Problem Analysis and Path Exploration for Deep Integration of Application-oriented Undergraduate Education and Regional Industry

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Abstract. The relationship between applied undergraduate education and regional industry is reflected through demand for talents. Via deep integration of these two, applied undergraduate education can serve the needs of regional industrial development. Currently, the main problems in integration of applied undergraduate education with regional industrial development in China include the restrictions by school system and social development level on integration of applied undergraduate colleges with regional industries, the discrepancy between educational philosophy of applied undergraduate colleges and regional industrial development, the mismatch between applied undergraduate education and regional industrial demands for talents, and so on. Therefore, applied undergraduate colleges must by relying on government policy supports explore effective paths for deep integration of applied undergraduate education with regional industries by actively conducting integration, employing multiple education modes, improving the quality of personnel training, etc.

Introduction
Application-oriented undergraduate education is the major component of higher education. China’s GER (gross enrollment rate) of higher education in 1996 was only 6%; while in 2017, this number was close to 40%. Annual average increasing rate in these two decades is 1.7%. The rapid developing application-oriented undergraduate education provides a large number of high-quality skilled talents for economic transformation and development of regional industry timely. With economic transformation of our country and industrial structural adjustment advancing further, the traditional economy mode is being replaced by modern intellective, technologic and innovative economy modes; therefore, it is required to further integrate application-oriented undergraduate education and regional industry development in depth so as to create a win-win situation for them.

The Integration is a generalized concept. of which, “integration” refers to “the combination for several kinds of things” and is more meaningful than “cooperation”. It is also a joint development objective that should be realized in the way in which educational organizations (mainly for universities) and industrial organizations (sectors and enterprises) is fully dependent on their own recourses and advantages in society and take school-enterprise cooperation as principal line and project cooperation as carrier.

Current Situation of the Integration
There is new requirement for application-oriented undergraduate education due to transformation and upgrading of regional industrial structure

In the recent years, application-oriented undergraduate education has been developed with the rapid development of regional industrial economy. According to the data statistics concerned, GDP of Guangdong in 2017 reached RMB 8.987923 trillion with year-on-year growth rate of 7.5%, ranking the first in the country; while currently, Guangdong’s economy is faced with the great adjustment in industrial structure on its development road. On the one hand, since talent is the key for industrial economy development, educational organizations actively adapt to Guangdong’s
industrial economic and industrial structural adjustment, transformation and upgrading in terms of application-oriented undergraduate education; they advance the overall layout, establish majors according to the demand of business development and assist in difficulty overcoming and problem settlement met in development process of industry economy. On the other hand, development of regional industrial economy is convenient for rapid development for application-oriented development undergraduate education of our country and lays the abundant material and school running foundations for application-oriented undergraduate education. In the present stage, industrial economic structure of Guangdong is optimizing constantly, strategic industry is developing quickly and economy and trade modes are changing greatly; all of those boost the generation of new cultivation requirement for application-oriented undergraduate education.

There is primary school-enterprise cooperation between application-oriented undergraduate education and regional industry

Application-oriented undergraduate education is highly sensitive to regional economy development and it is just for this sensibility that is in favor that application-oriented undergraduate universities (hereinafter referred to as “these universities”) understand the trend for regional industry economy development, contact industries and enterprises and establish cooperative relationship with them actively; they understand the development, HR demand and key skills expectation for talents of hot industry through school-enterprise cooperation and thus they can adjust talent training program timely to meet employers’ demands. For most of application-oriented undergraduate universities, school-enterprise cooperation is superficial in general; to be specific, the cooperation only involves singing cooperation agreement with enterprise, holding opening ceremony, arranging students to visit practice base, etc.

Occupational and industrial structures are interacted

The relation between application-oriented undergraduate education and industry structure is showed through demand structure for talents. Development of industrial structure influences application-oriented undergraduate education in development scale, educational level and major structure. Optimization for industrial structure mainly refers to the requirement improvement for knowledge and technology and application of new technology in industrial production; accordingly, it also boosts the requirement improvement for talents and thus will put forward the new requirement for talent training and influence major design. Not the simple correspondence, the relation between major design of application-oriented undergraduate education and industry structure is subject to the school and social systems and development levels. Occupational structure accelerates industrial structural optimization and upgrading in return. Application-oriented undergraduate educational organizations improve their education level by educating and training those industrial employees; not satisfied with the current situation, the workers having been provided with the education will try to step into the capital-intensive industry from labor-intensive industry, which promotes industrial structural upgrading. In conclusion, occupational and industrial structures are interacted, though they are unbalanced in practical development.

