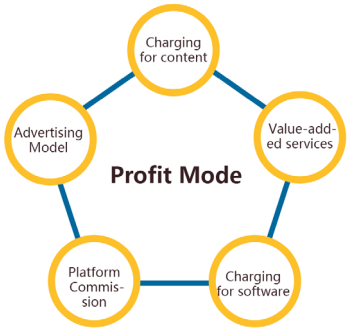
The actions of trans-boundary enterprises' are encouraged after the increase of the investment potential of learning industry is seen. The trans-boundary enterprise can be divide into four types: platform-based trans-boundary, central trans-boundary, value-added trans-boundary, integrated trans-boundary.

Data source: Tao, R.(2014). Trans-boundary is Popular in the Education Industry this Year.



Discover new revenue making models based on the traditional charging model. Domestic online learning industries normally make revenue by charging learning contents, services, software, platform commissions and advertisements.

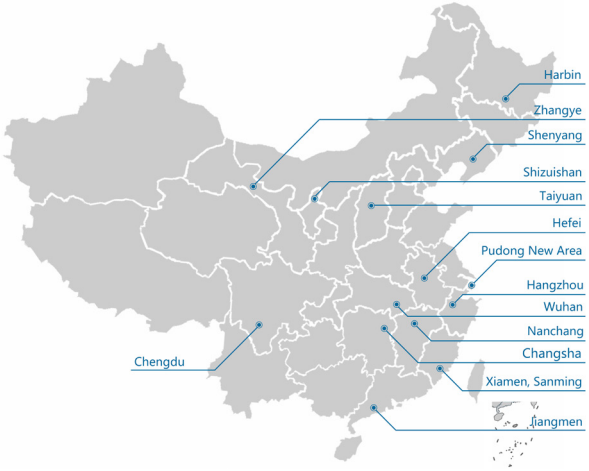
Data source: Industry Information Network, Chinese Online Education Market and Investment Potential Research Report (2012-2016), 2012.



Industry Development Analysis

Similar to high-end smart industries, the education and learning industry has become one of the main directions for entrepreneurs. It brings two apparent changes: 1) Encourage economy upgrades; 2) Promote learning and expansion of innovation markets.

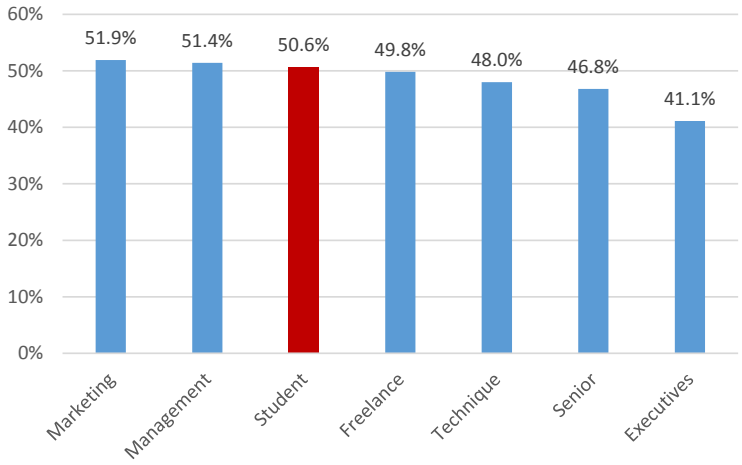
Data source: Demonstration of base cities in which small businesses venturing and innovating, 15 cities nominated as the first batch of "Public Venture and Multitude Innovation Model Cities", 2015.



The first-batch of "Public Venture and Multitude Innovation" model cities

Students are becoming the main force for the new round of "Public Venture and Multitude Innovation" cities. People between 21 and 30 years old present more entrepreneurial potential. Students rank the third in entrepreneurial potential and with greater passion towards life.

Data source: Penguin Intelligence, Survey of People Segments' Venture Potential, 2015



The Potential Possibility of Venture in Chinese Population

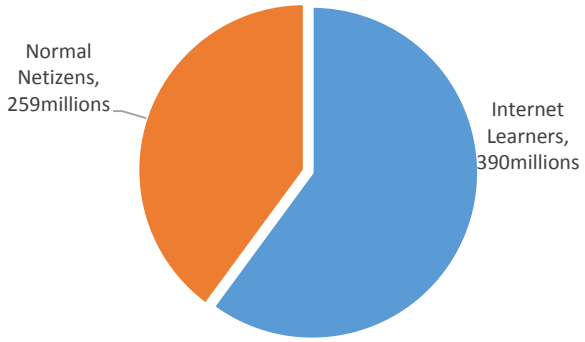
Based on the structure of "Government-School-Family", the traditional education industry directed mainly by the government is hunger for new elements, new ideas and new markets. The B2B2C closed-loop ecology has been formed fast in education Industry chain and it appears in two aspects: 1) the open industry field and the trend of Industrialization; 2) Learner-centered, which aims at meeting the demands of lifelong learning and enriching the connotation of city industries.

