IT Applications in QA for Higher Education —— a case study of college graduates following up initiatives in China

Dr.Jianzhong Cha
UNESCO Chair Professor, Beijing Jiaotong University
Chairman of the Board of UNESCO Chair

Dr.Boqing Wang
President, MyCOS Research Institute
Member of the Board of UNESCO Chair

UNESCO
United Nations Educational,Scientific and Cultural Organization

UNESCO Chair on Cooperation between Higher Engineering Education and Industries

Table of Contents

1.Advantages of IT Applications in Higher Education Management

2. Effects and Influences of Online Survey

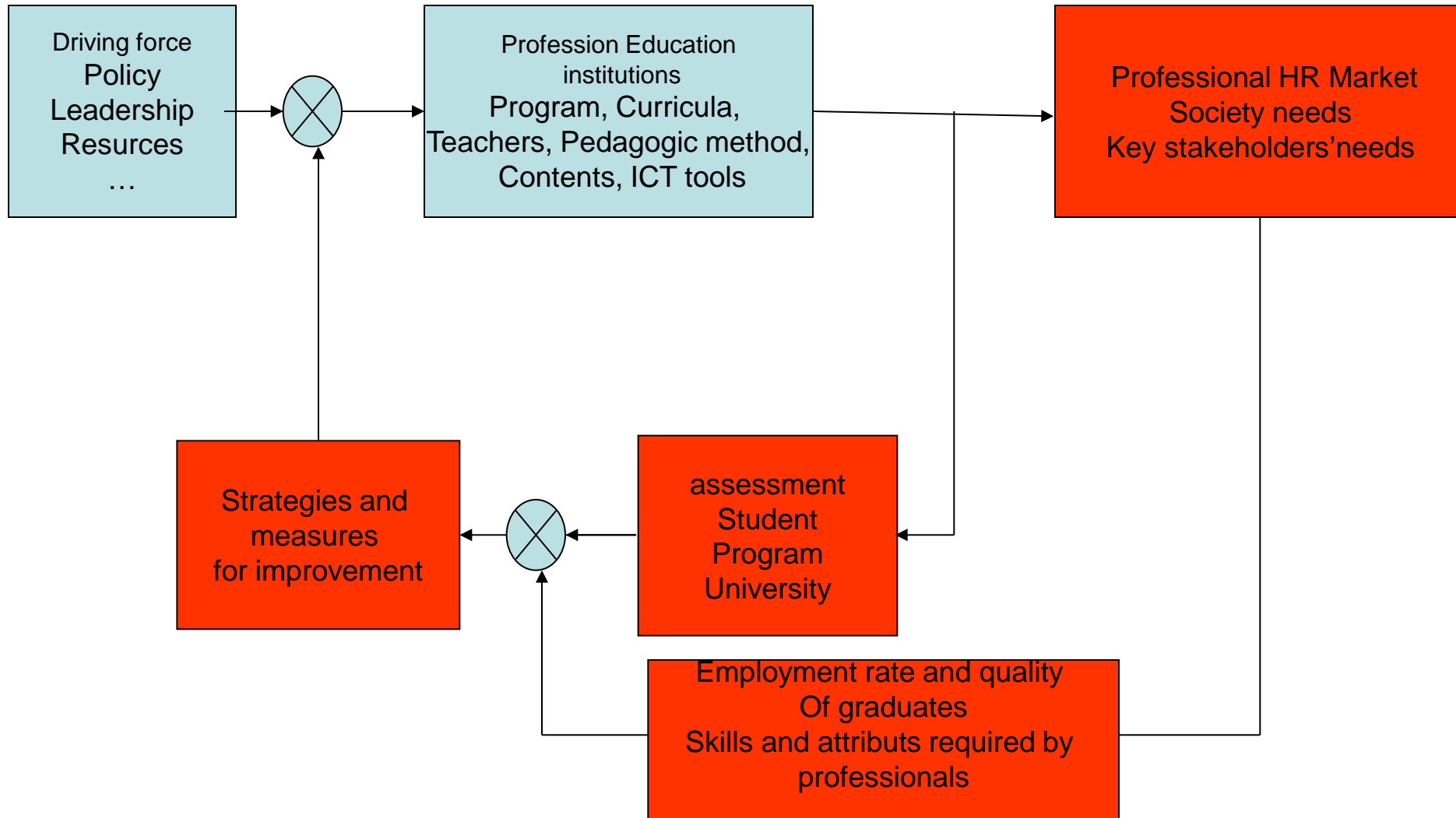3. Comparison with Traditional Methods

4. Survey Data Applications

Table of Contents

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

Macro Control Model for Higher Education

| Driving force
Policy
Leadership
Resurces
… | → ⊗ → | Profession Education institutions
Program, Curricula,
Teachers, Pedagogic method,
Contents, ICT tools | → | Professional HR Market
Society needs
Key stakeholders'needs |

| Strategies and
measures
for improvement | ← ⊗ ← | assessment
Student
Program
University |

Employment rate and quality
Of graduates
Skills and attributs required by professionals

Where to apply IT in Higher Education

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

- Flipped Classroom
- Management of project-based learning Process
- Online learning and distance education
- Quality assurance systems
- Recruitment process
- Employment analysis and management
-

Everywhere needs information processing （retrieval, representation, storage , exchange , mining, …..)

.1.1 A New Survey Method with IT Application by MyCOS

UNESCO

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
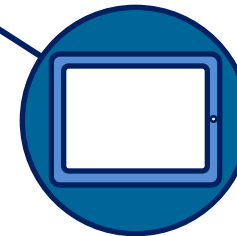between Higher Engineering
Education and Industries

MyCOS- Third party independent educational data collector and analyst

Annually to carry out surveys as part of QA process:

Campus Services,

Employment Services,

Course Evaluation,

Assessment on Basic Work Skills and Core Knowledge of graduates

1.2 What Colleges Need to Know about their graduates?

Immediate and objective feedback from alumni in following areas:

1. Quality of educational experience: (1) Pedagogic system effectiveness
(2) Compatibility between alumni's ability/ knowledge/skills and social demands
(3) Positioning and quality of specific majors

2. Employment competitiveness of graduates

3. Alumni satisfaction and perception on college's contributions to their professional career development

4. Deep and focused view on value-to-job of the curricula related to their majors

1.3 Detailed Indicators

1.4 The Structure of Survey Process

Survey System

Core Technologies：
✓Electronic questionnaire
✓Online survey
✓Database Technology

Characters：
✓Scaled in hundreds of thousands samples
✓High-level information security

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

1.4 The Advantages of IT Applications
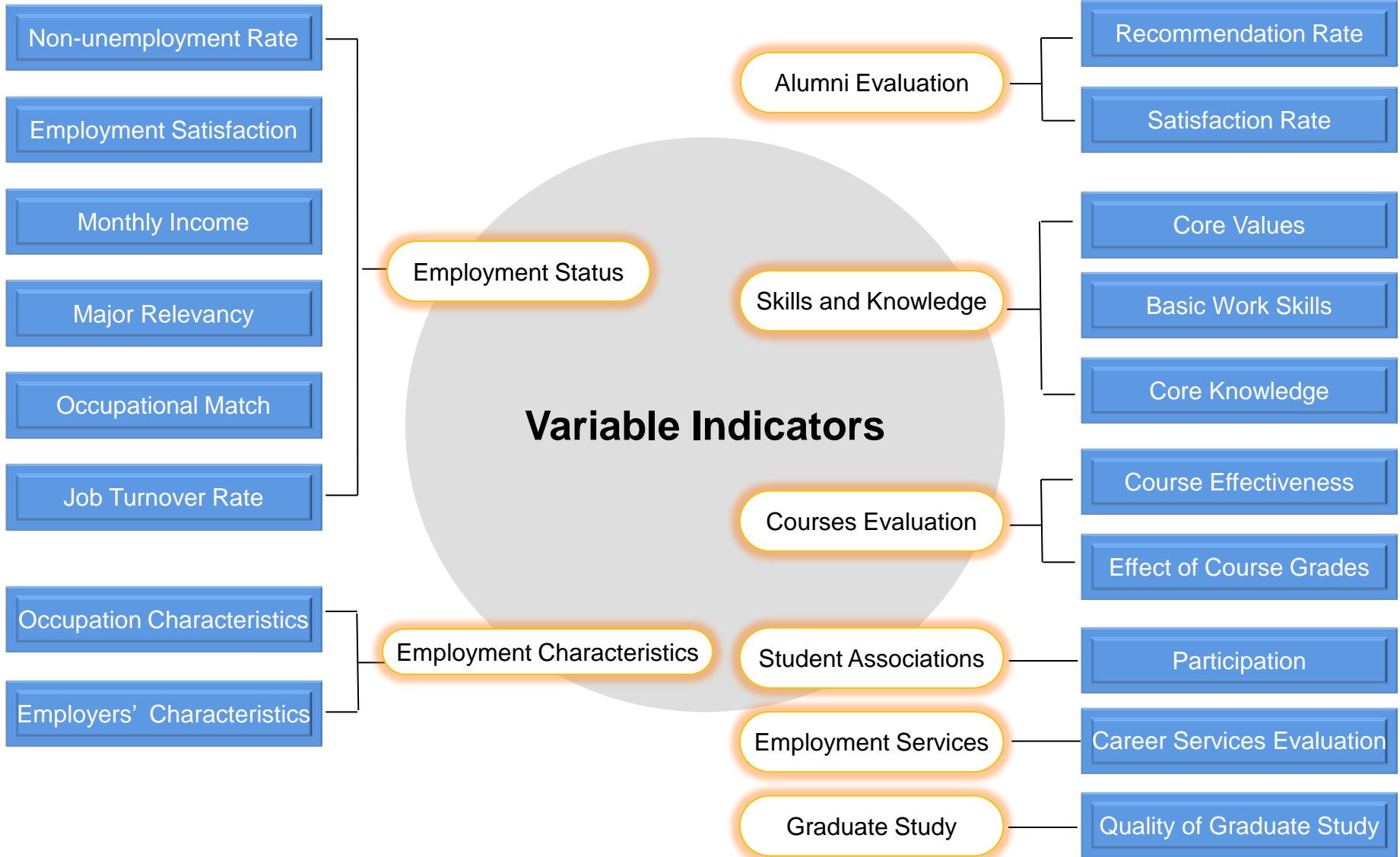
United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

Survey System → Data Mining System

Core Technologies：
✓Data mining technology
✓Data analysis technology

Characters：
✓Hundreds of reports prepared simultaneously
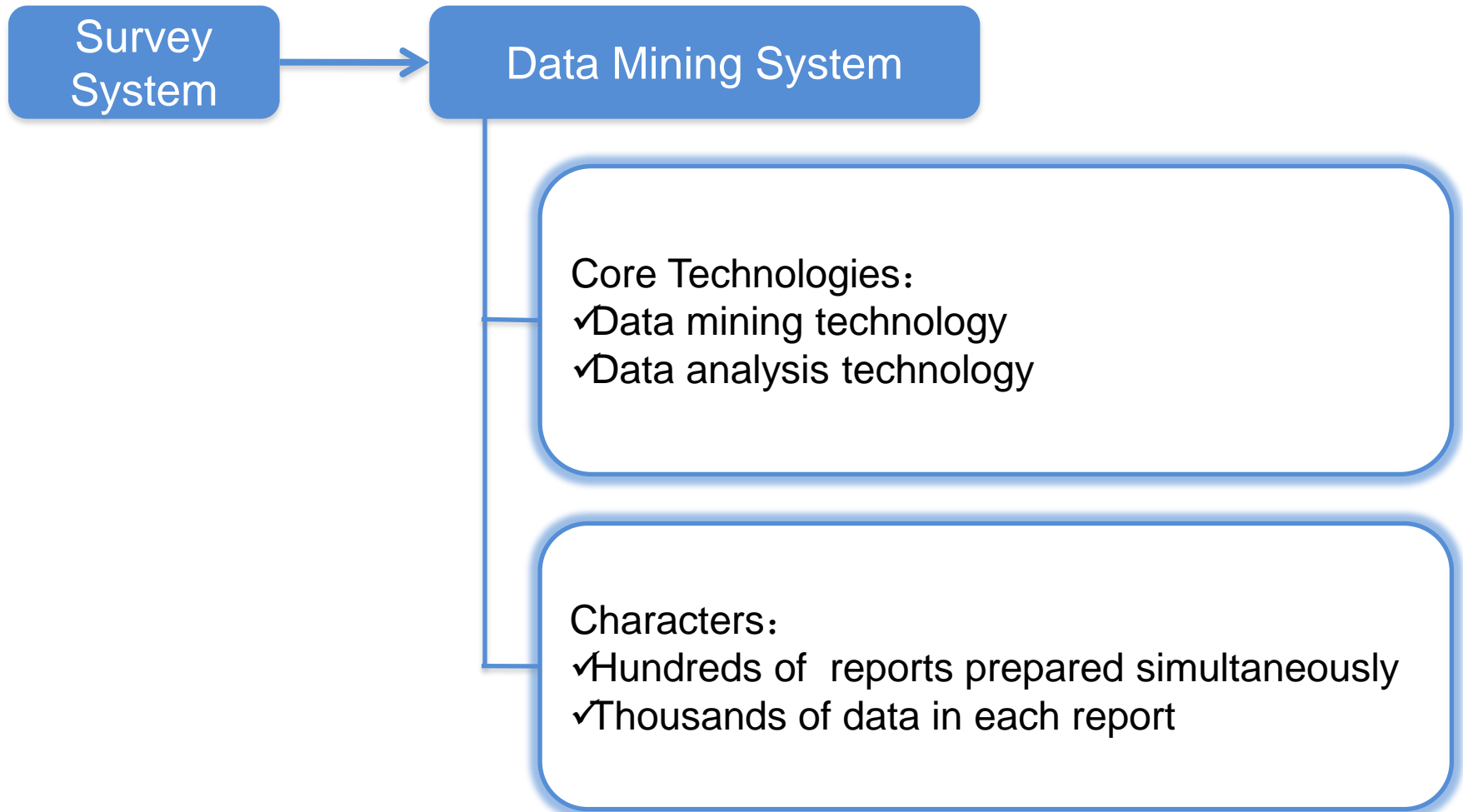✓Thousands of data in each report

1.4 The Advantages of IT Applications

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

Survey System → **Data Mining System** → **Presentation of Data**

Core Technologies：
✓BI (Business Intelligence) technology
✓Mobile internet technology
✓IOS and Android programming technology

Characters：
✓The system can serves hundreds of colleges simultaneously
✓Free data combinations for correlation analysis and comparison

