Under the Background of Artificial Intelligence
Transformation of Higher Vocational Institutions

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SHENZHEN POLYTECHNIC
About Shenzhen Polytechnic

Founded in 1993, Shenzhen Polytechnic is located in the window city of China's reform and opening up, Shenzhen (neighbor to Hong Kong). The Polytechnic covers an area of 2.36 million square meters, with 78 majors, 24,000 full-time students, more than 2,200 faculty and staff, including 202 professors, 651 associate professors and 370 doctors.

The Polytechnic strengthens cooperation with leading companies such as Huawei, Ping An Group, China Merchants Group, Alibaba and Tencent to cultivate high-quality technical personnel. The graduates are popular in labor market. On average, one graduate can get 4.8 jobs.

The Polytechnic emphasizes on scientific and technological research and development, introducing Prof. Hoffmann-Nobel Prize Winner in Chemistry, and establishes a number of high-end platforms such as Hoffmann Research Institute for Advanced Materials to provide technical services for micro, small and medium-sized enterprises.

According to third-party evaluation, Shenzhen Polytechnic has been ranked top in comprehensive competitiveness of Chinese higher vocational education colleges for three consecutive years.
Content

I  Background Analysis
II  How to transform
PART 1
Background Analysis

Characteristics of new technologies and industrial revolutions
Challenges for higher vocational institutions
(I) Characteristics of the new scientific and technological revolution and industrial revolution with artificial intelligence as the representative

The talents who have received standardized training, like telemarketers, will be replaced largely, with the replacement rate of 99.0%.

The senior intellectual workers engaging in the work of “strong stylization and high repeatability”, like accountants, will be replaced, with the replacement rate of 97.6%.

1. A large amount of jobs will disappear

Characteristics of the new scientific and technological revolution and industrial revolution with artificial intelligence as the representative

2. Large-scale personalized customization

- Online customization
- Products characterized by multiple varieties, large scale, standardization, platformization, modularization, personalization and popularization

1955
- The yield of a single product of Volkswagen Beetle reached the top

1980
- Products characterized by few varieties, large scale, standardization and popularization

1913
- Ford Model T
- Products characterized by few varieties, large scale, standardization and popularization

1850
- Karl Friedrich Benz invented cars
- Products characterized by multiple varieties and small scale
- Products customized for the rich

Production

Modularization and standardized production

To

Personalization and specialization
(I) Characteristics of the new scientific and technological revolution and industrial revolution with artificial intelligence as the representative

From production-oriented manufacturing to service-oriented manufacturing

GE Company, by installing a large amount of sensors on the aeromotor, can achieve the real-time intelligent analysis and intelligent control and provide reliable maintenance services based on the engine data and the latest AI technologies to further form the intelligent “system of optimized operation and sound support” of the aeromotor.

On this basis, GE carries out the rental service mode paid by the hour to provide lifelong service for the engine. And consequently, it becomes a service-oriented manufacturing enterprise by increasing the profit through its service.

3. Service-oriented manufacturing

GE power turbine sending the consumption data of electrical energy
4. The human society will enter the spiritual world

It can be boldly predicted that the human society will surpass the material world to enter the spiritual world in the future.
(II) Challenges brought by artificial intelligence to higher vocational education

1. All previous scientific and technological revolutions and industrial revolutions can promote the transformation and upgrading of higher vocational education.

<table>
<thead>
<tr>
<th>Main production characteristics</th>
<th>Agricultural society</th>
<th>The first industrial revolution</th>
<th>The second industrial revolution</th>
<th>The third industrial revolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handicraft workshop</td>
<td>Handicraft workshop</td>
<td>Machine production (mechanization)</td>
<td>Achievement of electrification</td>
<td>Achievement of informatization</td>
</tr>
<tr>
<td>Small-scale production</td>
<td>Small-scale production</td>
<td>Establishment of the factory system</td>
<td>Large-scale, flow-line and standardized production</td>
<td>The science and technology have an increasingly obvious promoting effect on production, with higher and higher demands for technical content in the work</td>
</tr>
</tbody>
</table>

Vocational education mode

- Apprenticeship system (from father to son and from master to apprentice)
- Inchoate vocational schools emerged at the right moment
- Secondary vocational schools emerged
- Higher vocational institutions emerged
(IV) Challenges brought by artificial intelligence to higher vocational education

2. Ten challenges

* The posts established for talents who have received higher vocational education may disappear largely.

* The boundary between white-collar and blue-collar workers in the conventional sense gets increasingly obscure and the corresponding boundary of engineering, technical and skilled talents will also get more and more obscure.

* With the acceleration of technical iteration, people's expanding ability in the professional career will become more and more important.

* Due to the material abundance, people will have more and more spare time and pay more attention to life education.