Industry capital		Upper-stream industry		Middle-stream industry		Down-stream industry	
Capital governance	Attraction Financing Investment Management Withdrawal ……	Resource integration and creation	Site facilities Materials Participants In-system resources Products and terminals ……	Resources gathering and utilizing	School centered Tutoring organization Online Platforms Purchasing for exhibition ……	Organizations	Government organizations Traditional education Internet enterprises Vertical service platform Research association ……
Capital corporation	PPP Government + school School + society Society + society ……	Innovation of the supporting services	Technology platform Content channels Information consultation Added value ……	Upstream and downstream docking	Investigation and planning Consultation and evaluation Electric commercial enterprises Added value ……	Individual	Parents of students Workers Specialists and scholars Elders and children ……

Educational Industry Chain

Chinese Practice and Outlook of Smart Learning

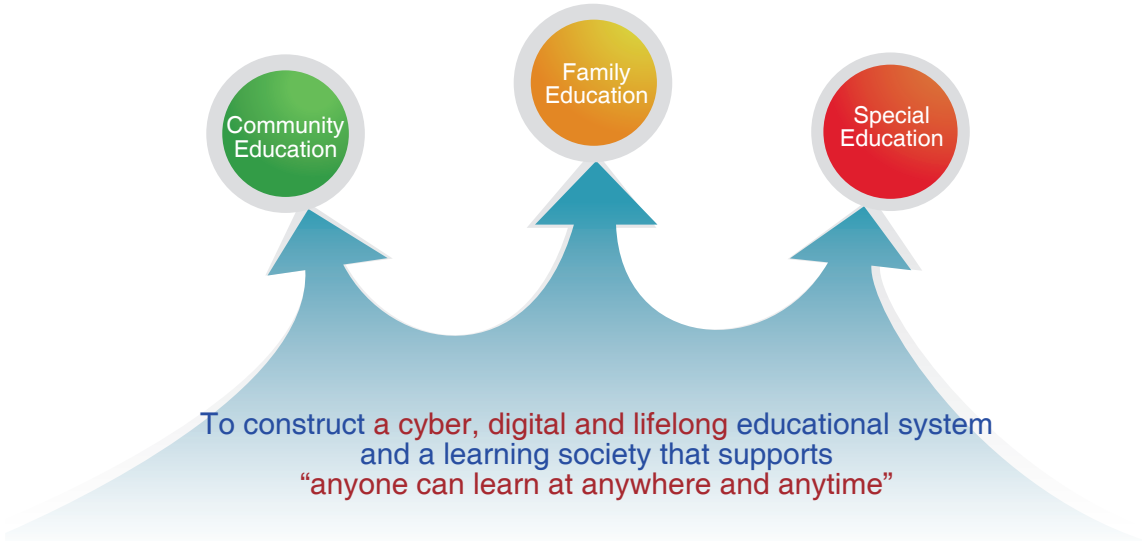
Environment Evolution and Development of Smart Learning



Number of Normal Netizens Compared with Number of Internet Learners by Dec. 2014

Internet learning helps learners transform the fragmentary knowledge into skills. There are two groups that should be paid more attention: 1) the groups who made contributions to social development ;2) the groups that shifted during the combination of informatization and industrialization.