1.5 More Applications of Survey Data

UNESCO

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
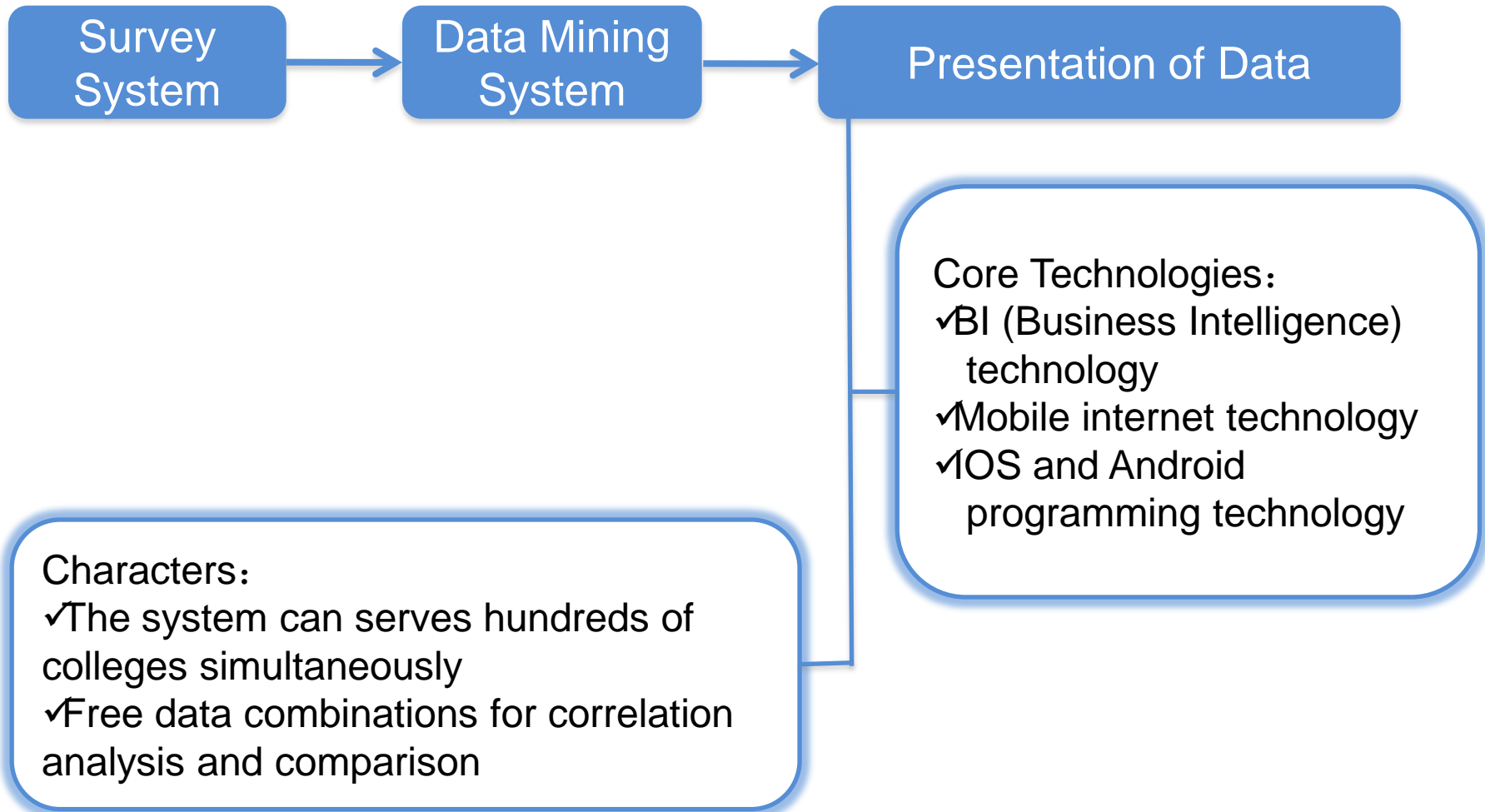between Higher Engineering
Education and Industries

- ✓ College Graduate Mid-Term Career Development Evaluation

- ✓ College Graduate Long-Term Career Development Evaluation

- ✓ Employer Demand and Hiring Needs Evaluation

- ✓ Six Months Postgraduate Advanced Degree Employment and Education Quality Follow-Up Evaluation

- ✓ Comprehensive College Tracking and Evaluation for Undergraduates & Advanced Degree Candidates

- ✓ Curricula and Pedagogy Evaluation System

Table of Contents

1. .Advantages of IT Applications in Higher Education Management

2. Effects and Influences of Online Survey

3. Comparison with Traditional Methods

4. Survey Data Applications

2.1 Value and Effects at Macro Level

UNESCO

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

1 Publications of Blue Book for Employment for 8 continuous years (2007-2014)

• Chinese College Graduates' Employment Annual Report (2014) is based on collected samples of 270,000,
• Reflects graduates' short-term and mid-term employment quality
• Pedagogy evaluation
•.Provides references for decision makers to adjust higher education management and process at different levels.

2 Requirement in Engineering Program Accreditation

• Applying membership to Washington Accord
• Need evaluation and feedback from students, alumni, faculty and employers
• IT-based survey services provided and 219 engineering programs from 96 universities/colleges passed the engineering program accreditation in China.

# of Samples for the Blue Books of College Graduates Employment

Annual Report on the Development of China's Study Abroad

The Chinese College Graduates' Employment Annual Report

Annual Report on the Educational Quality for Chinese Higher Vocational Education
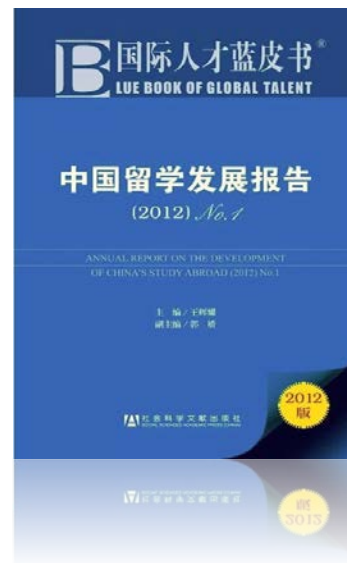
2.2 *Value and Effects in Middle Level*

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

1 Graduates Employment Follow-up Projects in Several Provinces

- Employment quality of graduates for all universities and colleges located in the province has been provided
- Provincial Education Department can identify majors with "Red Light" for adjustment of recruitment quota
- Adopting measures to improve low employment quality related programs for higher quality

2 Inspection and Evaluation of the Key Disciplines Development for 9 provinces in China

- 9 provincial educational departments are developing standard for their key academic disciplines
- Great needs for colleges to regularly implement online surveys to monitor current status of progress

Provincial Education Departments

江苏省教育厅
Jiangsu

湖北省教育厅
Hubei

广东省教育厅
Guangdong

From 2009: Six-Month Postgraduate College Employment and Education Quality Follow-Up Evaluation

From 2009: Six-Month Postgraduate College Employment and Education Quality Follow-Up Evaluation

From 2011: Six-Month Postgraduate College Employment and Education Quality Follow-Up Evaluation

Other provincial/municipal scope institutions include Henan, Sichuan, Hainan, Zhejiang, Chongqing, Tianjin and Ningbo

United Nations Educational, Scientific and Cultural Organization

UNESCO Chair on Cooperation between Higher Engineering Education and Industries

2.3 Value and Effects in Micro Level

UNESCO
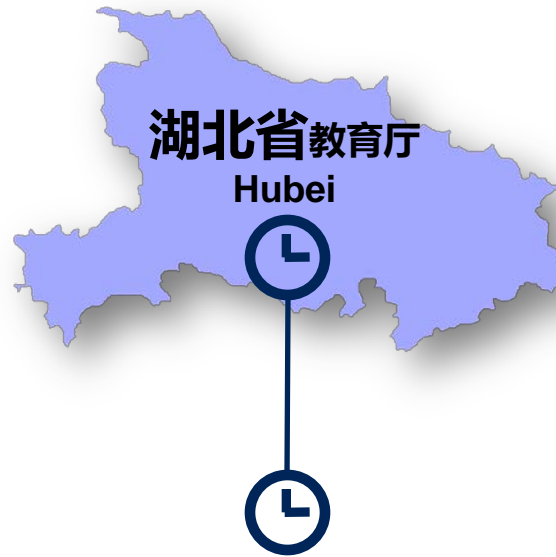
United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

1 Evidence-based Continuous Improvement

- First-hand data and evidence-based judgments will serve as the foundation to improve academic program
- Needed by faculties and administration for decision making
- At program level through college level

2 Professional Career Planning

- Based on feedback of alumni on major retaining rate , job stability and sustainability, sufficiency of their ability/knowledge/skill from study
- Career Planning service can be designed to assist current students to strength their professional career awareness and enhance their employment quality after graduation

2.3 Value and Effects in Micro Level

3 Longitudinal Feedback of Educational Quality

• Complete Close Loop Feedback System for colleges to received objective feedback on education quality from outside key stakeholders
• Continuously improve educational management and process through adjustment of academic programs; improvement of teaching& learning, student recruitment and career services

4 Mid-term Survey

• Three to five years after graduation
• Indicators: salary increase, advancement and other employment characters
• To compare the educational influence in mid-term with social demands.

Partial College Partners

UNESCO
United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

浙江大学
Zhejiang University

温州大学
Wenzhou University

中山大学
Sun Yat-sen University

东南大学
Southeast University

天津大学
Tientsin University

西南交通大学
Southwest Jiaotong University

重庆大学
Chongqing University

北京理工大学
Beijing Institute of Technology

电子科技大学
University of Electronic Science and Technology of China

西北工业大学
Northwestern Polytechnical University

华南理工大学
South China University of Technology

西南财经大学
Southwestern University of Finance and Economics

华中科技大学
Huazhong University of Science and Technology

华中师范大学
Central China Normal University

上海大学
Shanghai University

User Distribution of Survey Systems

602

universities and colleges across China

Table of Contents

1. .Advantages of IT Applications in Higher Education Management

2. Effects and Influences of Online Survey

3. Comparison with Traditional Methods

4. Survey Data Applications

3. Compared with traditional Methods

1 From the aspect of cost

	Paper questionnaire	online survey
Cost	> ￥100	< ￥10
Resource consumption	spending much time, money and human resource	limited resource consumption
Sample size	hundreds, may lack necessary representativeness	10 thousands, large or full sample survey
Side effects	interference with normal functions of organizations	none

IT Survey is cost-effective with better results

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries
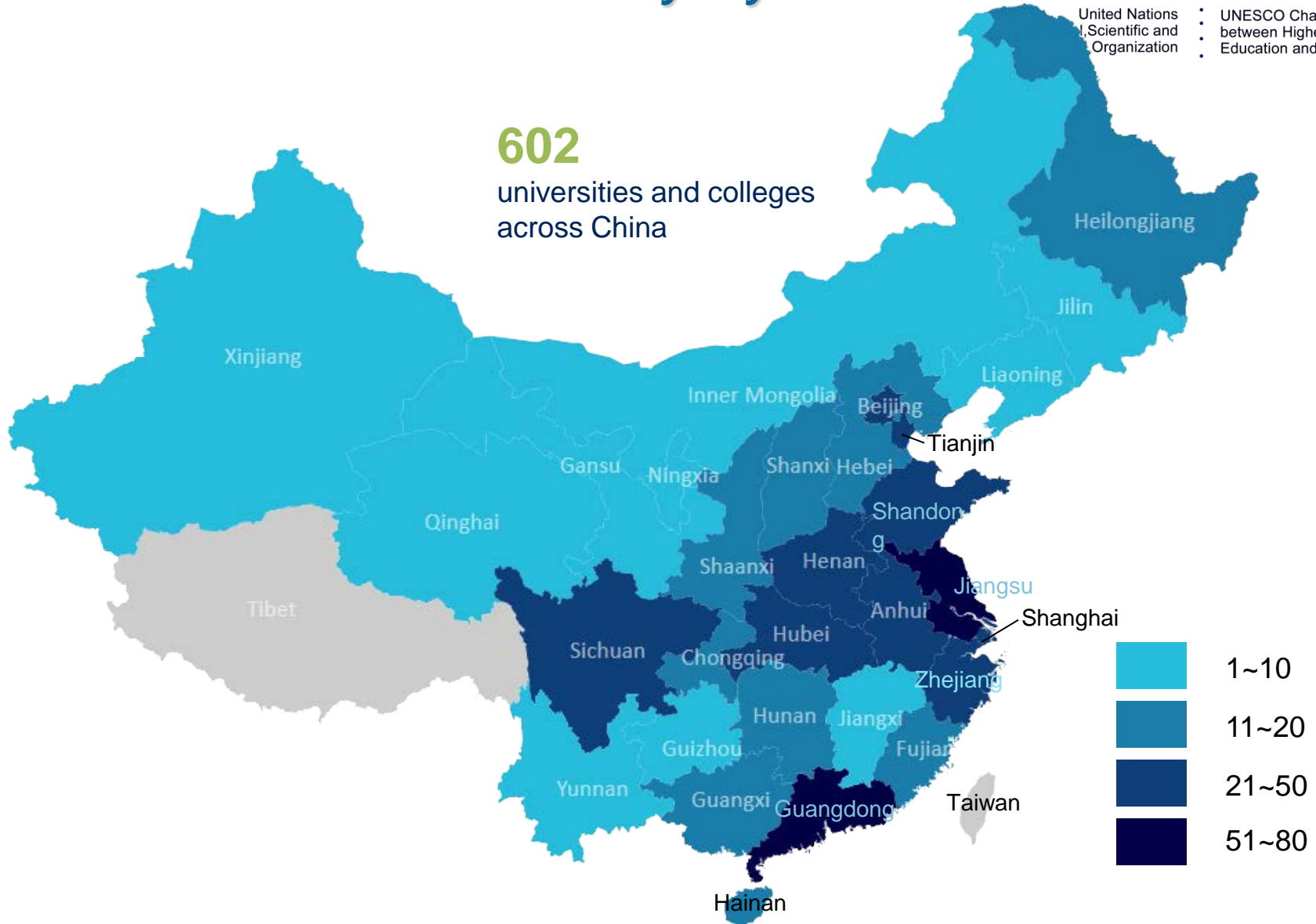
3. Compared with traditional Methods

UNESCO

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

(2) From the aspect of sample collection rate and questionnaire design

	Paper questionnaire	Online survey
Sample collection rate	less than 10%	about 50% (Multi-Invitations)
Sample quality	No immediate feedback	sample collection rate and sample quality can be improved as immediate feedback of answering status
Question design	question design with logic path unavailable	question design based on actual needs with logic path available
Compared with online surveys, the paper questionnaire survey is not flexible-adaptable in depth and breadth.		