Problems Existing in the Integration

Application-oriented undergraduate education and regional industrial development should be developed on an integrative basis and application-oriented undergraduate universities should establish majors and curriculums according to regional economic development when running school. In reality, though there is the Integration, but it only stays at the relatively superficial level and is not complete. The specific problems existing are as follows:

The Integration is subject to systems and development level

The Integration between non-state-run application-oriented undergraduate universities and regional industry is not so emboldened and profound and the cooperation between them is superficial most often. The reason is that the non-state-run universities’ existing and developing are
mostly dependent on private investors rather than national finance; in policy, there are few clauses for assistance and support oriented to those non-state-run ones faced with difficulty. Since subject to school systems and talent training cycle, application-oriented undergraduate educational organizations cannot adapt to industry development well, are lacking in running vitality and fail in meeting enterprise’s talent demand in major design, let alone in deep integrations such as cooperating with enterprise specialist to prepare talent training program, building off-campus training base, developing curriculum system and textbook. Moreover, regional industrial development is affected by social economic organization form and development level and industries and enterprises will not be so enthusiastic about school-enterprise cooperation without financial support.

**School running ideas of application-oriented undergraduate universities are not in line with regional industrial development**

Lots of application-oriented undergraduate universities adopt traditional ideas for school running and leaders of education competent authorities or school managers are lacking in theory and practice experience for higher university’s management generally; though improving to some degree in education level, teachers in these universities are obviously inferior to those of ordinary colleges and universities in education background and research ability. There are more young, low-title and poor-research and academic capacities teachers in these universities; in particular, proportion of teachers with high titles is 30% or so; while in ordinary colleagues and universities, the number is over 70%. Therefore, not enjoying enterprise’s production and management experience, most of teachers in these universities only repeat what the book says most often in class and are unable to give lessons combining with enterprise’s practice, let alone deal with enterprise’s actual operating problems. At present, these universities are “evaluated” mainly by education administration authority; but for various reasons, the evaluation has become the ruler to measure these universities’ development. It is just for that, these universities’ development will be not so consistent with regional development when they meet the evaluation standard.

**Application-oriented undergraduate education does not match with talent demand of regional industry**

Application-oriented undergraduate education does not match with talent demand of regional industry. This problem should be settled through major establishment; however, with advancing of education industrialization and employment marketization of application-oriented undergraduates in our country, these universities have far less school funds raised than those required for actual management demand, as they are limited in funds raising channel and capacity. Therefore, these universities settle funds insufficiency problem only by establishing hot major and increasing number of students. However, they there are phenomena for establishing hot majors blindly and repeating establishing major; many of them tend to invest in low-cost majors; majors with high repetition rate are Accounting, E-commerce, Business English, Business Administration, Marketing, etc. According to survey, these majors are featured by high unemployment rate, low employment rate and relatively low salary and annual number of student enrollment has an ascending tendency. The unreasonable major establishment causes mismatching between graduates trained and industry demands and coexistence of graduate excess and talent deficiency.

**Path Exploration of the Integration**

The government’s matching support will boost the deep school-enterprise integration

Governments at all levels and other education competent authorities should improve educational laws and regulations, so as to ensure the deep integration at the system construction level. The coordinated development of application-oriented undergraduate education and regional industrial economy should be promoted through the new pattern for government-school-enterprise development that is oriented by the relevant educational policy issued by government, focused on
establishing the effective management mechanism of college & department and based on enterprise’s involvement. Upon plan amendment of local economic and social development, local governments are suggested to take application-oriented undergraduate education into consideration, so as to have an overall layout for development speed and scale of application-oriented education and regional economic development, provide the corresponding support to theses universities in terms of policy and financial input and encourage them to enlarge and strengthen their key majors; they should control and allocate financial resources fully, lead talent training of these universities to make it conform to the demand for regional industrial development and determine major structure and layout reasonably concentrating on the key of regional industrial development. Upon preparation of preferential policy for regional industry development, local governments should ask application enterprise to assist these universities in development, establish the corresponding appraisal indexes and understand enterprise can be supported in policy only through those indexes. When preparing subject funds management system of these universities, educational competent authorities should establish the corresponding declaration system of subject funds for application-oriented undergraduate education; they should ensure the policy tilts toward those subjects regarding deep integration of application-oriented undergraduate education and regional industrial economy and allocate subject research funds by rule upon decision of subject project establishment. Moreover, local governments should support the development of these universities fully; stimulate schools and enterprises’ initiative and accelerate the deep integration by issuing preferential policy, establishing restraint mechanism, etc.