Data source: Baidu Library, White Paper for Internet Learning (2014) from Ministry of Education, The 35th Statistics Report of Chinese Internet Development by CNNIC

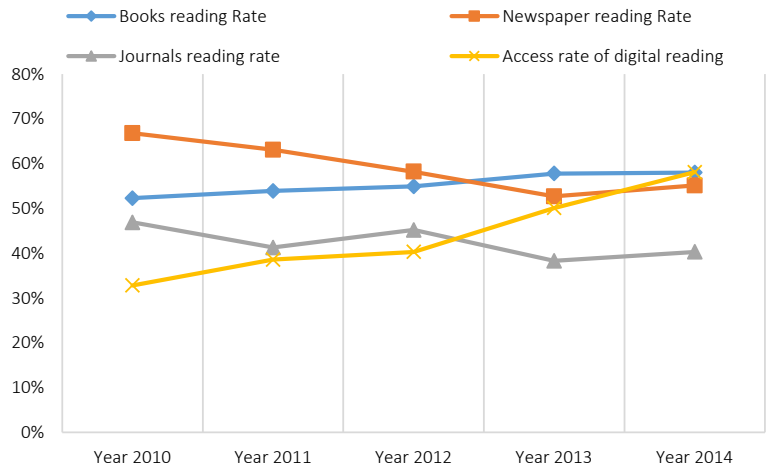


Three subjects of implicit education has embodied explicitness gradually

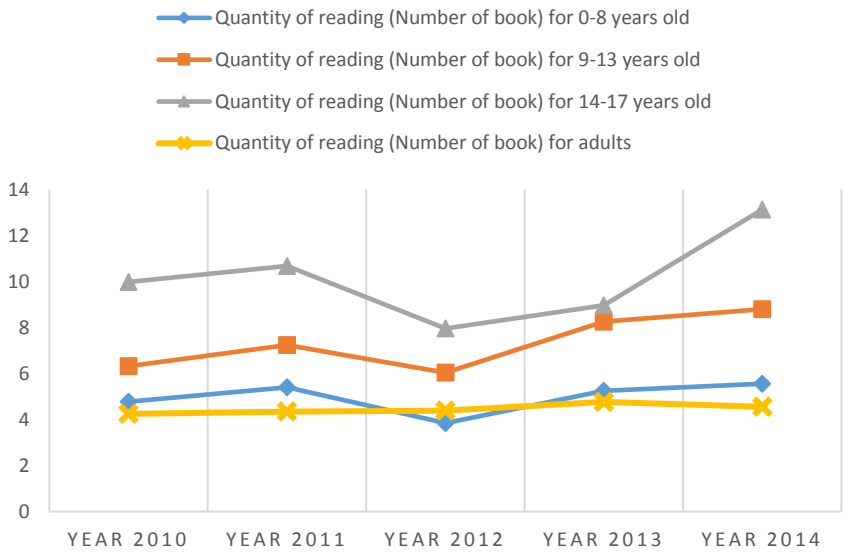
Implicit education has become explicit gradually. Smart learning makes the implicit learning groups gradually explicit. Typical ones are the community education, family education and special education.

Serious reading is an indispensable way to inherit human being's knowledge. With the growing popularity of digital reading, fragmentation reading and serious paper reading will go hand in hand in short future.

Data resource: The National Reading Survey, a special subject of national reading



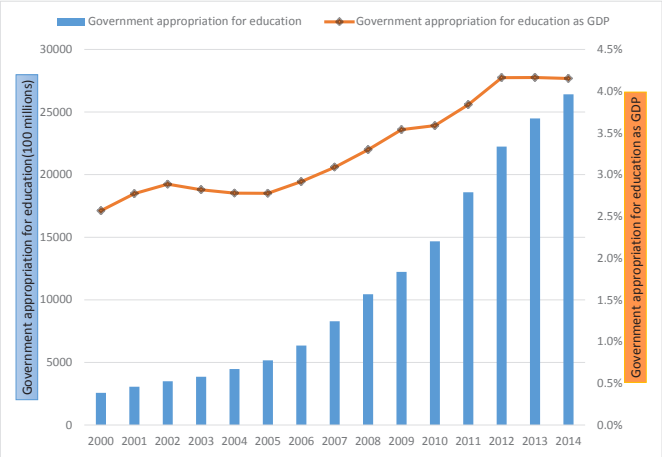
The Comprehensive Reading Rate of Each media from 2010 to 2014



The comparison of quantity of reading for people who are under 18 and for that of adults between 2010 and 2014

The amount of reading for people who are under 18 years old have increased to different extent. From the historical data, teenagers aged between 14 to 17 years old read most, whereas kids from 0-8 years old read about 5 books per year.