* With the production mode transforming from standardization to personalization, people will pay more attention to the personalization of talent training.
With the production mode transforming from large-scale production to workshop-style production, the threshold of entrepreneurship will be reduced greatly and the innovation and entrepreneurship education will become more and more important.

The age of artificial intelligence is an age that technical innovation is everything, so the ability of technical innovation will become a key factor to position a higher vocational school.

With the acceleration of technical iteration, the retraining of engineers and technicians will get more and more important, so the training function of higher vocational schools will become increasingly crucial.

How to improve the educational and teaching means through artificial intelligence.

How to transform the school management mode through artificial intelligence.
PART 2
How to transform

Talent cultivation
Innovation and entrepreneurship
Technical research and development
Social service
Internationalization
(I) To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

1. Transformation of discipline and specialty

(1) Upgrade the connotation of traditional specialties

**Early-warning mechanism for red-card and yellow-card specialties**

Based on the evaluation data from the third party:
✓ Give a warning to the early-warning specialties
✓ Reduce the enrollment of yellow-card specialties
✓ Stop the enrollment of red-card specialties
✓ Support the enrollment of green-card specialties

**Dynamic adjustment mechanism of specialties**

✓ “Close, stop, merge and switch” the laggard specialties (from 100 to 70)
✓ Adjust the specialties based on the industrial transformation and upgrading
✓ *(e.g. transforming the accounting and financial specialties to financial and technical specialties)*
(I) To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

(2) Emphasize the specialties under the layout of strategic emerging industries and future industries

The specialties will be established to comply with the emerging and future industries, such as intelligent manufacturing, robot, cloud computing and big data, etc.

1. Transformation of discipline

Newly established specialties in 2018
Specialty renaming
Newly added specialty orientations
Adjusted specialty orientations

Specialties under the layout of new and hi-tech industries 21 (%)
Specialties under the layout of cultural and creative industries 14 (20%)
Specialties under the layout of modern logistics industry 2 (3%)
Specialties under the layout of financial industry 3 (4%)
Specialties under the layout of strategic emerging industries and future industries 16 (23%)
Specialties under the layout of other industries 14 (20%)

Unit: piece
(I) To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

(3) Establish the comprehensive specialty of “artificial intelligence + X”

Promote the establishment of ‘new engineering courses’, build the new training mode of comprehensive specialty in the form of ‘artificial intelligence + X’, and set up 100 comprehensive specialties of ‘artificial intelligence + X’ by 2020.
(I) To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

(1) Solve the key problems that hinder the personalization of education by means of AI technology

- Solve the personalization of training programs by means of the intelligent recommendation engine
- Solve the precision of teaching procedures by means of the technology of learning analysis
(1) Solving the key problems that hinder the personalization of education by means of AI technology

Schematic diagram for the technology of learning analysis

Fig. 3 Framework for the adaptive learning system based on big data and learning analysis
(I) To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

(2) Achieve the “six integrations”

- Integration of production and education
- Integration of technology and culture
- Integration of higher vocational education and general higher education
- Integration of theory and reality
- Integration of artificial intelligence and teaching
- Integration of education and life

2. Transformation of talent training
(I) To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

(2) Achieve the “six integrations”

2. Transformation of talent training

- Achieve the integration of production and education through the institutes of characteristic industries

- Establish different specialties and formulate curriculum standards jointly
- Hire teachers and engineers from each other and build laboratories together
- Cultivate students and employees jointly

Opening Ceremony for Architectural Engineering Institute of Shenzhen Polytechnic and Tagen Group

Having been founded

Architectural Engineering Institute of Shenzhen Polytechnic and Tagen Group, and Shenzhen Healthcare Institute

Under negotiation

To set up a group of institutes of characteristic industries
(I) To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

(2) Achieve the “six integrations”

Background

The boundary of white-collar, gray-collar and blue-collar workers gets obscure
The boundary between higher vocational education and general higher education gets obscure accordingly

Route

Stick to the foundation of vocational education

Graduation orientation VS graduation skills

Integrate with the ideas and courses of general higher education

Expand the elementary courses, professional basic courses and design courses
Set up one or two classes for different specialties to achieve the elite education
(I) To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

(2) Achieve the “six integrations”

Integration of theory and reality
- Taking ability as the target
- Taking project as the carrier
- Taking student as the subject

Integration of technology and culture
- Transform the specialty with culture as the guide
  - Professional culture course + industrial culture course
  - Achieve the cultural education through specialized courses
  - Promote the lectures on cultural quality
  - Build the platform for the cultivation and practice of cultural quality
  - Academies, volunteers, associations and social practices

2. Transformation of talent training
(1) To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

(2) Achieve the “six integrations”

Integration of education and life

Academy establishment
- Complete living facilities; harmonious teacher-student relationship
- Highlighted cultural spirit; abundant practical activities
- **Positive psychology set up by Shenzhen Polytechnic**
- School life VS life after graduation