3 From the aspect of analysis/applications

	Paper questionnaire	online survey
Operation	manual input with human cost, time cost and mistakes	computer-based automation
Time	long survey period	just-in-time processing
Sample size	hundreds, no representativeness	10 thousands, large or full sample survey
Feasibility	Not good enough for massive educational scope	good for massive educational scope management, with strengths of fast data collection, accurate data mining/analysis and data presentation in real time.

E-questionnaire/Online surveys aim to provide quick solutions for improvement of education institutions, not only collecting data

Table of Contents

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

The following is from the macro, middle, micro three levels, to illustrate how to make use of survey data to provide suggestion and guidance on pedagogic management and quality assurance.

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

4.1 Macro Level

5-years trend of Monthly Income 4-Year College Graduates

5-years trend of Monthly Income
3-Year Vocational College Graduates

Average Monthly Income

- Class of 2013 average monthly income is ¥3250

Class of 2013 Monthly Income 4-Year College Graduates

Major	Income (Yuan)
Engineering	3775
Economics	3681
National Average	**3560**
Management	3524
Sciences	3452
Law	3411
Literature	3353
Medicine	3202
Agriculture	3157
Education	3151

0   800   1600   2400   3200   4000 (Yuan)

Class of 2013 Monthly Income
3-Year Vocational College Graduates

Transportation	3167
Manufacturing	3156
Information Technology	3066
Material Science & Energy	3045
Biochemistry & Pharmaceuticals	2988
National Average	**2940**
Civil Engineering	2935
Textiles & Food	2827
Finance & Economics	2811
Culture & Education	2793
Tourism	2792
Arts, Design & Communication	2790
Medical Sciences & Health	2519

0   700   1400   2100   2800   3500   (Yuan)
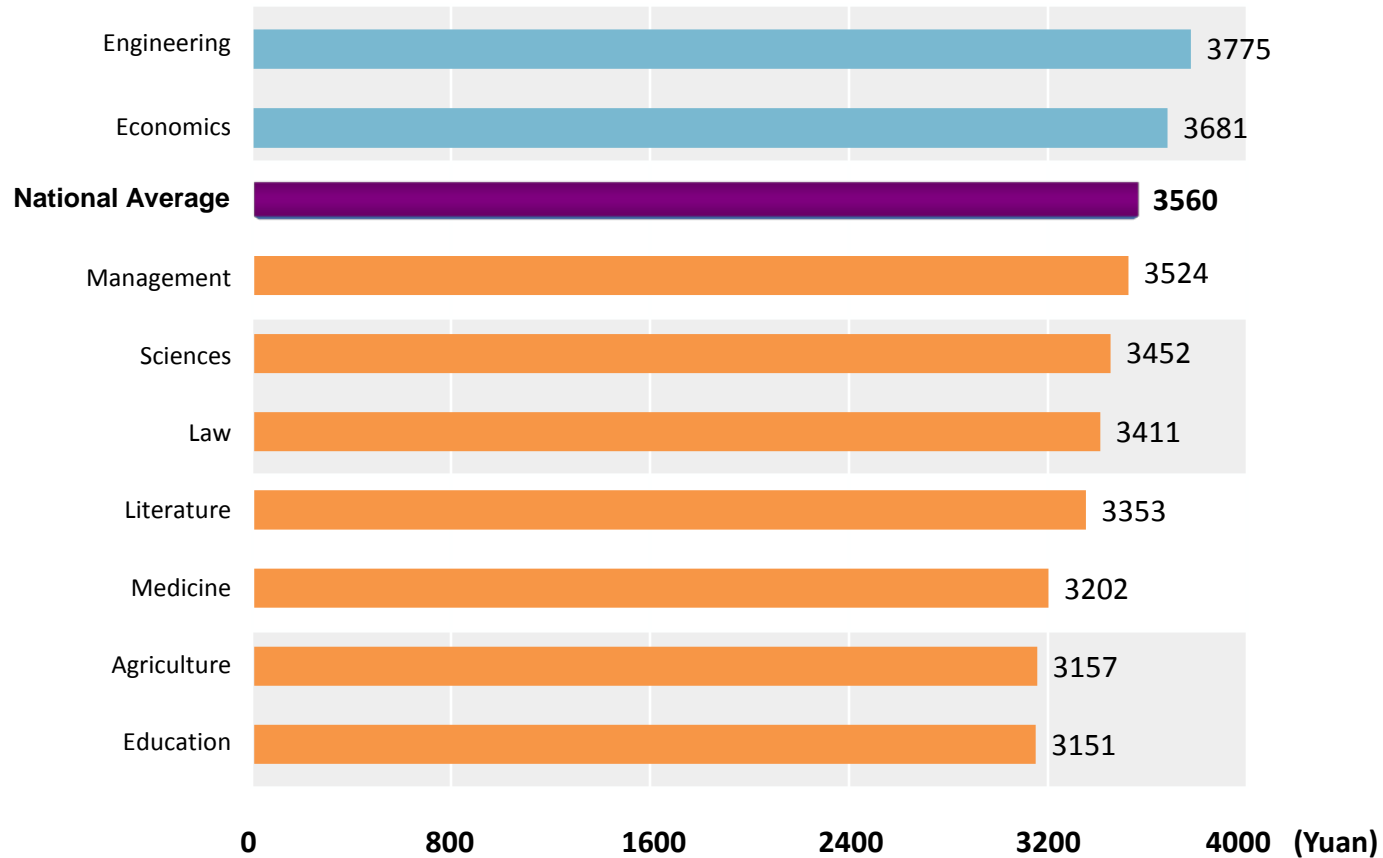
UNESCO
United Nations Educational, Scientific and Cultural Organization

UNESCO Chair on Cooperation between Higher Engineering Education and Industries

UNESCO

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

- Monthly Income is one of key indicators of employment quality
- Reflects the value recognition of graduates from labor market
- During the past five years, low-income groups is shrinking but high-income groups is growing as overall phenomena
- Different incomes distributed among majors/groups can be further studied for reasons to result the difference and some measures should be adopted to improve low income

Employment Status of 211 College Graduates (6 months after graduation)

Class of 2013 Class of 2012 Class of 2011

	FTE	PTE	Self-Employed	Graduate Studies in China	Graduate Studies in HK/Macau/Overseas	Unemployed & Preparing for Graduate Studies in China	Unemployed & Preparing for Overseas Graduate Studies	Actively Job Searching	Unemployed/Other
Class of 2013	66,7	0,6	0,7	23,5	3,4	1,3	0,5	2,3	1,0
Class of 2012	68,8	0,6	0,6	20,9	3,5	1,7	0,7	2,2	1,0
Class of 2011	72,1	0,6	0,6	17,9	2,0	1,9	0,5	3,4	1,0

211 Colleges Classes of 2011-2013

Employment Statues of Non-211 Graduates (6 months after graduation)

Class of 2013　Class of 2012　Class of 2011

(%)

Category	Class of 2013	Class of 2012	Class of 2011
FTE	81,0	81,7	81,2
PTE	0,9	0,8	0,9
Self-Employed	1,3	1,3	1,1
Graduate Studies in China	8,2	7,2	7,5
Graduate Studies in HK/Macau/Overseas	1,0	1,0	0,7
Unemployed & Preparing for Graduate Studies in China	1,4	1,7	1,7
Unemployed & Preparing for Overseas Graduate Studies	0,4	0,4	0,3
Actively Job Searching	4,2	4,2	5,0
Unemployed/Other	1,6	1,7	1,6
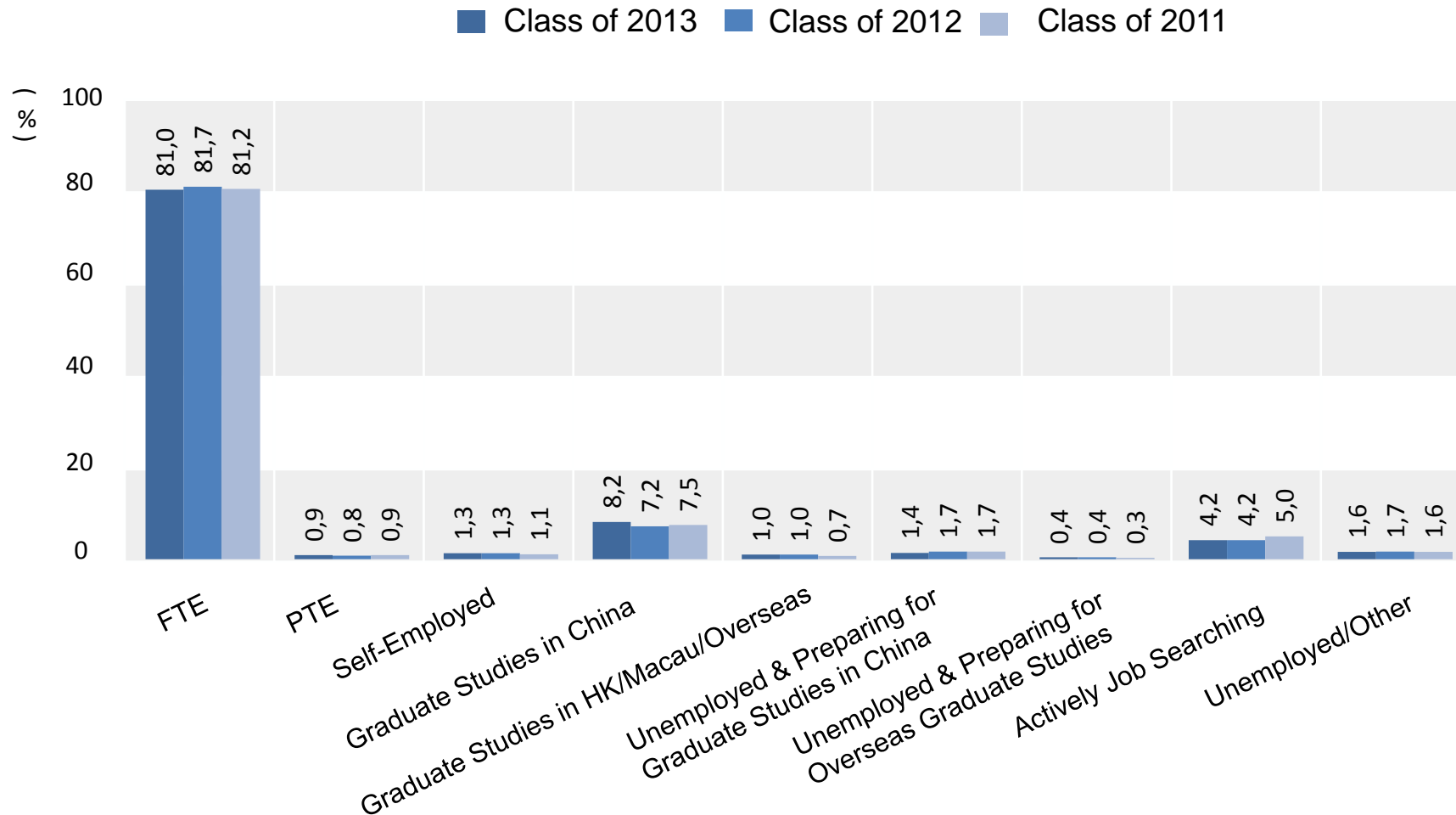
Non-211 Colleges Classes of 2011-2013

Employment Status of 3-year Vocational College Graduates (6 Months After Graduation)

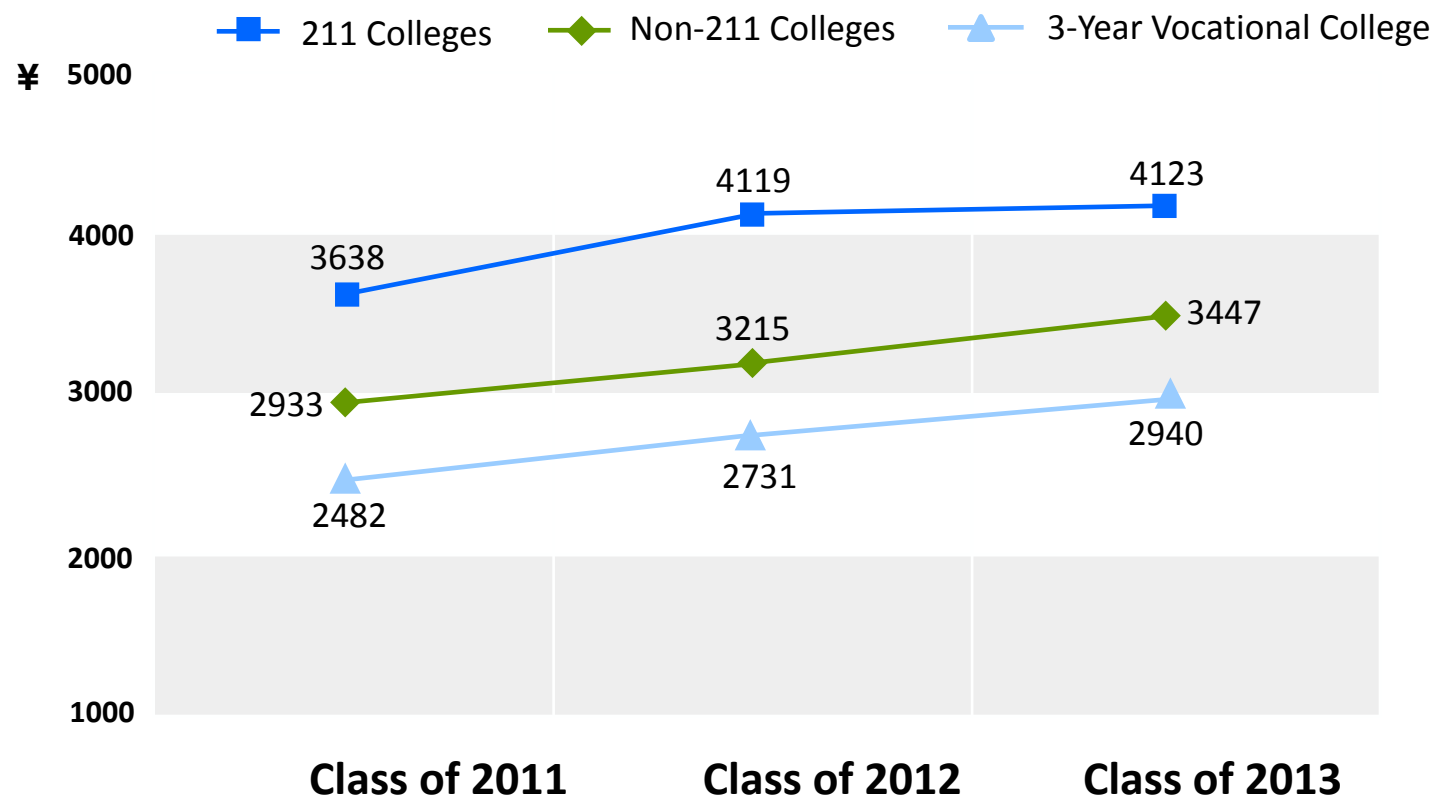**UNESCO** — United Nations l,Scientific and al Organization