Data resource: The National Reading Survey, a special subject of national reading

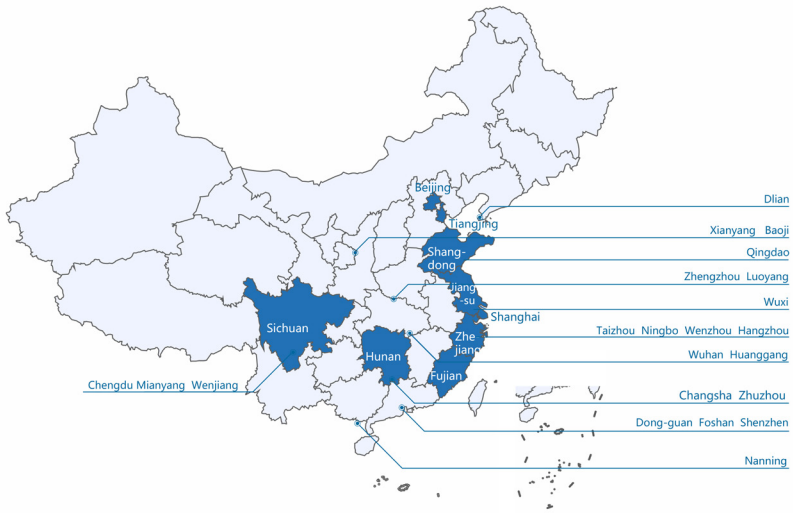


The growth of government appropriation for education of China from 2000 to 2014

The continuous increase of the educational investment promotes the development of smart learning. The ratio of government appropriation for education as GDP have reached 4% after years of efforts. This is a beginning rather than a destination. There are still many improvements that need to be made among different cities. We definitely need to increase the educational investment further.

Data source: the number of government appropriation for education of 2013 and 2014 got from Statistical Bulletin of Educational Finance for 2013 in China, Statistical Bulletin of Educational Finance for 2014 in China(Jointly released by MOE, SSB, and MOF ,China.
Other data from National Data, National Bureau of Statistics of China.

The impacts of Information Revolution on Smart Learning



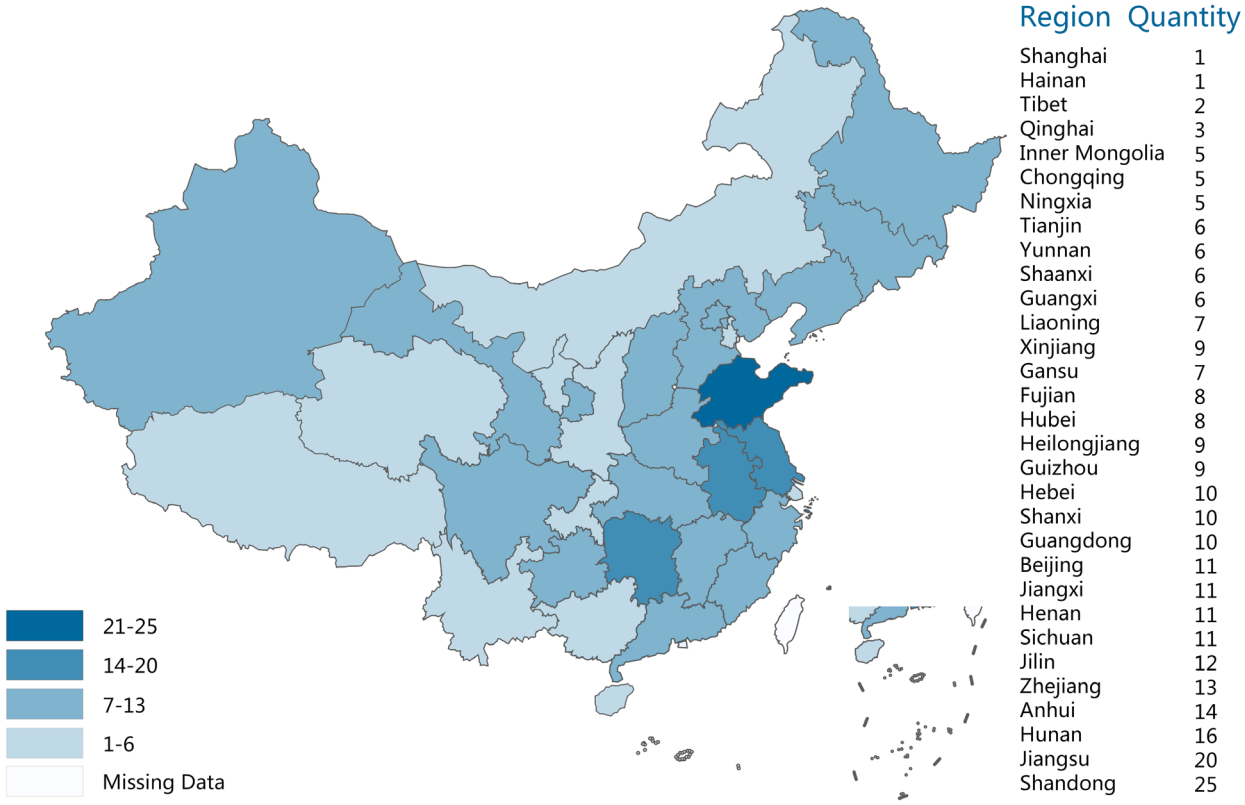
"Action Plan for Internet+" Distributes Smarting Learning