These universities should be integration activists

These universities should change the school running idea and become the activists in the Integration with regional industry. In terms of school running idea, these universities must break the original closed mode, give play to self-advantages and connect with industries and enterprises directly to carry out deep integration and make talents provided with application-oriented undergraduate education meet the demands for regional economic and social development; actively attract industrial enterprises and other social forces to involve in school running to realize the three factors’ (school, enterprise and government) being highly involved in the Integration and create the excellent ecological environment for the talent training way of “school-enterprise cooperation and work-learning combination”. Firstly, these universities should set up the idea for interacting with society. Local governments should distribute resources through preferential tax policy to ensure policy tilts toward these universities and improve the motivation for industrial enterprise participating in application-oriented undergraduate education; try to establish and improve the school running system where government, industry and enterprise are interlinked to facilitate the close integration of application-oriented education and regional economic and social development. Secondly, these universities should be active in the Integration and take the road of open school running. The open school running here means these universities should actively explore the road which government, industry and enterprise co-construct and cooperate with enterprises on an all-directional and multi-layered basis, e.g. our university actively explores the system and mechanism reform for open school running, initiatively extend the service to town-level regions and deeply integrate with large enterprises and groups in Dongguan City (such as Huajian Group and Wang On Group Limited); arranges teachers to act as senior manager in Jiangnan Agricultural Wholesale Group, perform the deep exchange with the enterprise and participate in its management; all of those make the enterprise’s specialist be involved in our education comprehensively respectively from major establishment, curricula construction, curricula standard formulation, teaching staff construction and base construction and enable school running of our university to embody enterprise’s wills and demands sufficiently and us to grape industrial development trend.

These universities should adopt the teaching mode of “major co-construction”. These universities should make school’s talent training be directly oriented to enterprise’s talent demands, have butt joint with the big database of enterprise’s business flow, acquire sustainably renewable practical teaching resources and upgrade the training courses from traditional simulation type to
high or full simulation type by establishing cooperative relationship with enterprises, replying on well-known enterprises in large enterprise training alliance (e.g. Eternal Asia in Shenzhen City: a leading enterprise of O2O supply chain in global business ecosystem) and introducing senior engineers and resources of brand enterprise into them under the guidance of industrial association; improve school’s software and hardware environments and overall teaching level and quality by introducing enterprise’s resources. Besides, schools and enterprises should undertake professional teaching, assess and monitor teaching, execute market research and optimize talent training scheme jointly; they should cooperate to develop teaching material and make course teaching of application-oriented undergraduate university conform to enterprise’s actual situation better, which is in favor with improvement of students’ practical ability.

**Application-oriented undergraduate universities implement “school factory” teaching mode.** Application-oriented undergraduate universities and regional industrial enterprises can deeply integrate with each other, since the former owns strong knowledge and technology reserves and the advantages for talent cultivation, while the latter enjoys rich capital and production & operation resources. The Integration of them, based on complementary advantages, will realize the win-win objective. The “school factory” teaching mode for application-oriented undergraduate universities should be carried out by coordinating the input mode of teaching resources and teaching projects with production operation. (1) Application-oriented undergraduate universities and regional industrial enterprises should determine the input mode of teaching resources for “school factory”. Application-oriented undergraduate universities should provide teaching space and part of teaching equipment, and separate “school factory” teaching area from common teaching area when operating “school factory” project. They should also strictly inspect the personnel and equipment entering in and exiting from this teaching area and make relevant registrations, as per the access inspection system for enterprises. Enterprises in this project should provide technical and equipment support for “school factory” project, and include the assets in “school factory” teaching area in the their fixed asset supervision system. If “school factory” project completes the cultivation plan as scheduled and expected, the government should provide subsidies to these regional industrial enterprises, and consider excellent talents from the project as their first choice, so as to encourage the deep integration of both parties. (2) Application-oriented undergraduate universities and regional industrial enterprises should work out the teaching content of “school factory” project. Regional industrial enterprises should include “school factory” project in their production plan system, and PMC of enterprises should make integrated planning and strictly execute material incoming and outgoing system. As for teaching content arrangement, regional industrial enterprises should arrange “school factory” to produce and sell non-key customer orders, and manage them according to their management requirements.

**Application-oriented undergraduate universities implement “order-oriented cultivation” teaching mode.** “Order-oriented cultivation” is the kind of cultivation mode for application-oriented undergraduate universities to cultivate students together with enterprises, after jointly studying market recruitment requirements, preparing talent cultivation plan and signing employment orders. Enterprises engaging in this project will employ the students cultivated this way first. Since the enrollment of students, universities will sign cooperation agreement with enterprises and make planning for students, with their employment as the goal. The planning includes specialty setting, talent cultivation plan and course system conforming to market demand, study direction positioning, implementation of occupational planning and employment strategy, employer follow-up survey and feedback system, etc. Enterprises teach their technologies and culture to their “future employees” in the classes provided by application-oriented undergraduate universities, and provides education services, such as pre-service training and regular training by virtue of the education resources of application-oriented undergraduate universities, so that their “future employees” can adapt to their working environment quickly after graduation and grow into talents wanted by them.
Conclusion

Through deep integration of application-oriented undergraduate education and regional industries, colleges and universities can have a better knowledge of the employment requirements of regional industrial enterprises, and thus provide talents to them. In turn, to meet the employment requirement of regional industrial enterprises will contribute to the regional development. In their deep integration, it is necessary to broaden the integration path, and innovate the patterns for cultivating talents by taking advantage of a wide range of innovation and entrepreneurship platforms, and thus facilitate the agglomeration and development of regional industrial enterprises.

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