UNESCO Chair on Cooperation between Higher Engineering Education and Industries

Legend: Class of 2013 ■ Class of 2012 ■ Class of 2011

(%)

Category	Class of 2013	Class of 2012	Class of 2011
FTE	82,5	83,0	82,8
PTE	1,6	1,5	1,3
Self-Employed	3,3	2,9	2,2
Continuing Education	3,8	3,3	3,7
Actively Job Searching	5,7	6,8	7,4
Unemployed/Other	3,1	2,5	2,6

3-Year Vocational Colleges Classes of 2011-2013

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
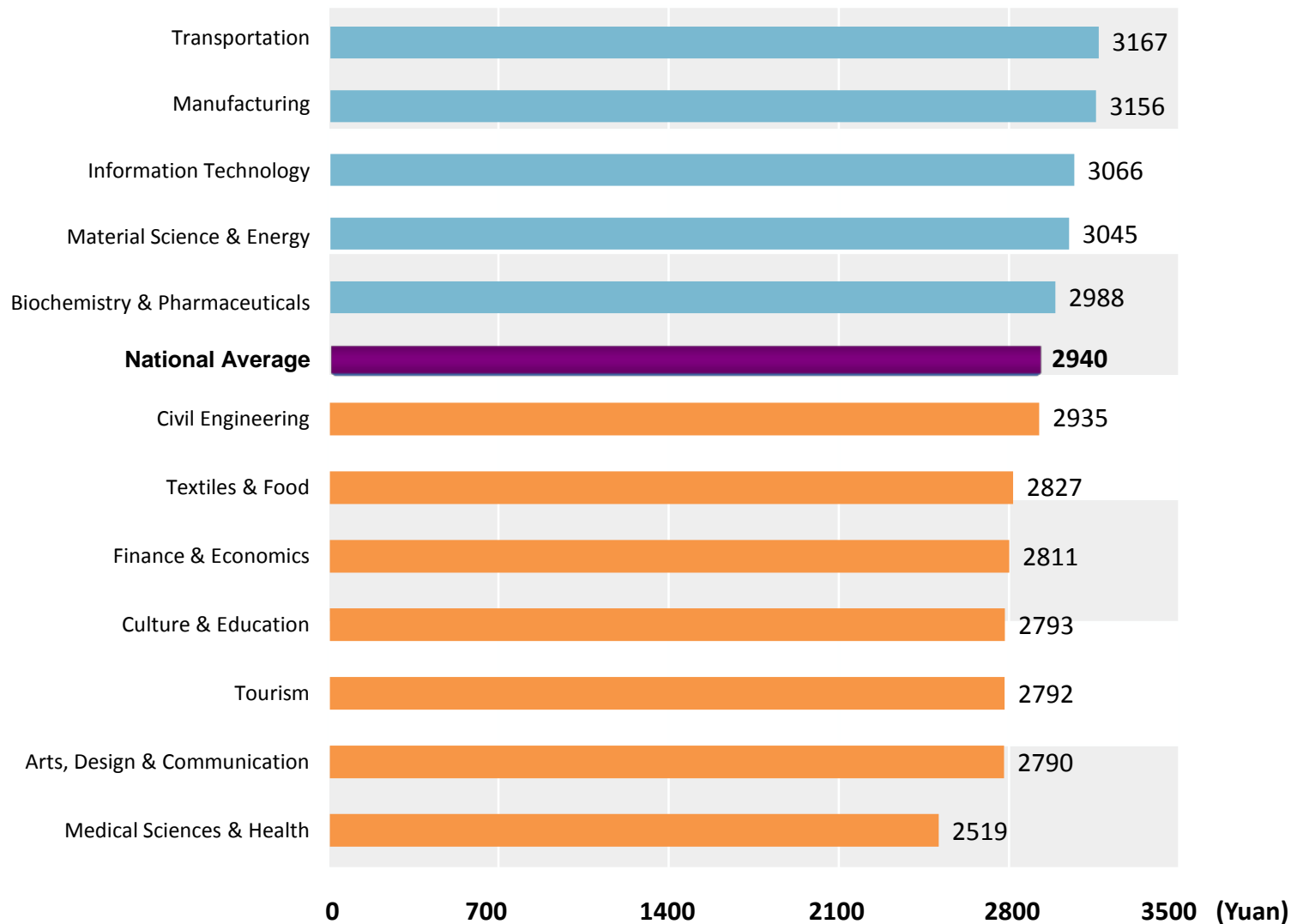between Higher Engineering
Education and Industries

• The employment status distribution of college graduates may indicates that, compared with that of higher vocational graduates, university should improve education process to prepare their graduates to adapt social needs
• More college graduates choose to pursuing advanced degree for better jobs

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

4.2 Middle Level
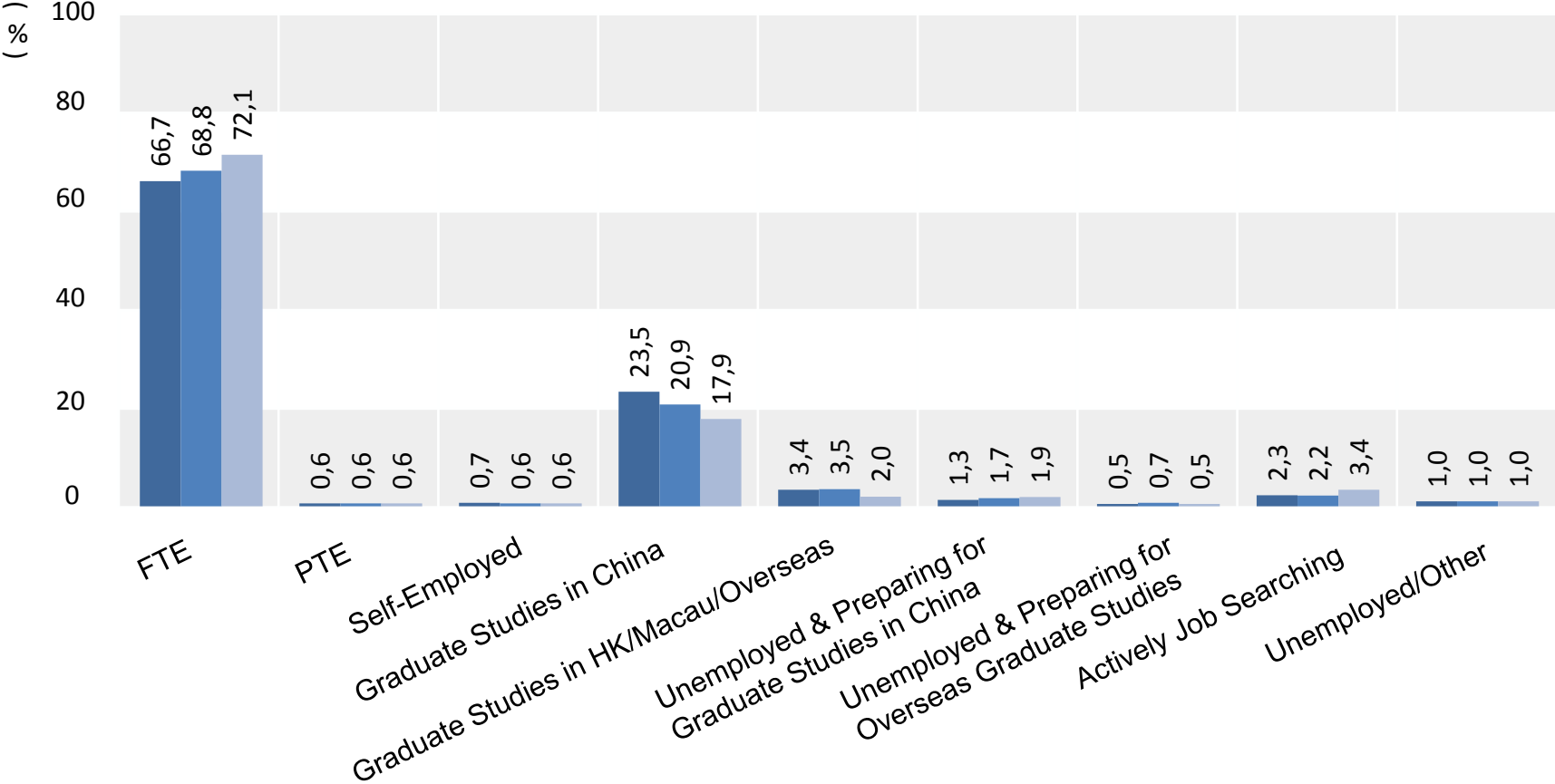
Employment Rate (6 Months After Graduation)

UNESCO
United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

- 2013 Class employment rate is 91.4% for all graduates

■ 211 Colleges Non-Unemployment Rate　　◆ Non-211 Colleges Employment Rate　　▲ 3-Year Vocational College Employment Rate

(%) 100

95

93.2　　94.4　　94.9

90.6　　91.3　　91.6

90

89.6　　90.4　　90.9

85

80

Class of 2011　　**Class of 2012**　　**Class of 2013**
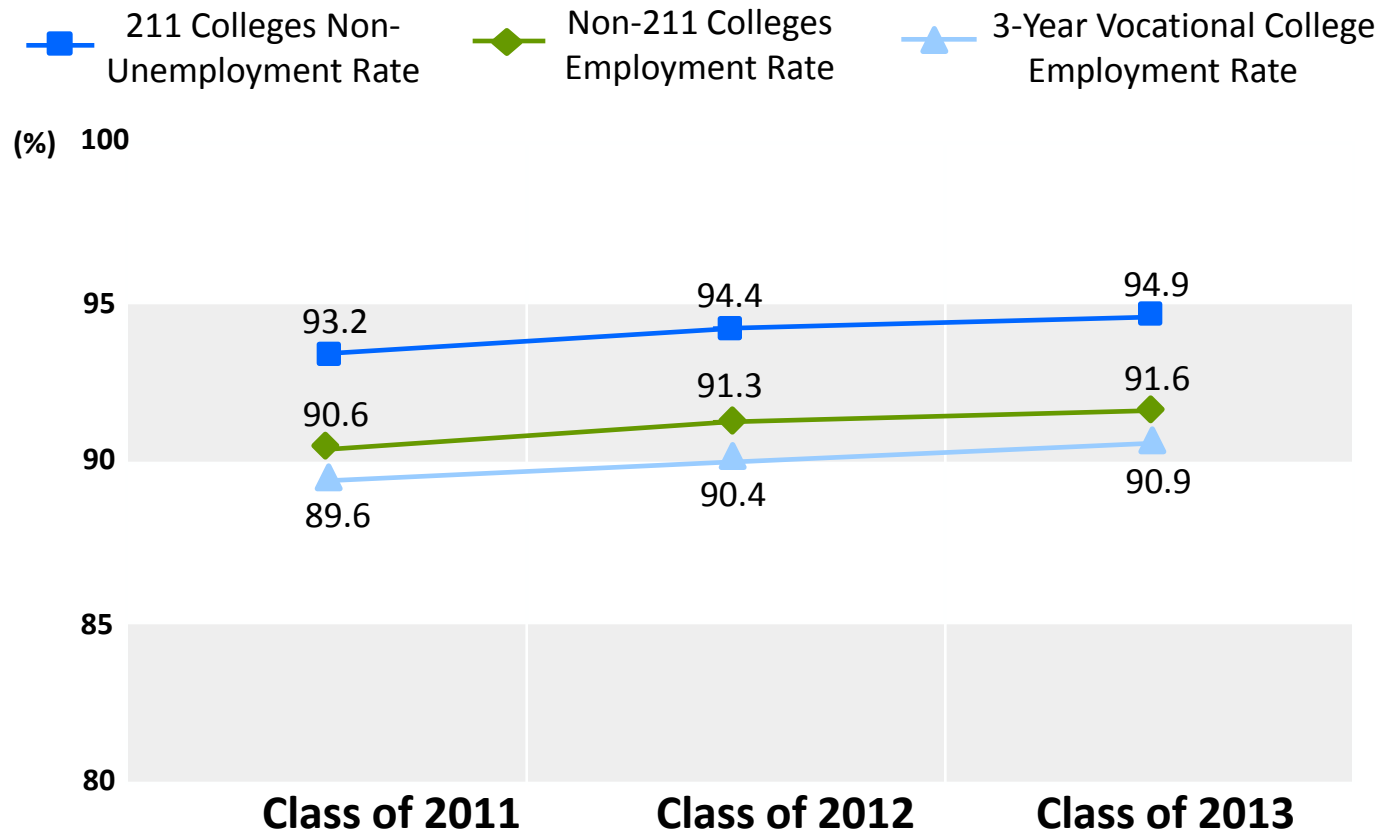
2013 Class Employment Rate by Majors for 4-Year College Graduates