Integration of artificial intelligence and teaching

**Introduce the intelligent teaching system**
- Solve the problem of personalized learning of students
- Provide the accurate service of teaching procedures
- Record the growing process of students accurately

**Promote the role restructuring of teachers**
To be the cradle for the technical and skilled talents who can adapt to the age of artificial intelligence

3. Improvement of three abilities

Employment ability
- Cultivation of the core competence
- Employment rate
- Employment quality
  - Salary
  - Specialty relevancy
  - Career development channel

Expanding ability during the vocational career
(including the abilities of innovation and creativity, solidarity and cooperation, and self-learning, etc.)
- Professional basic ability
- Self-learning ability
- Innovative ability
- Cultural quality and vocational quality

Creative ability for a happy life
- The global higher education is transforming from the development-oriented education to the growth-oriented education
- Characteristics of vocational education
(II) To be the cradle for entrepreneurs

Cultivate the talents who can adapt to the employment and those who can create employment posts.

Encourage a part of students to establish a business and a majority of them to devote themselves to employment with entrepreneurship.
(II) To be the cradle for entrepreneurs

Education is the center
Hierarchy is the route
People are the target
Innovation is the core

Advanced double-
creation education mode deeply integrated with professional education

Elementary education
Preparatory education
Professional education
Practical education
(III) To be the technology R&D center for micro, small and medium-sized enterprises

Cooperate with government sectors, world-class enterprises and research institutes

- Build the ten technician workstations
- Build the ten innovative centers for application technology
- Build the ten public service platforms for productive service industry
- Build the three application R&D platforms
- Build the new system for the incubation and transfer of technological achievements
- Build the world-class think tank for the development of vocational education

Find your own position on the chain of scientific technicalization and technological industrialization
(III) To be the technology R&D center for micro, small and medium-sized enterprises

Hoffmann Institute for Advanced Materials

The team led by professor Roald Hoffmann, the winner of Nobel Prize in Chemistry

Institute of Intelligent Manufacturing Technology

Professor Sun Lining, the Chang Jiang Scholar

Institute of Intelligent Science and Engineering

Professor Su Hongye, the Chang Jiang Scholar
(IV) To be the school for the lifelong education of citizens

Exclusive academic education in schools

To

Schools for the lifelong education of citizens

Break the fence and enter the society
Carry out the social training on a large scale
Develop the school education and the vocational training simultaneously
Promote the full-time education and the part-time education simultaneously

DATA

The labor productivity will have an increase of 17% with 1 year added to the length of schooling of employees in the manufacturing industry.
(IV) To be the school for the lifelong education of citizens

Task unification in specific stage

All the people can learn in any place and at any time

Generally, the length of schooling is the externalization of the industrial flow-line thinking in the educational field.

The mixed age education will become normal in the future.
(IV) To be the school for the lifelong education of citizens

1. **Establish a group of industrial training institutes**

<table>
<thead>
<tr>
<th>Name of industrial training institutes</th>
<th>Construction progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shenzhen Healthcare Institute</td>
<td>Having been constructed</td>
</tr>
<tr>
<td>Cross-border Institute for E-commerce Training</td>
<td>Under construction</td>
</tr>
<tr>
<td>VR Technical Training Institute</td>
<td></td>
</tr>
</tbody>
</table>

2. **Establish a group of community colleges**

<table>
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<th>Name of industrial training institutes</th>
<th>Construction progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Tourism College of Dapeng New District</td>
<td>Having been constructed</td>
</tr>
<tr>
<td>Xili Community College</td>
<td>Under construction</td>
</tr>
<tr>
<td>Institute of Community Healthcare</td>
<td></td>
</tr>
</tbody>
</table>
PART 2
First-class construction

Internationalization

First-class achievements
1. Strengthen the cooperation with the international organizations in the field vocational education

- Strengthen the cooperation with UNESCO-UNEVOC and other international organizations
- Visit from the director of UNESCO-UNEVOC
- Play the role of Research & Training Center for UNESCO Asia-Africa Project
2. Take advantage of the international coalition platform in vocational education

Hold “Belt and Road” International Conference on TVET periodically
3. Promote the cross-border education

Malaysia
Build a close strategic cooperation relationship with colleges and universities of applied science

Bulgaria and other regions
Accelerate the establishment of Chinese language and culture center and vocational education training center
4. Accelerate the introduction and development of the teaching standards for international education

Found the “Sino-Germany Intelligent Manufacturing Institute”

Establish the “Center for International Training of Intelligent Manufacturing Technology and Vocational Ability Assessment”

Reach a cooperative intention with China Representative Office in Bavaria, Germany

Sign the Memorandum of Understanding together with industries and enterprises
Thanks!

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