INSPIRING STUDENT : MAKER EDUCATION

Prof. Li Zheng, Vice Provost
Tsinghua University, Beijing, China
2015.11
WHO ARE WE?
History

1911  Tsinghua School
1928  National Tsinghua University
1952  Became an engineering university
1978  Reconstruction in a comprehensive university
Now   19 Schools, 56 Departments
Beautiful Campus

The World's Most Beautiful College Campuses
Top University in China

- Undergraduate students ~ 15,184
  - Chinese students ~ 13,794
  - Foreign students ~ 1,390
- Freshmen ~ 3,735
  - Chinese students ~ 3,379
  - Foreign students ~ 356

- 50+% TOP 10 students (S&T) select Tsinghua in recent 10 years
- One thousandth high school students can be admitted at Tsinghua Univ.
Tsinghua Alumni as Prominent Scholars

Cradle of leaders in China’s scientific, technological, and industrial sectors

- 25% of Chinese Academy of Sciences (CAS) fellows
- 20% of Chinese Academy of Engineering (CAE) fellows

6 of 14 winners of China’s Highest Award for Science and Technology by 2008
Tsinghua Alumni as Top Political Leaders
Tsinghua as “cradle of engineers”

Tsinghua’s education emphasizes on 3S

- **Solid** fundamental knowledge on arts and science
- **Strong** research and practical training in industry
- **Social** responsibilities and innovation
Undergraduate Programs

- 19 Schools, 56 Departments

- School of Information Science and Technology
- School of Mechanical Engineering
- School of Aerospace
- School of Civil Engineering
- School of Architecture
- School of Sciences
- School of Life Sciences
- School of Medicine
- School of Materials Science and Engineering
- School of Economics and Management
- School of Public Policy and Management
- School of Marxism
- School of Humanities
- School of Social Sciences
- School of Journalism and Communication
- Academy of Arts and Design
- School of Environment
- School of Law
- PBC School of Finance
Undergraduate Programs

- Major for undergraduates: 66
- Courses for undergraduates: ~6000

- Engineering: 8538, 62%
- Science: 3111, 23%
- Humanities and social sciences: 2145, 15%

[Graph showing the distribution of majors with percentages and counts]
Program structure

General courses (comprise of subject courses, broaden science and liberal electives)
70 Credits

Core Major Courses
30~40 Credits

Electives
40~30 Credits

Thesis
15 Credits

1st~2nd Year

3rd~4th Year

Summer semester

Enhanced Experimental and Practical elements
Contribution of Engineering Education to China

1. Serving as a crucial part of the national education system

2. Playing a vital role in China’s economic growth and social development

3. Training high-quality engineers through national key construction projects

Tsinghua’s valuable heritage: Learning through solving the real problems in key national projects.
“MAKER”
EDUCATION
CAN System

Content → Competency
Teaching → Learning
Administration → Governance
Learning Goal for Innovation Centered Education

To Be

Independent、Courage、ingenuity、inclusive、Responsibility

To Do

creativity、execution、leadership

To Know

Cross-discipline
learning
Innovation Education System

【Impacts】
【Activities】
【curricula】
【Labs】
【Goal】
最未来

Futureest

2014年第1期 / 总第4期  3月

内页编号：TH-1105

把不起眼的项目做到伟大 ——访未来航空兴趣团队辅导员陈素利
“匠”眼识金——访未来航空兴趣团队指导教师高旭
打造清华“梦工厂” 我的动漫梦

兴趣天空任翱翔
——首届全国大学生“小科技创新团队”颁奖记

特稿  No. 1000000001

本期介绍
2014兴趣团队寒假调研
Ideas!
The fundamental industry training center acted as the interdisciplinary ideation, design and making platform.

The maker workshop at Academy of arts and design and Maker Space student association became the important hub of China maker network.

Keep complementarily and synergy relationships with other projects such as x-lab, XIN Center, students Futurest teams.
Makers translate the idea into reality
The main characters are innovation, practice and sharing
Emphasize "Learning by doing"
Maker Movement changes the way of learning, production, and create the new campus culture
Extension of the hacker culture, DIY culture
Tsinghua’s Efforts For the Next generation

Since the 1990s, Tsinghua has worked hard to build up a comprehensive, research-oriented, and open university with the world-class standard.