Major	Employment Rate (%)
Management	93,5
Engineering	92,6
Economics	91,9
National Average	**91.8**
Medicine	90,7
Education	90,0
Agriculture	89,8
Literature	89,3
Law	88,4
Science	88,1
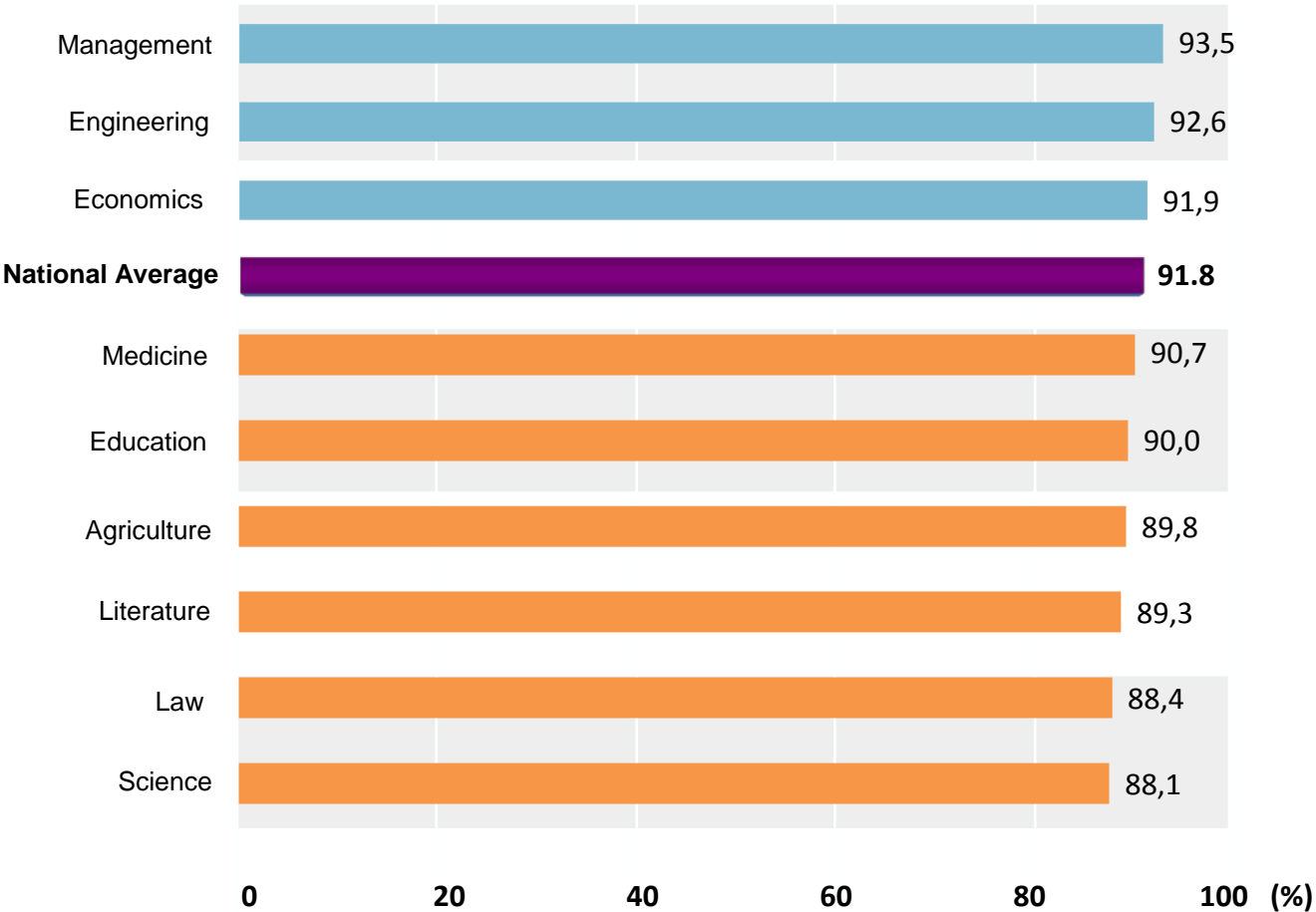
2013 Class Employment Rate by Majors for 3-Year Vocational College Graduates

Major	Employment Rate (%)
Material Science & Energy	92,1
Manufacturing	91,8
Textiles & Food	91,8
Biochemistry & Pharmaceuticals	91,3
Finance & Economics	91,0
National Average	**90.9**
Civil Engineering	90,7
Information Technology	90,6
Medical Sciences & Health	90,5
Transportation	89,8
Culture & Education	89,2
Tourism	88,3
Arts, Design & Communication	88,3

0   20   40   60   80   100   (%)

UNESCO

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
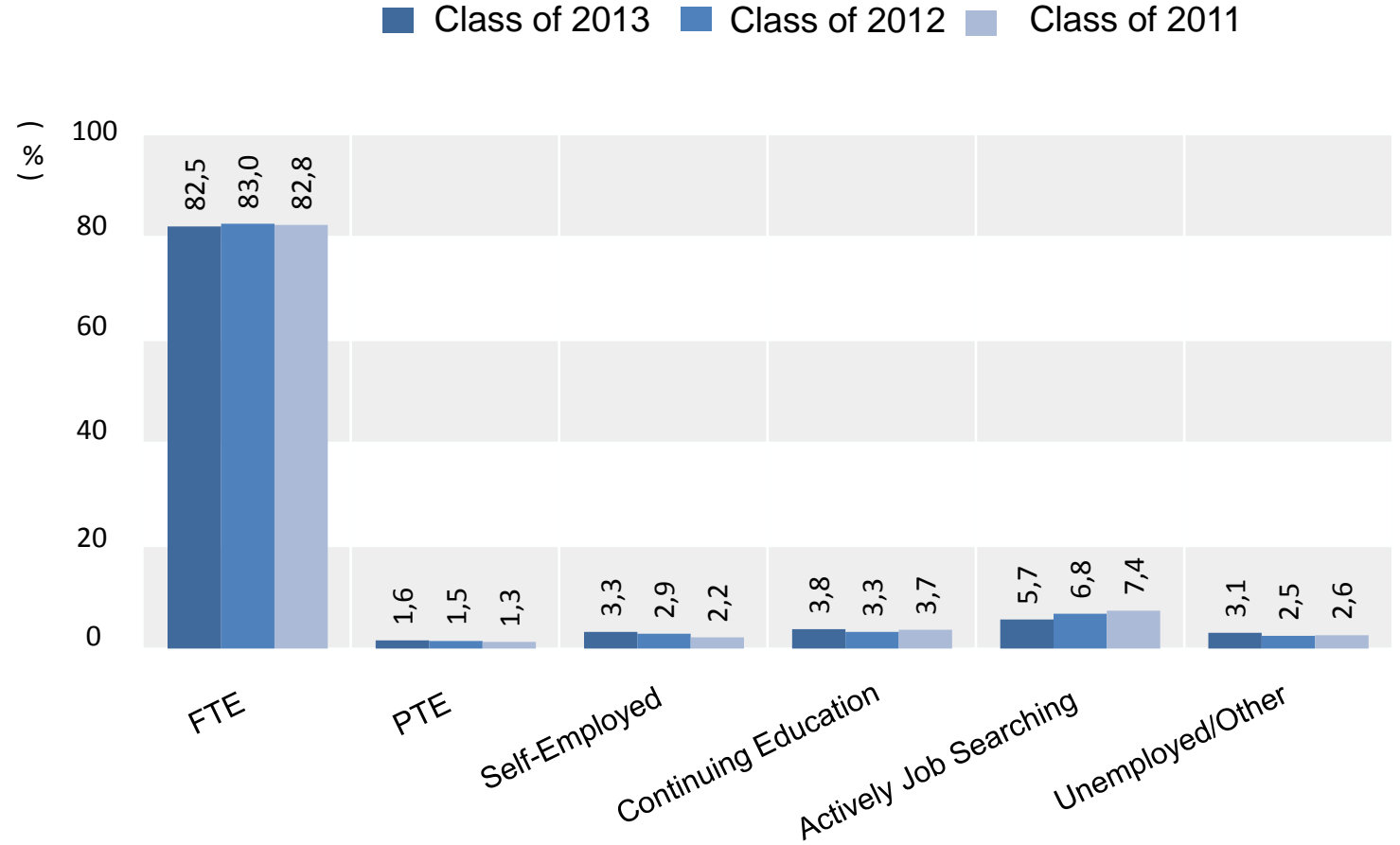between Higher Engineering
Education and Industries

- "Red Light", "Yellow Light" and "Green Light" reflect the employment rate of majors
- Poor employment quality may indicate
    (1) Low education quality for employers to refuse incompetent graduates for jobs
    (2) Overheated majors are set up at colleges so that supply of graduates excesses the demand of labor market

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

4.3 Micro Level

Job Relevancy to Majors

- 2013 Class graduates' job relevancy to majors is 66% for all colleges

Legend: 211 Colleges · Non-211 Colleges · 3-Year Vocational Colleges

% 90

	Class of 2011	Class of 2012	Class of 2013
211 Colleges	69	73	73
Non-211 Colleges	67	68	68
3-Year Vocational Colleges	60	62	62

Reflect the major retaining rate of graduates

Job Quit Rate Analysis

- 34% of Class of 2013 quit their first job within 6 months after graduation

Reflect the first job stability of graduates

Job Satisfaction Analysis

- 56% of Class of 2013 graduates who are employed are satisfied with their jobs

Class of 2013   Class of 2012

%

	National Average	211 Colleges	Non-211 Colleges	3-Year Vocational Colleges
Class of 2013	56	61	57	54
Class of 2012	55	62	57	51