"Internet plus" hastens new modes and new opportunities. It promotes the deep connection of innovation achievements and all kinds of economic and social fields. At present, around 31 provinces and cities have mentioned concepts and actions relevant to education.

Data source: Specific survey launched by the project team.

Appendix

Pioneer National Smart Cities Distribution (district, county and town)



Region	Quantity
Shanghai	1
Hainan	1
Tibet	2
Qinghai	3
Inner Mongolia	5
Chongqing	5
Ningxia	5
Tianjin	6
Yunnan	6
Shaanxi	6
Guangxi	6
Liaoning	7
Xinjiang	9
Gansu	7
Fujian	8
Hubei	8
Heilongjiang	9
Guizhou	9
Hebei	10
Shanxi	10
Guangdong	10
Beijing	11
Jiangxi	11
Henan	11
Sichuan	11
Jilin	12
Zhejiang	13
Anhui	14
Hunan	16
Jiangsu	20
Shandong	25

Notes: Xinjiang includes Xinjiang production and Construction Corps in the survey.

Data source: The list of 3 batches pilot national smart cities published by Ministry of Housing and Urban-Rural Development of China

The National Pilot Smart Cities (by May 20th, 2015) Published by MoHURD, MoIIT and MoST

Province	city	Province	city	Province	city	Province	city	Province	city
Anhui	Wuhu	Shanxi	Lishi district, Lvliang	Jiangsu	Dongtai	Henan	Hebi	Sichuan	Suining
Anhui	Tongling	Inner Mongolia	Wuhai	Jiangsu	Changshu	Henan	Luohe	Sichuan	Chongzhou
Anhui	Bengbu	Inner Mongolia	HulunBuir	Jiangsu	Hongze county, Huai'an	Henan	Jiyuan	Sichuan	Wenchuan couty
Anhui	Huainan	Inner Mongolia	Erdos	Jiangsu	Yangzhou	Henan	Xinzheng	Sichuan	Xingwen county, Yibin
Anhui	Fuyang	Inner Mongolia	shiguai district, Baotou	Jiangsu	Nanjing	Henan	Luoyang new district	Sichuan	Guang'an
Anhui	Huangshan	Inner Mongolia	Hohhot	Jiangsu	Yancheng	Henan	Xuchang	Sichuan	Luzhou
Anhui	Huaibei	Lioa ning	Hunnan new district, Shenyang	Jiangsu	Zhangjiagang	Henan	Wugang	Sichuan	Leshan(Emeishan included)
Anhui	Hefei high and new tech development zone	Liaoning	Dalian ecology new city	Zhejiang	Guangling district, Yangzhou	Henan	Lingbao	Sichuan	Chengdu
Anhui	Ningguo harbor eco-industry park	Liaoning	Yingkou	Zhejiang	Wenzhou	Henan	Kaifeng	Sichuan	Wenjiang district, Chengdu
Anhui	Huoshan county, Lu'an city	Liaoning	Zhuanghe	Zhejiang	Jinhua	Henan	Nanynag	Sichuan	Nanchong
Anhui	Suzhou	Liaoning	Puwan new district, Dalian	Zhejiang	Zhuji	Hubei	Wuhan	Sichuan	Leshan
Anhui	Bozhou	Liaoning	Shenhe district	Zhejiang	Shangcheng district, Hangzhou	Hubei	Jiang'an district, Wuhan	Guizhou	Tongren
Anhui	Jinzhai county, Liu'an	Liaoning	Tiexi district	Zhejiang	Zhenhai district, Ningbo	Hubei	Huanggang	Guizhou	Liupanshui
Anhui	Chuzhou(Dingyuan county included)	Liaoning	Shenbei new district	Zhejiang	Gongshu district, Hangzhou	Hubei	Xianning	Guizhou	Wudang district, Guiyang
Anhui	Hefei	Liaoning	Hunnan new district	Zhejaing	Xiaoshan district, Hangzhou	Hubei	Yichang	Guizhou	Guiyang
Anhui	Ma'anshan	Liaoning	Heping district, Shenyang	Zhejiang	Haishu district, Ningbo	Hubei	Xiangyang	Guizhou	Zunyi
Jiangxi	Pingxiang	Liaoning	Xinming	Zhejiang	Meishan Bonded Port, Ningbo	Hubei	Caidian district, Wuhan	Guizhou	Bijie
Jiangxi	Honggutan new district, Nanchang	Liaoning	Dalian	Zhejiang	Xianxiang county, Yinzhou district, Ningbo	Hubei	Jingzhou(Honghu city included)	Guizhou	Kaili
Jiangxi	Xinyu	Liaoning	Shenyang	Zhejinag	Ninghai county, Ningbo	Hubei	Xiantao	Guizhou	Pan county, Liupanshui