- Strengthening international cooperation
- Improving the connection with the industry
- Reforming education model and pedagogy
- Building up the lifelong learning competence
Each maker participant will be seen as a hero, following the Campbell’s the hero Journey, we set 1, 3, 6, 8 as the four critical phrases that have significant impact in the young maker’s journey.
Makers meets Challenges from the real-world
Maker Learning model

- Peer-to-peer learning
- Project based practice
- Flipped classroom
- Experiential Learning
Maker culture emphasizes Design Thinking

- Empathy
- Integrative Thinking
- Optimism
- Experimentalism
- Collaboration
Maker culture emphasizes experiential learning, Hands-on practice Interest-based learning
Maker culture emphasizes the iteration from prototype to product.
Tsinghua Maker Space Association established in Sept. 2013. The co-founder came from engineering and design majors.
Innovation related Class、XLP、National science and technology competition、University organized Competition、Students Associations
U.S.-China High-Level Consultation on people to people exchange

US-China Young Maker Competition
Cross-cultural communication, innovation change the world, international influence
The first Tsinghua Makers’ Day at Nov. 29th 2014
Tsinghua Maker Space Association, members come from different disciplinary
Minor Program of Maker will be proposed.
World Biggest Maker Space
Tsinghua i.Center Makerspace
Tsinghua i.Center Content Structure

6F Startup incubation Platform: startup support, international Creative community

4F Innovation acceleration: Startup team and accelerating program

1F Creativity Inspiration: maker coffee, Fab Lab

6F innovation/startup

5F Deep innovation: maker Mentor, interdisciplinary realization

3F Innovation resource management: Data and information processing center

2F Creative design: creativity workshop, teamwork

Tsinghua i.Center Space Structure
1F Creativity Inspiration: maker coffee, Rapid prototyping

- Student identity and personal data records
- Maker coffee, transboundary creative activity participation
- Prototyping and concept implementation, information publishing platform
激发创意：创客咖啡、快速成型

学生在创客咖啡进行互动交流，有机会和各种资源对接

1F Creativity Inspiration: maker coffee, Rapid prototyping
激发创意：创客咖啡、快速成型

1F Creativity Inspiration: maker coffee, Rapid prototyping

各类快速成型设备，可以通过线下和线下连接，提供各类原型制作服务

Various types of rapid prototyping equipment provide online and off-line connection and offer a variety of prototyping service
On 2F, students innovation team do teamwork by combining various course and skill training.
2F 创意设计：创意工坊、团队训练

2F Creative design : creativity workshop. teamwork

学习新的技能，由教师、助教以及学生开设的短期工作坊、自主课程

Learn new skills, short-term workshops set up by teachers, teaching assistants and students, independent course
3F Innovation resource management:

Data and information processing center

作为服务和管理层，满足师资交流以及培训

创客空间运营管理信息平台、创新创客课程管理系统、跨学科知识库系统

i. Center operations management information platform, innovation and maker course management system interdisciplinary knowledge base system
4F 加速创新：三创团队、加速项目
4F Innovation acceleration: Startup team and accelerating program

成熟的团队得以进入到4F的专业空间，开展长期的项目
Mature team have access to 4F professional space to carry out long-term programs
5F 深度创新：创客导师、跨界实现
5F Deep innovation：maker Mentor, Interdisciplinary realization

5F的空间提供Design Thinking的训练并支持设计与实现的课程与项目
5F space provides Design Thinking training and supports courses and programs about design and realization
5F Deep innovation: maker Mentor, Interdisciplinary realization

5F的平台更专注于有重大影响力的项目，汇聚驻校创客和Fellow的资源

5F platform is more focused on significant programs and gather resources from in-campus maker and Fellow
6F 创业孵化：创业支持、国际社区
6F Startup incubation Platform: startup support, international community

6F的空间满足辅修专业课程的需要，同时校友种子基金将提供更专业的支持
6F space satisfies the need of minor professional courses, meanwhile alumni seed fund will provide more professional support
6F Startup incubation Platform: startup support, international community
6F 创业孵化：创业支持、国际社区
6F Startup incubation Platform：startup support, international community

建立国际远程合作平台，互联全球创新实验室和教室
Establish international remote collaboration platform, interconnect global innovation labs and classrooms

6F的空间可以灵活变化，满足课程、比赛、活动、宣讲、展览等多种需求
6F flexible space meets curriculum, competitions, events, lectures, exhibitions, and other needs
顶层休闲空间在城市农业、太阳能、环境团队提供试验场

Top leisure space provides proving ground for urban agriculture, solar energy and environment team
Both Deep processing of prototype and engineering practice-related training are accessible for students.
B1-B2-B4 深度加工：工程文化 + 产品制作

学生不仅得到能力成长，并领悟和体验工程文化，得到素质方面提升。
Students not only obtain ability improvement, but also comprehend and experience the engineering culture, thus to obtain quality improvement.
B1-B2-B4 深度加工：工程文化 + 产品制作

灌装线 Bottling Line
入口 Entrance
生产线 Production line

二层走廊 2F corridor
机器人单元 Robot unit
工作单元 Working unit
How is China reconfiguring higher education to innovate and compete in global markets? 

Thanks!