Importance and Satisfaction of 35 Basic Skills for 4-Year College Graduates（2-1）

UNESCO
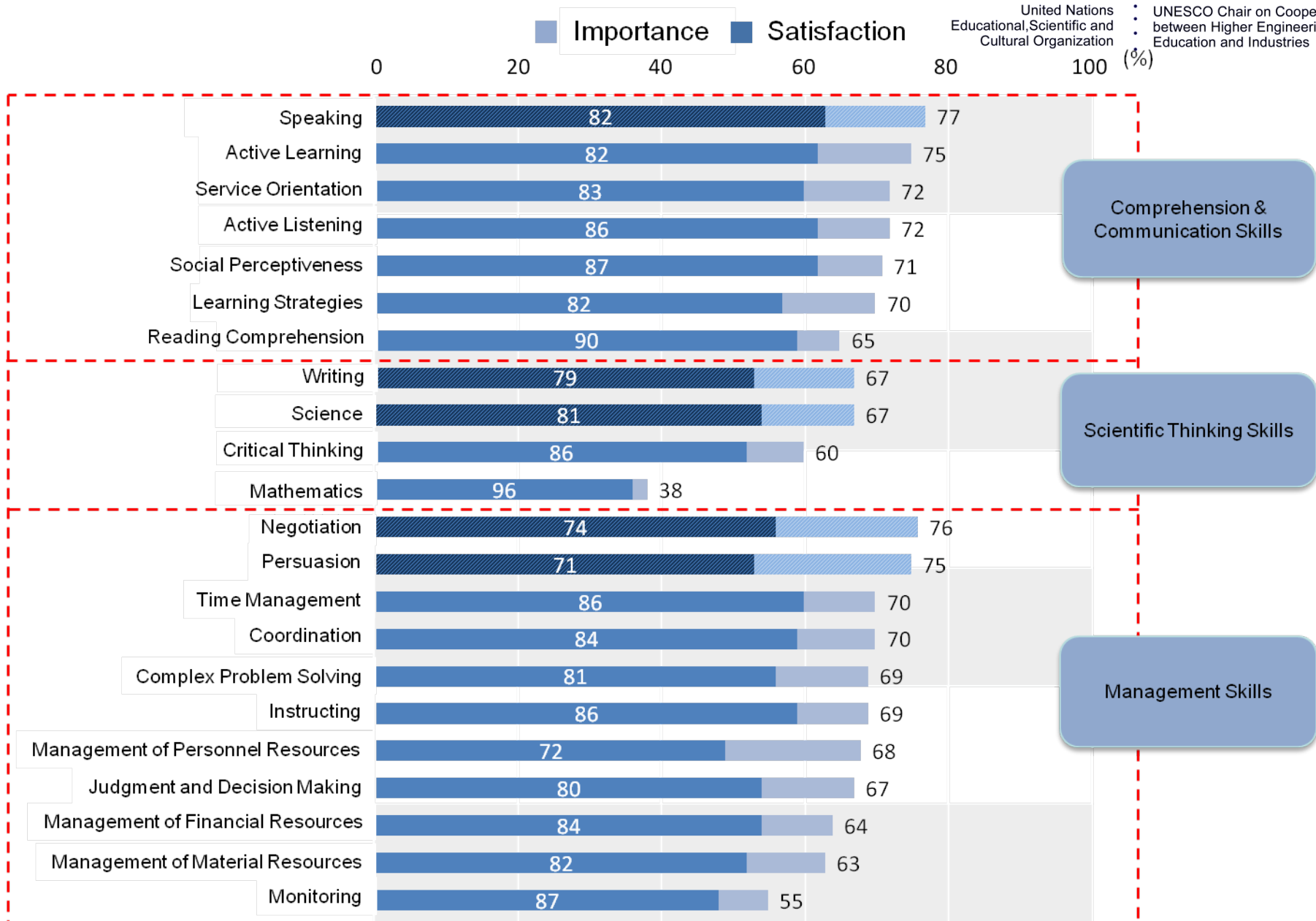
United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
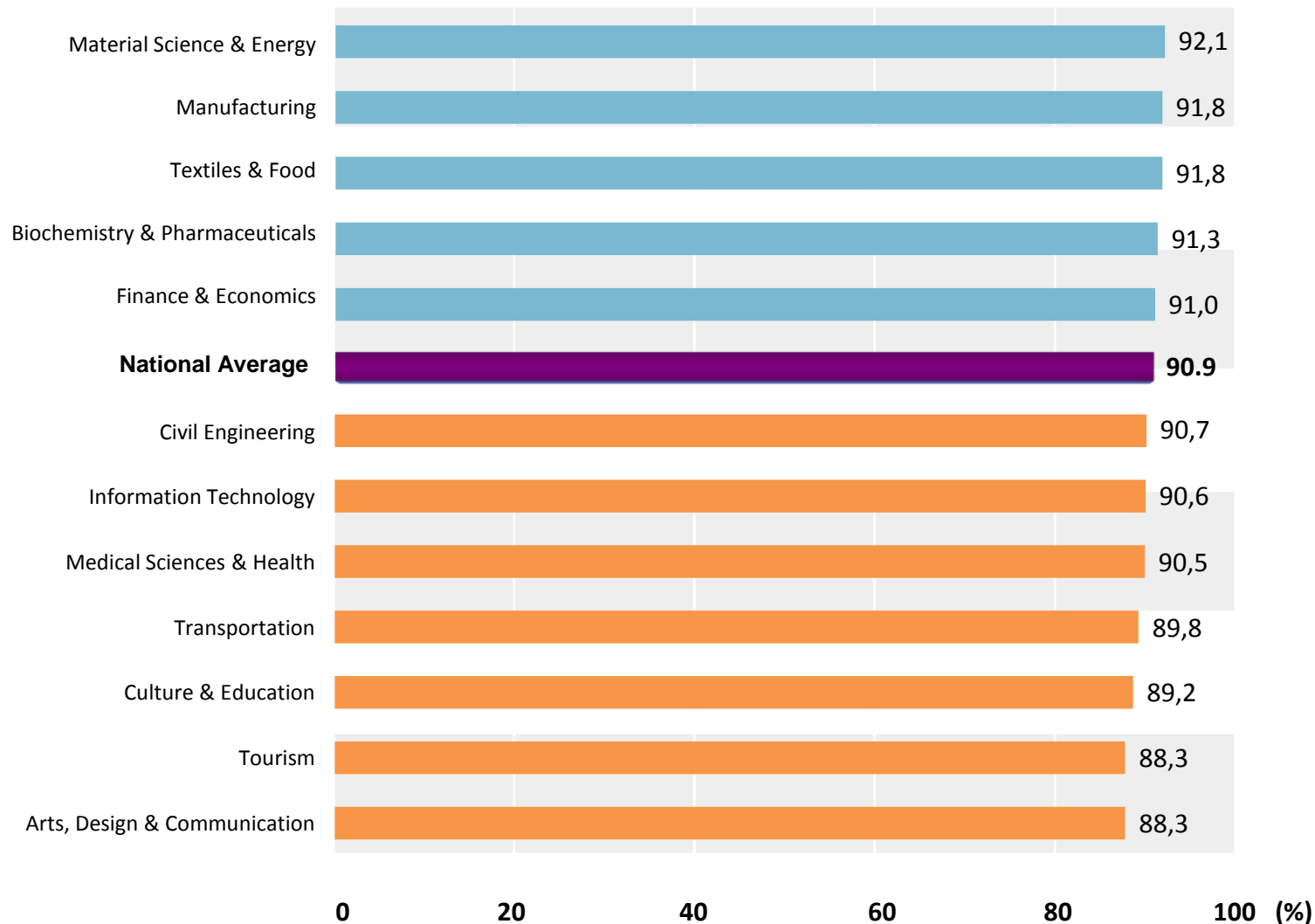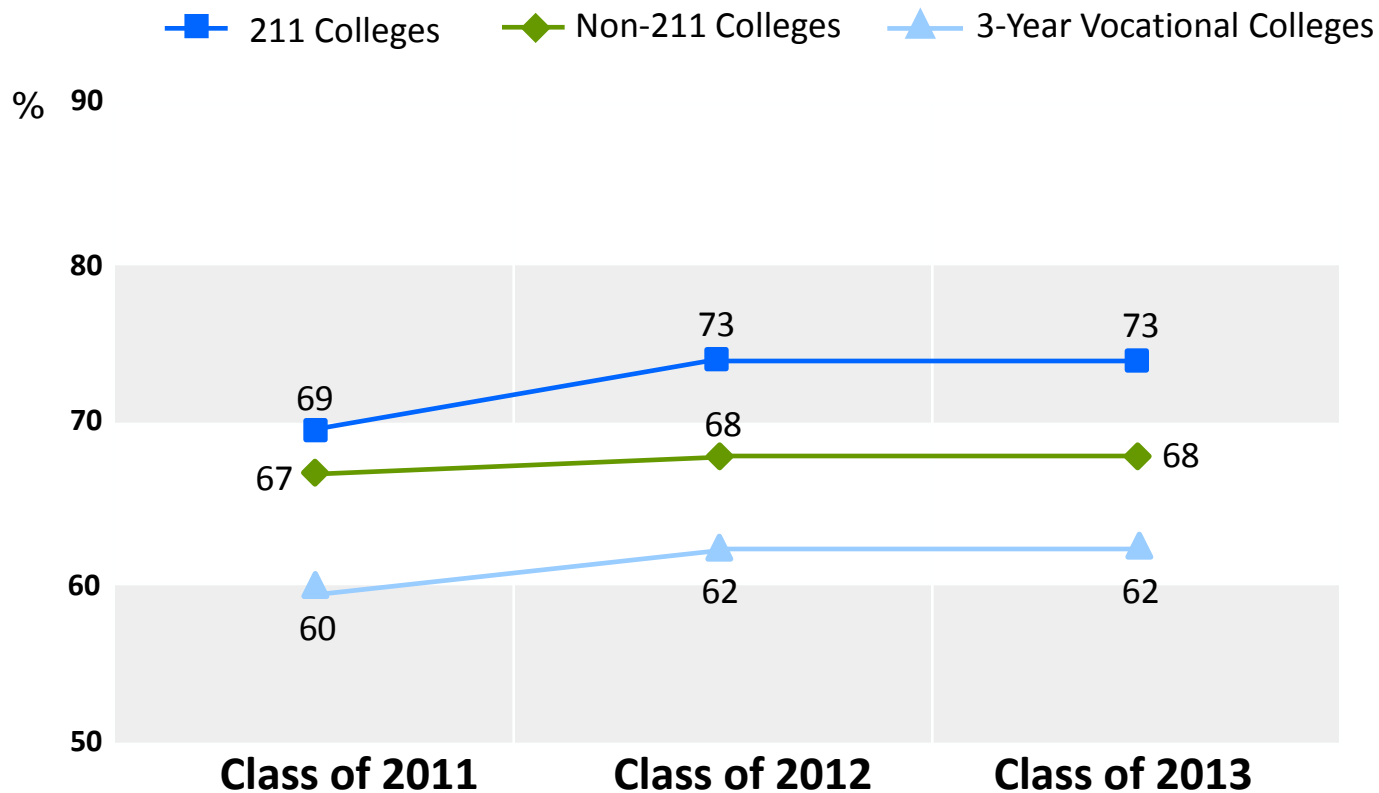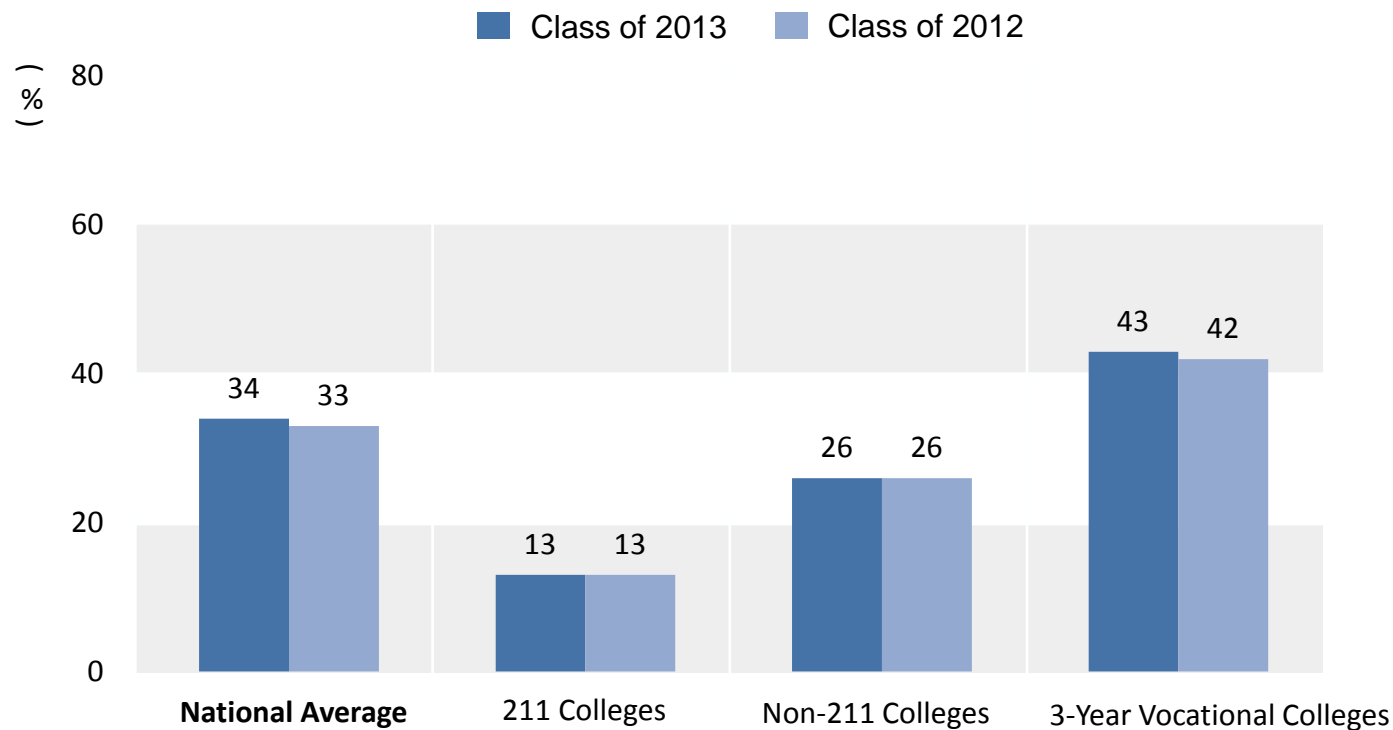Education and Industries

■ Importance ■ Satisfaction

(%)

Skill	Satisfaction	Importance
Speaking	82	77
Active Learning	82	75
Service Orientation	83	72
Active Listening	86	72
Social Perceptiveness	87	71
Learning Strategies	82	70
Reading Comprehension	90	65

Comprehension & Communication Skills

Skill	Satisfaction	Importance
Writing	79	67
Science	81	67
Critical Thinking	86	60
Mathematics	96	38

Scientific Thinking Skills

Skill	Satisfaction	Importance
Negotiation	74	76
Persuasion	71	75
Time Management	86	70
Coordination	84	70
Complex Problem Solving	81	69
Instructing	86	69
Management of Personnel Resources	72	68
Judgment and Decision Making	80	67
Management of Financial Resources	84	64
Management of Material Resources	82	63
Monitoring	87	55

Management Skills

Importance of and Satisfaction of 35 Basic Skills for 4-Year College Graduates （2-2）

Legend: Importance (light blue), Satisfaction (dark blue)

Application Analysis Skills

Skill	Satisfaction	Importance
Troubleshooting	77	74
System Analysis	70	71
Technology Design	76	69
Quality Control Analysis	79	67
Operation and Control	73	67
Operation Monitoring	67	66
Operations Analysis	80	64
Equipment Maintenance	74	63
Equipment Selection	82	57

Hands-On Skills

Skill	Satisfaction	Importance
Programming	70	74
Installation	73	62
Repairing	71	57

Importance and Satisfaction of 35 Basic Skills for 3-Year Vocational College Graduates （2-1）
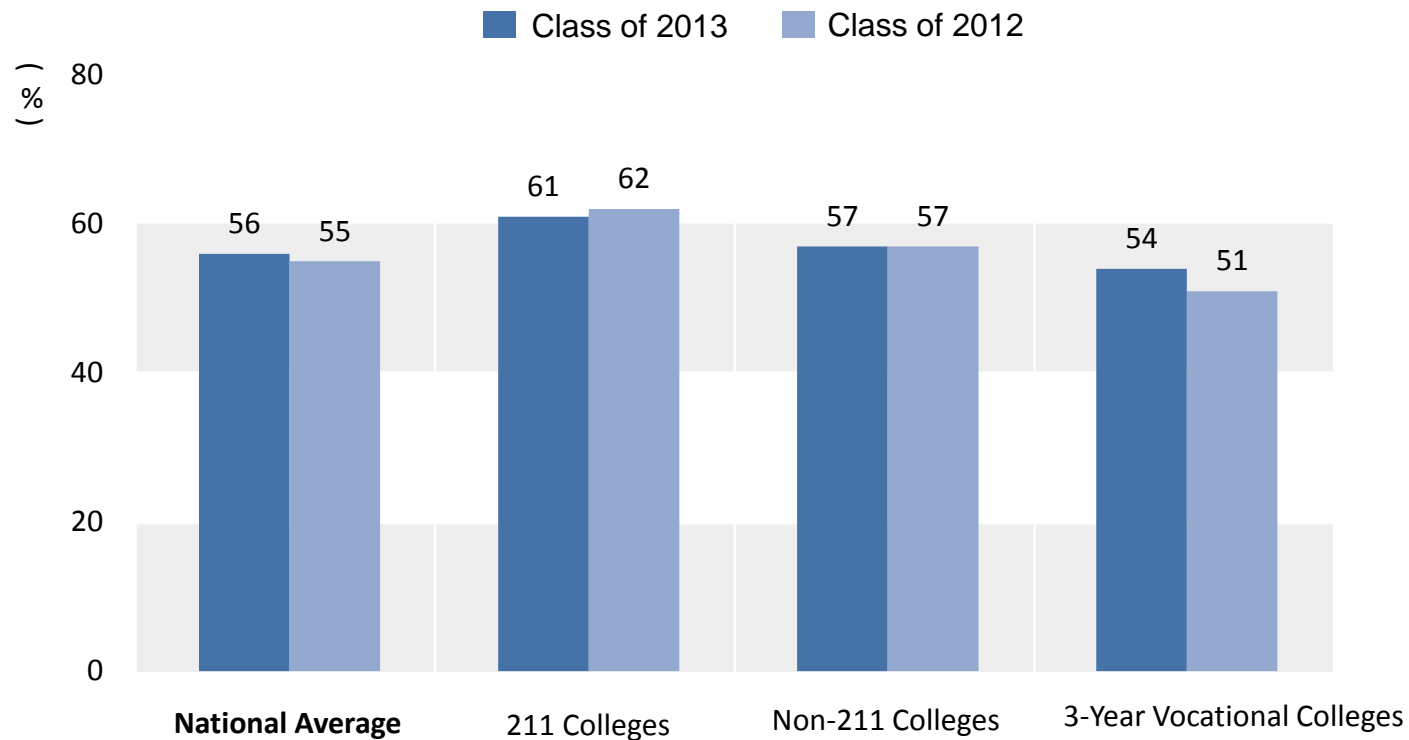

Legend: Importance / Satisfaction (%)