Jiangxi	Zhangshu	Jilin	Liaoyuan	Zhejiang	Changhua town, Lin'an	Hubei	Xiannan district, Xiaogan	Guizhou	Xixiu district, Anshun
Jiangxi	Gongqingcheng	Jilin	Panshi	Zhejiang	Wenling	Huann	Zhuzhou	Guizhou	Xixiu district, Anshun
Jiangxi	Wuyuan county, Shangrao	Jilin	Siping	Zhejiang	Chang'an town, Fuyang	Hunan	Shaoshan	Guizhou	Zunyi, Honghua gang district
Jiangxi	Yingtan	Jilin	Yushu	Zhejiang	Daxie development zone, Ningbo	Hunan	Yunlong demonstration district, Zhuzhou	Yunan	Wuhua district, Kunming
Jingxi	Ji'an	Jilin	Changchun high and new tech development zone	Zhejiang	Ningbo	Hunan	Baijia town, Liuyang	Yunan	Mengzi , Honghe Hani & Yi autonomous perfecture,
Jiangxi	Nanfeng county, Fuzhou	Jilin	Fusong county, Baishan city	Zhejiang	Hangzhou	Hunan	Meixi lake international service zone,Changsha	Yunan	Mile, Honghe Hani & Yi autonomous perfecture
Jiangxi	Donghu district, Nanchgang	Jilin	Soudengzhan town, Jieling, Chuanying district	Fujian	Jiaxing	Hunan	Yueyang Tower district, Yueyang	Yunan	Dali
Jiangxi	Gaoxin district, Nanchang	Jilin	Tonghua	Fujian	Nanping	Hunan	Changsha county, Changsha	Yunan	Wenshan
Jiangxi	Nanchang	Jilin	Jiangyuan district, Baishan	Fujian	Pingtan	Hunan	Yongxing county, Chenzhou	Yunnan	Yuxi
Jiangxi	Zhanggong district, Ganzhou	Jilin	Linjiang	Fuiian	Changshan district, Fuzhou	Huann	Jiahe county, Chenzhu	Xinjiang	Korla
Beijng	Dongcheng district	Jilin	High-tech zone of Jilin	Fujian	Putian	Hunan	Taoyuan county, Changde	Xinjiang	Kuitun
Beijing	Chaoyang diatrict	Jilin	Changchun	Fujian	Taiwanese, investment zone, Quanzhou	Hunan	Zhangjiang town	Xinjiang	Urumqi
Beijing	Future technology city	Jilin	Jilin	Fujian	Changle	Hunan	Forerunner area of Changsha river	Xinjiang	Karamay
Beijing	Lize CEBD	Jilin	Yanbian	Fujian	Quanzhou (Dehua county, Penglai town of Anxi county included)	Hunan	Yanghu new eco-city	Xinjiang	Yining
Beijing	ETDZ	Jilin	Jingyue high and new tech development zone	Fujian	Zhangzhou merchant group , economic & technology development zone	Hunan	Bingjiang business new city	Xinjiang	Changji
Beijing	Changyang town, Fangshan district	Heilongjiang	Zhaodong	Fujian	Xiamen	Hunan	Qiyang county, Yongzhou	Xingjiang	Fuyuncounty, Altay prefecture
Beijing	Mentougou district	Heilongjiang	Zhaoyuan	Fujian	Fuzhou	Hunan	Xiangtan economic and technology development zone	Xingjiang	Shihezi
Beijing	Panggezhuang town, Daxing district,	Heilongjiang	Huanan	Fujian	Shishi	hunan	Changde(Jingshi, Li county, Hanshou county included)	Xigjiang	Wujiaqu
Beijing	New Shougang high-end industry comprehgensive service area	Heilongjiang	Qiqihar	Shandong	Dongying	Hunan	Yuanjiang	Ningxia	Wuzhong
Beijing	Liangxiang higher education zone, Fangshan district	Heilongjiag	Mudanjang	Shandong	Weihai	Hunan	Anren county, Chenzhou	Ningxia	Yinchuan
Beijing	Niujiestreet, Xicheng district	Heilongjiang	Anda	Shandong	Dezhou	Hunan	Yizhang county, Chenzhou	Xiangxia	Shizuishan
Beijing	Beijing	Heilongjiang	Jiamusi	Shandong	Xintai	Hunan	Hengyang	Ningxia	Yongning county, Yingchuan
Tianjin	Southern new district	Heilongjiang	Shangzhi	Shandong	Shouguang	Hunan	Chenzhou	Ningxia	Zhongwei
Tianjin	Eco city	Heilongjaing	Xiangfang district, Harbin	Shandong	Changyi	Guangdong	Zhuhai	Shaanxi	Xianyang
