Innovative Training Based on Student Needs

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Outline

1. Changing social needs
2. Well-organized training
3. Individually-tailored study
4. Systemic innovations
1. Changing social needs

With social and economic development, social needs for higher education have changed

Φ Higher education in the process of being popularized

<table>
<thead>
<tr>
<th>Year</th>
<th>2002</th>
<th>2006</th>
<th>2009</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of gross college enrollment</td>
<td>15%</td>
<td>22%</td>
<td>24.2%</td>
<td>36%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Φ Diversified needs on the part of students and their families

Φ Diversified needs for talents demanded by social changes

“National mid- & long-term education development plans”

USTC offers well-organized, individually-tailored training to meet changing social needs
2. Well-organized training

1. First-class scientists

Φ China’s strategic need for “empowering the nation through science and technology and talent cultivation”

Φ Fostering world-class leaders in basic sciences

Φ USTC’s tradition of training first-class scientists

| 29 of USTC graduates are academicians of CAS, and 21 APS fellows |
| “Plans for training top-notch students in basic disciplines” |
| CAS “programs for cultivation of top scientists and engineers” |
2. Well-organized training

Φ Under a partnership framework, USTC and relevant CAS research institutes have jointly set up seven talent classes for fostering first-rate scientists

<table>
<thead>
<tr>
<th>Talent classes</th>
<th>CAS Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hua Luogeng class of mathematics</td>
<td>Math &amp; system science research institute</td>
</tr>
<tr>
<td>Yan Jici class of physics</td>
<td>Physics research institute</td>
</tr>
<tr>
<td>Bei Shizhang class of life science</td>
<td>Biophysics research institute</td>
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<tr>
<td></td>
<td>Life science research institute</td>
</tr>
<tr>
<td>Talent class of mechanics</td>
<td>Mechanics research institute</td>
</tr>
<tr>
<td>Lu Jiaxi class of chemistry</td>
<td>Chemistry research institute</td>
</tr>
<tr>
<td></td>
<td>Organic chemistry research institute</td>
</tr>
<tr>
<td>Talent class of astronomical science &amp; technology</td>
<td>State observatory, Purple mountain observatory, Shanghai observatory</td>
</tr>
<tr>
<td>Zhao Jiuzhang class of modern earth &amp; space science &amp; technology</td>
<td>Geology &amp; geophysics research institute</td>
</tr>
</tbody>
</table>
2. Well-organized training

2. Research engineers

Φ National programs:

| An innovative nation to be built by taking a new Chinese-style approach to industrialization and training large numbers of talented people
| Research engineers as a main force in technical innovations and technological transfer

Φ USTC’s tradition of integrating theory with practice and science with technology

| Remarkable success in providing in-depth engineering education based on solid study of basic theories
| Among USTC graduates, there are 16 CAE academicians, more than 20 generals and numerous top technical personnel in China’s armed forces, 1 academician of US National Academy of Engineering, & over 20 IEEE fellows
2. Well-organized training

Φ Under a partnership framework, USTC and relevant CAS research institutes have established four talent classes for training high-caliber research engineers

<table>
<thead>
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<th>Talent classes</th>
<th>CAS partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wang Daheng class of mechanical &amp; electrical eng.</td>
<td>Changchun optics, precision machinery &amp; physics research institute</td>
</tr>
<tr>
<td>Zhao Zhongyao class of applied physics</td>
<td>Shanghai applied physics research institute</td>
</tr>
<tr>
<td>Talent class of materials science</td>
<td>Metal research institute</td>
</tr>
<tr>
<td>Talent class of computer &amp; IT</td>
<td>Computing tech research institute, Electronics research institute</td>
</tr>
</tbody>
</table>
2. Well-organized training

3. Outstanding people in various fields

Φ In addition to its ideal of being a first-class university and cultivating top-notch talents, USTC is also devoted to training various types of outstanding people

| Zhang Yaqin, former head of Microsoft Asian research inst. & VP of Microsoft Global |
| Deng Zhonghan, CAE academician, chairman of Vimicro |
| Chen Yilong, IEEE fellow, chief scientist of GM Asia & Pacific |
| Chen Xiaowei, President of Peoplexz.com |
| …… |
3. Individually tailored study

USTC provides individually-tailored study to overcome shortcomings of “mass-production type education” and meet different needs

1. Talent classes

Φ 11 talent classes set up in collaboration with CAS research institutes

Φ Three types of integration in a talent class

- **Integration of inst. & dept.**
  to optimize student growth

- **Integration of sci. & education**
  to give students opportunities to learn about frontiers of science

- **Integration of theory & practice**
  to raise students’ capacity of innovation
3. Individually tailored study

Φ **Aims of training**

- Providing students with a solid foundation in math & physics, mastery of research methods, creative mentality & innovation skills, whereby they will become first-class scientists or research engineers in 15-20 years

Φ **Student admission**

- At the end of 2nd year, outstanding students are selected from various depts. for the class which is under dynamic rolling management

Φ **Form of training**

- Most basic courses are taught at USTC
- Freshman & sophomore year studies are pursued in original depts.
- Talent class training starts in the junior year by specific schemes
- Workshops/lectures are given by experts from partner research institutes
- Seminars/research projects for student participation at research institutes during vacations
- Specialized courses, research or thesis preparation at research institutes in senior year
3. Individually tailored study

2. Flexible curriculum design

Φ Optimally layered, flexibly-designed curriculum to provide for most suitably personalized study

Φ Uniform requirements for basic courses
  \ Generally required courses adapted to different disciplines

Φ Flexible setup of specialized courses
  \ Joint teaching in cooperation with experts from research institutes, industries and various organizations

Φ Enriched learning across disciplines
  \ Encouragement for multidisciplinary studies
4. Systemic innovations

1. University-wide reselection of majors in the 1st year

2. Free switch across majors

3. Advisors appointed to provide academic guidance

4. Individually-designed study schemes
   
   Students may design suitable learning schemes according to their own abilities and interests under the guidance of their advisors

5. Criterion of graduation set around core knowledge

   A non-major student may be eligible for a degree in any specialty once he/she has fulfilled the credit requirements for that particular specialty

   Qualified students of talent classes are awarded with honor certificates
Conclusions

- New needs and challenges for universities along with social changes
- Well-organized, individually-customized training in accordance with students’ abilities
  - Directions of specialization
  - Curriculum system
  - Methods of study
  - Research practice
- System assurance
Many Thanks!