UNESCO
United Nations Educational, Scientific and Cultural Organization

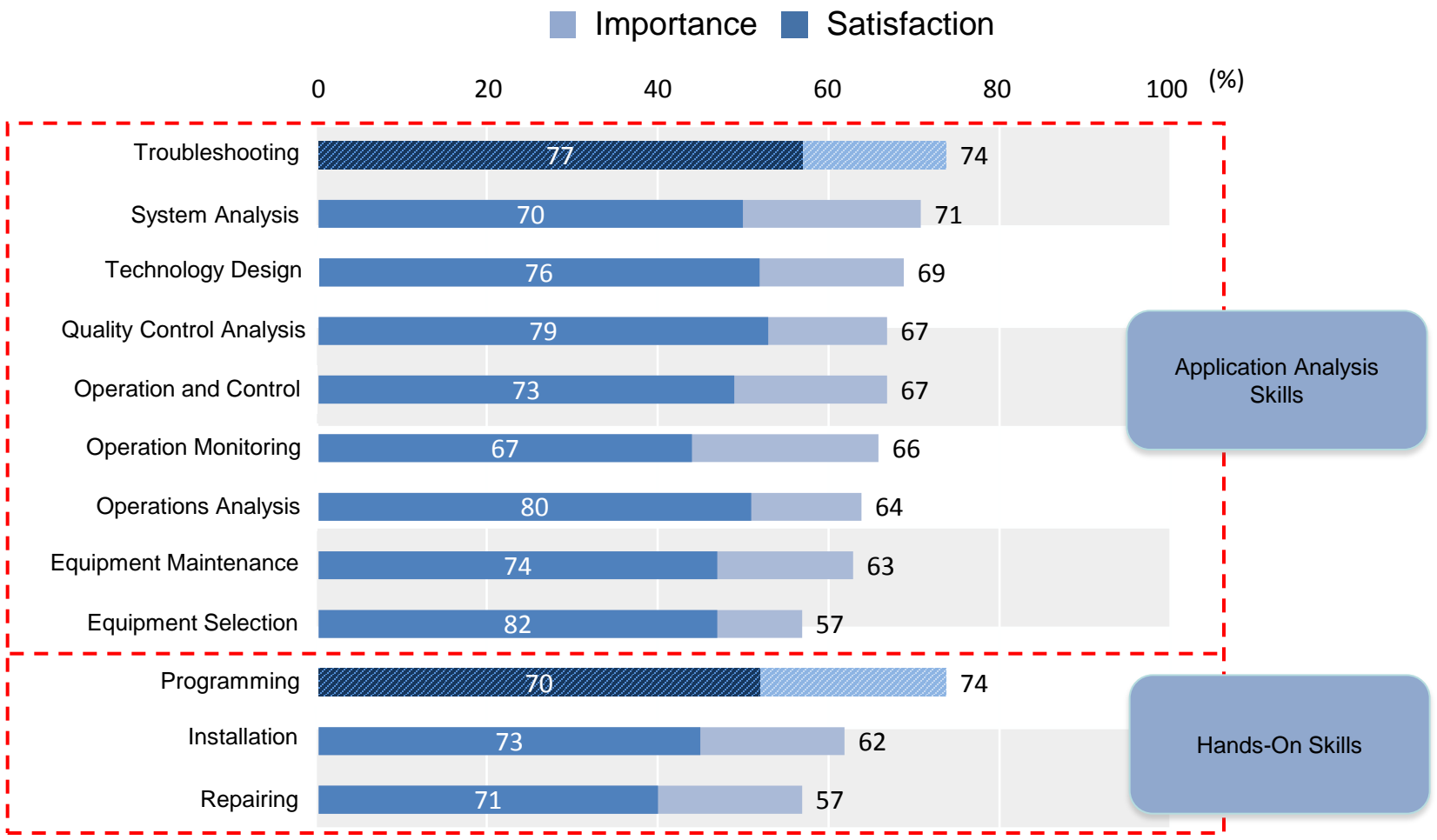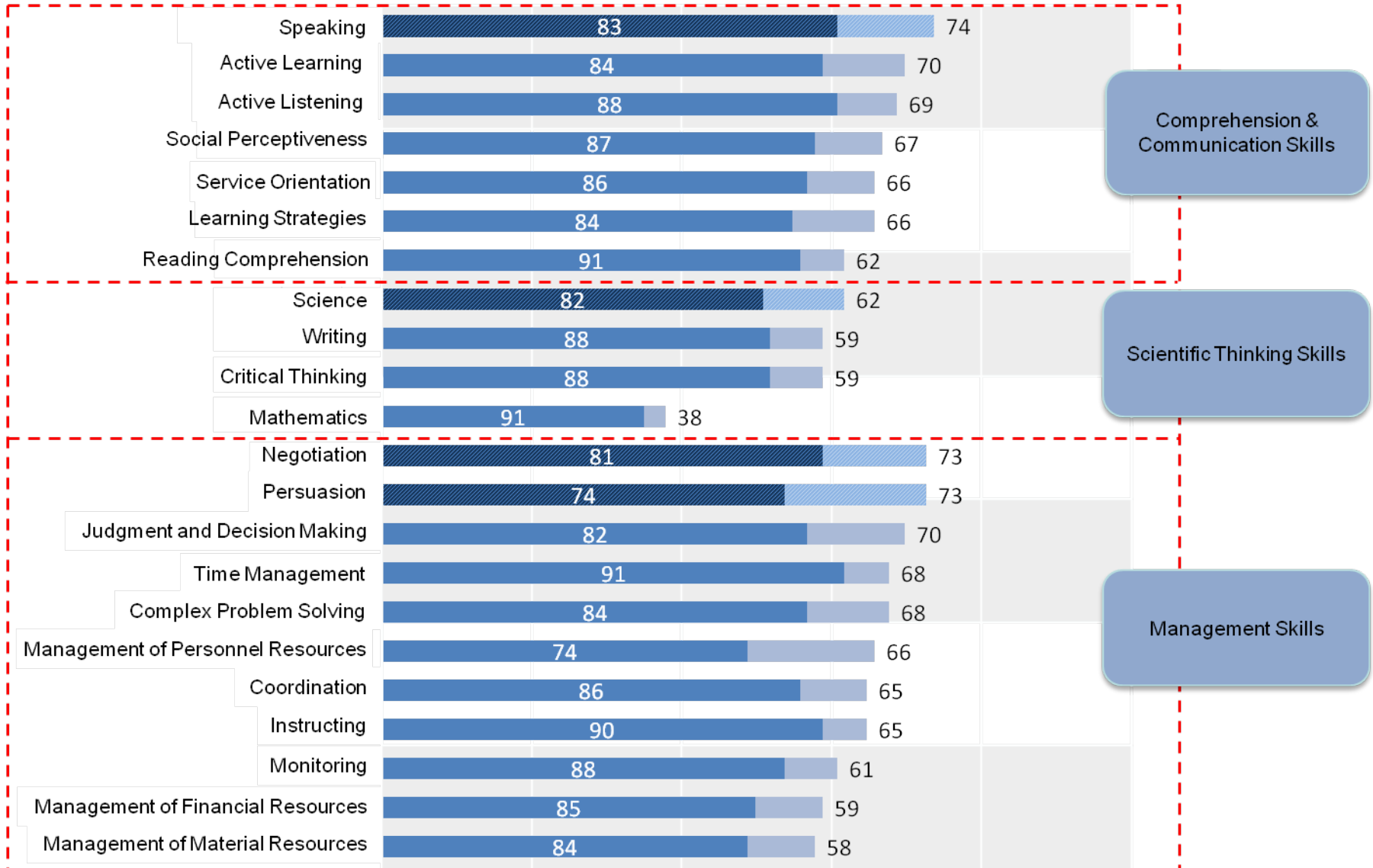UNESCO Chair on Cooperation between Higher Engineering Education and Industries

Comprehension & Communication Skills

Skill	Satisfaction	Importance
Speaking	83	74
Active Learning	84	70
Active Listening	88	69
Social Perceptiveness	87	67
Service Orientation	86	66
Learning Strategies	84	66
Reading Comprehension	91	62

Scientific Thinking Skills

Skill	Satisfaction	Importance
Science	82	62
Writing	88	59
Critical Thinking	88	59
Mathematics	91	38

Management Skills

Skill	Satisfaction	Importance
Negotiation	81	73
Persuasion	74	73
Judgment and Decision Making	82	70
Time Management	91	68
Complex Problem Solving	84	68
Management of Personnel Resources	74	66
Coordination	86	65
Instructing	90	65
Monitoring	88	61
Management of Financial Resources	85	59
Management of Material Resources	84	58

Importance and Satisfaction of 35 Basic Skills for 3-Year Vocational College Graduates （2-2）

Importance of and Satisfaction of 28 Core Knowledge For 4-Year College Graduates（2-1）

Legend: ▉ Importance　▉ Satisfaction

(%)

Category	Satisfaction	Importance
Sales and Marketing	72	68
Therapy and Counseling	75	67
Economics and Accounting	78	64
Psychology	80	64
Fine Arts	84	61
Law and Government	76	60
Customer and Personal Service	77	59
Engineering and Technology	79	59
Personnel and Human Resources	76	58
Design	78	57
Clerical	85	55
Mechanical	75	55
Production and Processing	76	55

Importance and Satisfaction of 28 Core Knowledge For 4-Year College Graduates（2-2）

Core Knowledge	Satisfaction	Importance
Administration and Management	81	54
Education and Training	80	54
Chinese Language	92	54
Chemistry	85	53
Communication and Media	86	53
Biology	86	52
Computers and Electronics	86	52
Foreign Language	84	51
Sociology and Anthropology	87	47
Telecommunications	82	45
Physics	87	43
Mathematics	93	38
Geography	92	36

Importance of and Satisfaction of 28 Core Knowledge For 3-Year Vocational College Graduates（2-1）

Legend: ■ Importance ■ Satisfaction

(%)

Core Knowledge	Satisfaction	Importance
Sales and Marketing	75	66
Psychology	81	63
Fine Arts	77	62
Therapy and Counseling	82	62
Economics and Accounting	82	60
Customer and Personal Service	79	59
Law and Government	82	59
Personnel and Human Resources	74	59
Design	77	58
Education and Training	81	56
Engineering and Technology	80	56
Administration and Management	82	55
Chemistry	86	55

Importance and Satisfaction of 28 Core Knowledge For 3-Year Vocational College Graduates（2-2）

UNESCO
United Nations Educational, Scientific and Cultural Organization

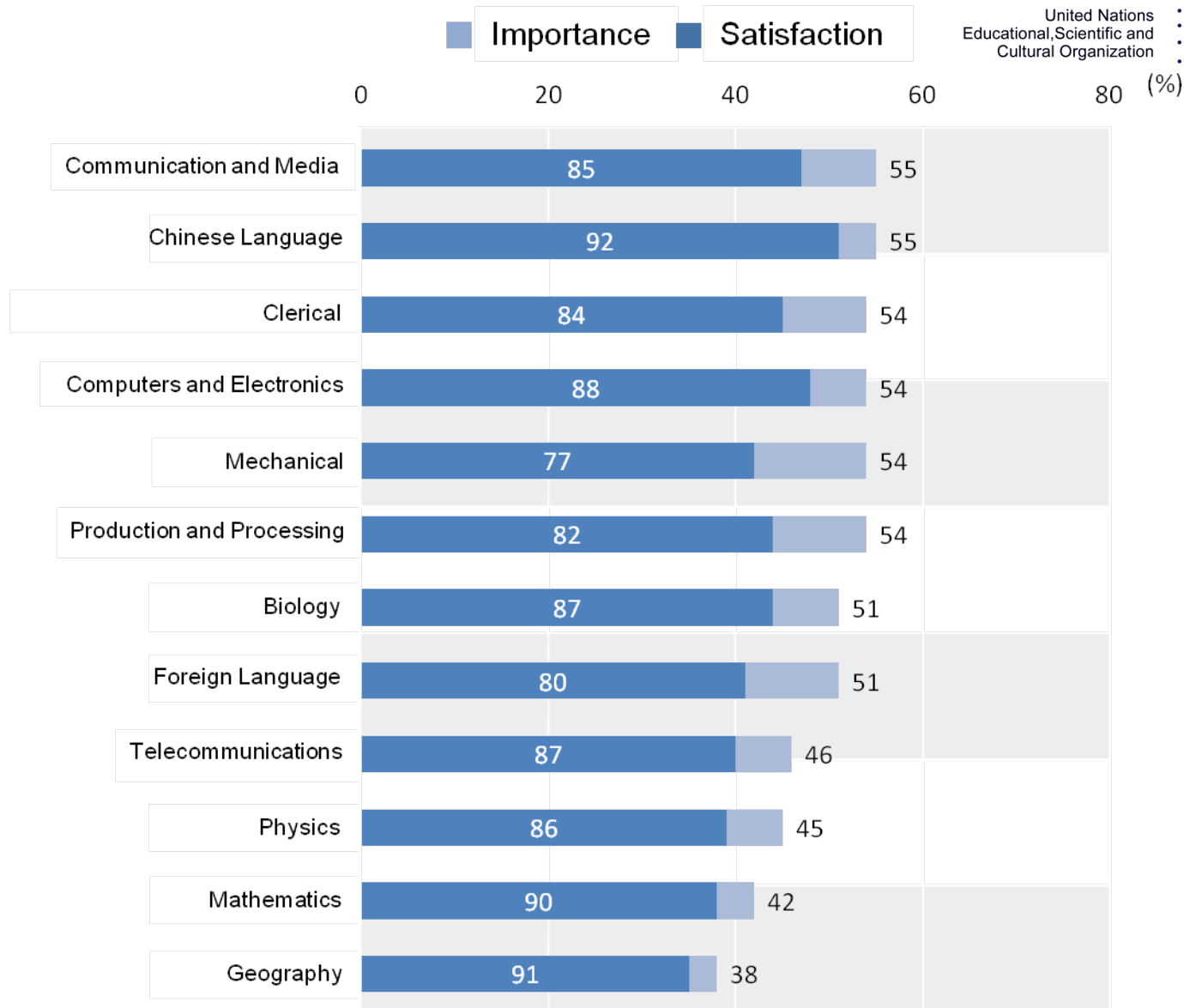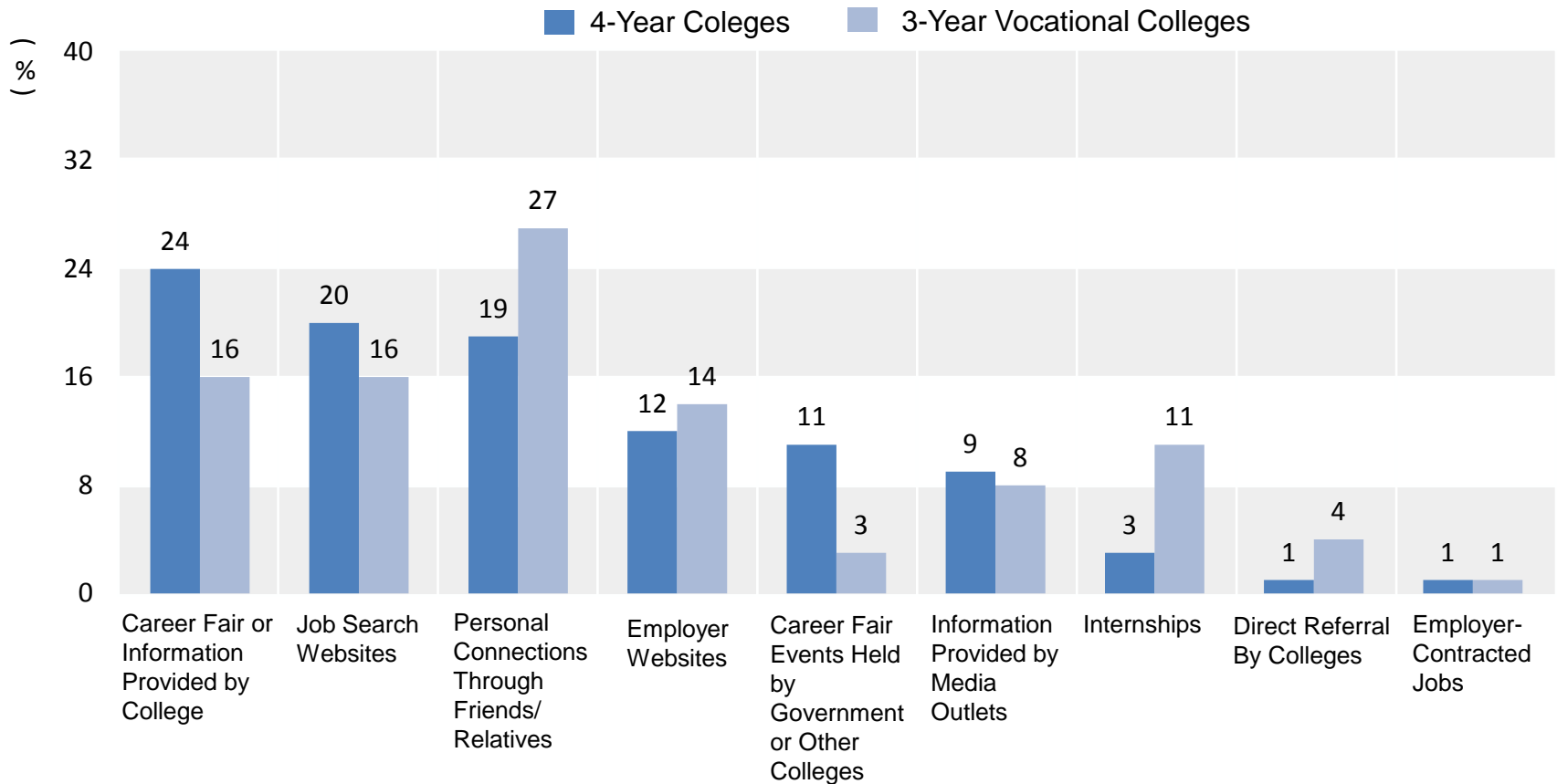UNESCO Chair on Cooperation between Higher Engineering Education and Industries