Tianjin	Wuqing district	Heilongjiang	Harbin	Shandong	Feicheng	Guangdong	Fanyu district, Guangzhou	Shaanxi	Yangling demonstration zone
Tianjin	Hexi district	Heilongjiang	Daqing	Shandong	West district of Jinan	Guangdong	Guangzhou, Luogang district	Shaanxi	Baoji
Tianjin	Binhai high-tech development zone and Beijing- Tianjin cooperation demonstration zone	Shanghai	Shanghai	Shandong	Yantai	Guangdong	Pingshan new district, Shenzhen	Shaanxi	Weinan
Tianjin	Jinghai county	Shanghai	Pudong new district, Shanghai	Shandong	Qufu	Guangdong	Shunde district, Foshan	Shaanxi	Yan'an
Tianjin	Tianjin	Shanghai	Changning district	Shandong	Rencheng district, Jining	Guangdong	Lecong town, Foshan	Shaanxi	Hanzhong
Hebei	Shijiazhuang	Shanghai	Yangpu district	Shandong	Laoshan district, Qingdao	Guangdong	Duanzhou district, Zhaoqing	Shaanxi	Xi'an
Hebei	Qinhuangdao	Jiangsu	Wuxi	Shandong	Qingdao High and New Technology Industry	Guangdong	Dongcheng district, Dongguan	Tibet	Lhasa
Hebei	Langfang	Jiangsu	Changzhou	Shandong	Zhongde Ecological Park, Qingdao	Guangdong	Cuiheng New Area, Zhongshan	Tibet	Nyingchi
Hebei	Handan	Jiangsu	Zhenjiang	Shandong	Changle county, Weifang	Guangdong	Nanhai district, Foshan	Gansu	Lanzhou
Hebei	Qian'an	Jiangsu	Taizhou	Shandong	Mingcun town, Pingdu	Guangdong	Jiangdong New Area, Heyuan	Gansu	Jinchang
Hebei	Beidaihe New Area	Jiangsu	West River new area, Nanjing	Shandong	Laiwu	Guangdong	Shenzhen	Gansu	Baiyin
Hebei	Gaofeidian district, Tangshan	Jiangsu	Suzhou Industrial Park	Shandong	Zhangqiu	Guangdong	Shantou	Gansu	Longnan
Hebei	Luannan county, Tangshan	Jiangsu	South City new area, Yancheng	Shandong	Zhucheng	Guangdong	Huizhou	Gansu	Dunhuang
Hebei	Boye county, Baoding	Jiangsu	Huaqiao economic and tech development zone, Kunshan	Shandong	Xuecheng district, Zaozhuang	Hainan	Wanning	Gansu	Zhangye
Hebei	Tangshan	Jiangsu	Zhangpu town, Kuanshan	Shandong	Ju county, Rizhao	Hainan	haikou	Gansu	Tianshui
Hebei	Qinhuangdao	Jiangsu	Nantong	Shandong	Linqu county, Weifang	Chongqing	Nan'an district, Chongqing	Gansu	Jiayuguan
Hebei	Yongnian county, Handan	Jiangsu	Danyang	Shandong	Jiaxiang county, Jining	Chongqing	Liangjiang New Area, Chongqing	Guangxi	Nanning
Shanxi	Taiyuan	Jiangsu	Wuzhong Taihu New Town, Suzhou	Shandong	West Coast New Area, Qingdao	Chongqing	Yongchuan district	Guangxi	Liuzhou
Shanxi	Changzhi	Jiangsu	Yanghe New Town, Suqian	Shandong	Laixi	Chongqing	Jiangbei district	Guangxi	Guilin
Shanxi	Pinglu district, Shuozhou	Jiangsu	Kunshan	Shandong	Qingdao	Chongqing	Yuzhong district	Guangxi	Guigang
Shanxi	Yangquan	Jiangsu	Feng county, Xuzhou	Shandong	Jinan	Chongqing	Chongqing	Guangxi	Qinzhou
Shanxi	Urban area of Datong	Jiangsu	Donghai county, Lianyungang	Shandong	Zibo	Sichuan	Ya'an	Guangxi	Yulin
Shanxi	Jincheng	Jiangsu	Xinbei district, Changzhou	Shandong	Jining	Sichuan	Wenjiang district, Chengdu	Qinghai	Golmud
Shanxi	Huairen county, Shuozhou	Jiangsu	Gaochun district, Nanjing	Shandong	Weifang	Sichuan	Pi county	Qinghai	Guide county, Hainan state
Shanxi	Datong	Jiangsu	Kirin Technology Innovation Park	Henan	Zhengzhou	Sichuan	Mianyang	Qinghai	Gonghe county, Hainan state
Shanxi	Xinzhou	Jinagsu	Xuzhou (Xinyi included)			(Note: The table has combined the lists published by Ministries)			

Ten Core Ideas in the White Paper: Smart Learning Environment in China 2015

1. In the information age, learning will be based on the smart learning environments. The smart learning environments adapt to the learning demands of " Any Time, Any Place, Any Way and Any Pace", supporting easy, engaged and effective learning.

2. The smart learning environments are one of the important base of “People Experience of Living”. Meanwhile, the “People Experience of Living " and the "City Innovation capacity" are jointly called “double engine” of the smart city establishment and development.

3. With the promotion of the smart city development and the progressive increase of social educational supply, the value of family learning, community learning and enterprise learning has become more and more obvious and has been an important part of lifelong learning together with school learning.

4. As the high-end form of digital campus, smart campus will provide their students with the smart learning environment that“digital natives” supposed to have. Smart campus development supposed to be important parts of smart city development, filling the gap between ICT in schools and urban informatization.

5. The continuous promotion of a series of national educational informatization projects have provided the majority students with technological environment for digital learning. “Cloud + Client” will be the main form of smart campus. The support and service ability and information safety are the bottlenecks needed to be broken through for the implementation of education informatization.

6. To meet "digital natives"' natural needs for new learning style, schools are actively optimizing the classroom environment, enriching digital resources supply and enhancing students’ smart learning experience. The new learning space will expand the physical space of classroom and break class boundaries. Managing students diversity and designing learning activities will become the concern of the classroom teaching in future.

7. Interactive electronic white boards , Tablet PCs and other intelligent devices are brought into classrooms gradually. Partial investigation suggests that, compared with “Tablet PC” and computer classrooms, students’ in multi-media and “Interactive whiteboards (IWB)” classrooms have weaker “smart” learning experience. The design and optimization of classroom environment will become the important fields researched jointly by departments of educational equipment, information and research, and other departments.

8. To construct modern enterprises and enhance vitality for urban innovation, we should implant smart learning into cooperate universities or enterprises human resource guarantee system, which will facilitate our country from a big manufacturing country towards a strong one forcefully.

9. Mobile Internet technology, intelligent robot technology and “Internet plus” strategy are hastening the birth of “smart learning” industry, providing products, techniques and services for school learning, family learning and enterprise learning, community learning, and so forth.

10. “Smart learning ” should become the core of smart city development which is not only a powerful support for citizen lifelong learning but also the key feature of city system “self-evolution”. The development of “smart learning” can both enhance people experience of learning and strengthen city innovation capacity, which reflects city quality of “smartness”.

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