Legend: Importance　Satisfaction

(%)

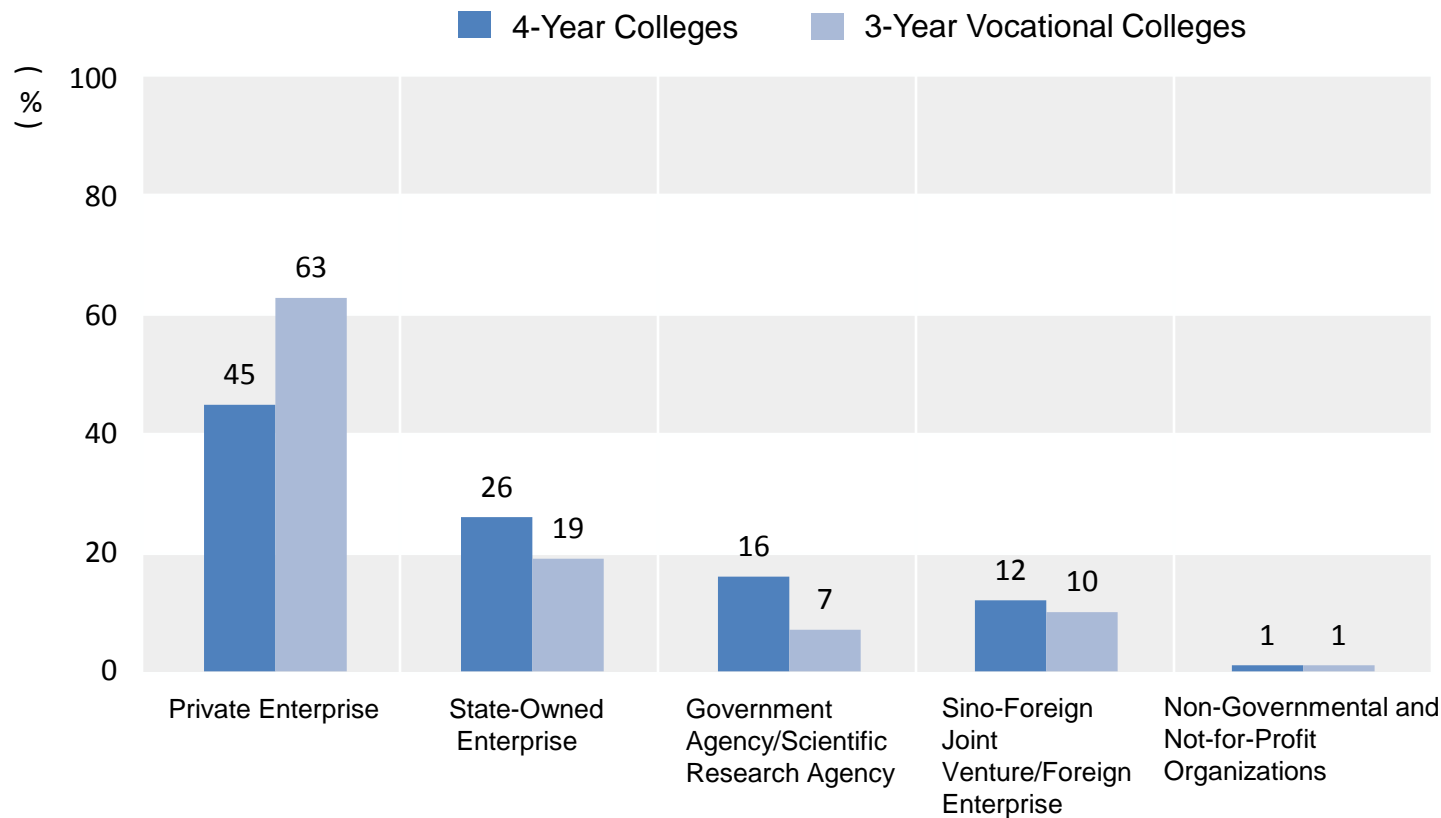| Knowledge	Importance	Satisfaction
Communication and Media	85	55
Chinese Language	92	55
Clerical	84	54
Computers and Electronics	88	54
Mechanical	77	54
Production and Processing	82	54
Biology	87	51
Foreign Language	80	51
Telecommunications	87	46
Physics	86	45
Mathematics	90	42
Geography	91	38

Job Search Channels

UNESCO
United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

- Class of 2013's primary successful job search channels are:

  4-year college graduates: on-campus recruitment

  3-year college graduates: personal connections

Type of Employer

- Class of 2013's primary employer is the private enterprise

Legend: ■ 4-Year Colleges ■ 3-Year Vocational Colleges

Employer	4-Year Colleges	3-Year Vocational Colleges
Private Enterprise	45	63
State-Owned Enterprise	26	19
Government Agency/Scientific Research Agency	16	7
Sino-Foreign Joint Venture/Foreign Enterprise	12	10
Non-Governmental and Not-for-Profit Organizations	1	1

Inf. of employment channels and distribution of employers prepares students to apply jobs in advance
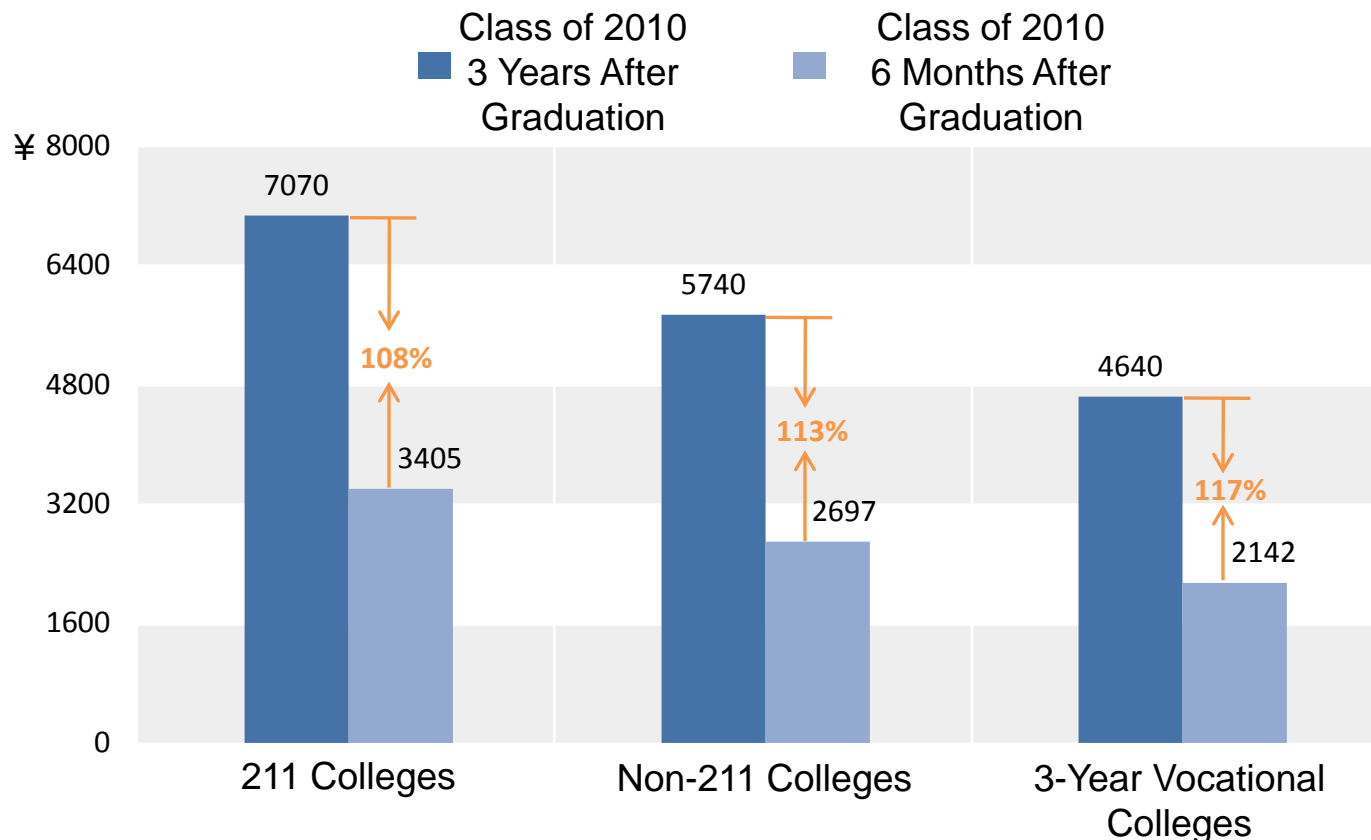
Monthly Income 3 Years After Graduation

United Nations
Educational,Scientific and
Cultural Organization

UNESCO Chair on Cooperation
between Higher Engineering
Education and Industries

- The Class of 2010's average salary 3 years after graduation increased 114% compared to 6 months after graduation
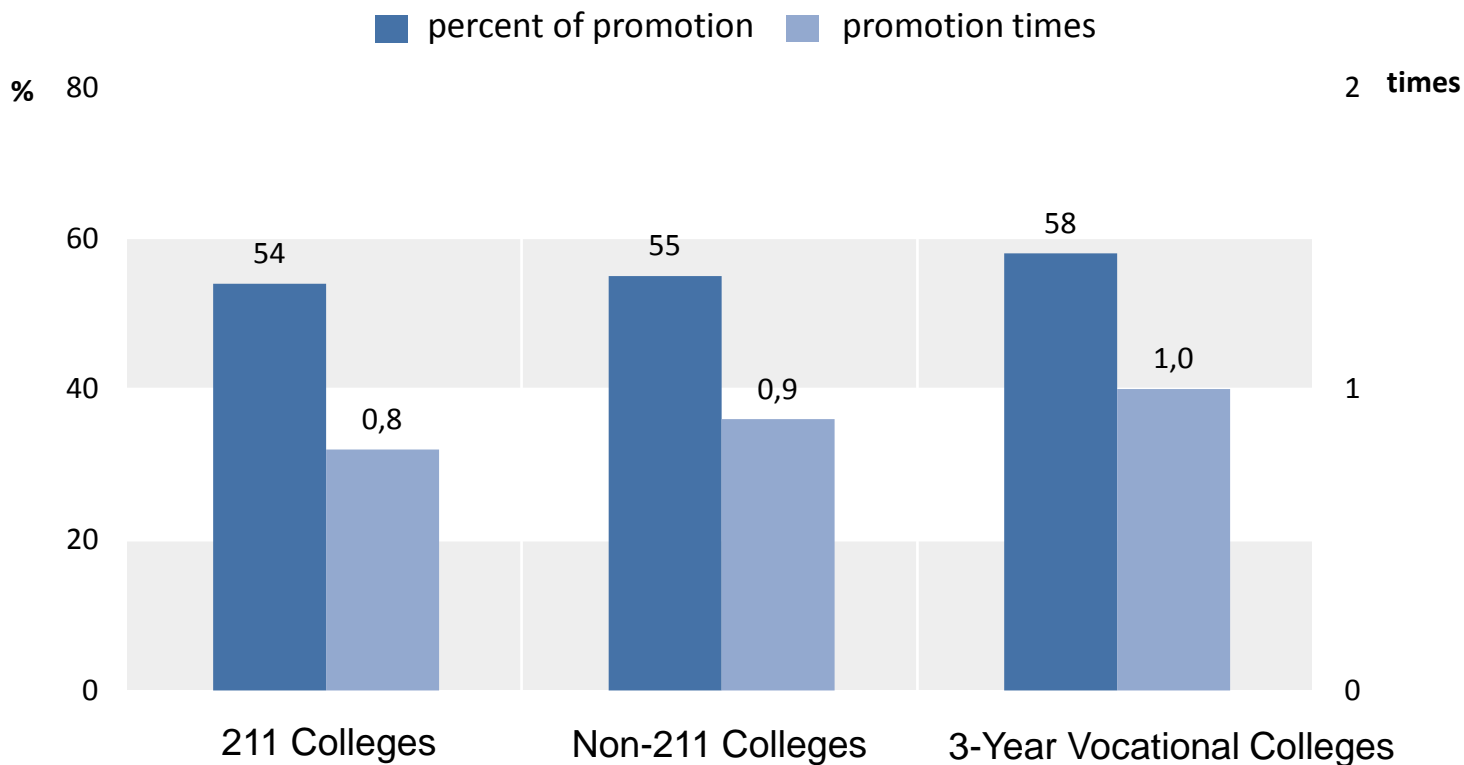

Class of 2010
3 Years After Graduation

Class of 2010
6 Months After Graduation

	3 Years After	6 Months After	Increase
211 Colleges	7070	3405	108%
Non-211 Colleges	5740	2697	113%
3-Year Vocational Colleges	4640	2142	117%

Promotion Rate Analysis

- 57% of the Class of 2010 have been promoted within 3 years after graduation

Track the long-term professional development of graduates for pedagogic improvement

Conclusions

• IT play a vital role for modern massive higher education

• IT is a necessary tools in education management and QA

• Higher education QA and management need advanced information technology (Big Data, Information Security, Mobil Internet, …)

• College Graduates Following up Initiatives require involvement of all key stakeholders of higher education, especially from industries

Thank You !

Q&A