Journal of Contemporary Educational Research, 2024, Volume 8, Issue 3
http://ojs.bbwpublisher.com/index.php/JCER
ISSN Online: 2208-8474
ISSN Print: 2208-8466

A Study on the Contribution of Vocational Education and Training to the Industrial Development in China

Xiu Wen Zhang[1,2]*, Adenan Ayob[1]

[1]Faculty of Education and Liberal Studies, City University Malaysia, 46100 Petaling Jaya, Selangor, Malaysia
[2]Jining Normal University, Inner Mongolia, 012000, China

Corresponding author: Xiu Wen Zhang, 2427816131@qq.com

Abstract: Vocational education and training are an important part of China's national education system. The two essential characteristics of employment orientation and social service determine that vocational education has a closer connection with social production than other types of education. At present, China's economic development is in a new stage of transformation and upgrading. The new normal of the economy will inevitably require a corresponding new normal of vocational education and training. The transformation of social needs will eventually lead to changes in the composition of the workforce. Vocational education and training should be aligned with the characteristics of the new normal economy. Using mixed research methods, this study focuses on vocational education and training and explores how it contributes to industrial development in China.

Keywords: Vocational education and training; Industrial development; China

Online publication: March 29, 2024

1. Introduction

One of the most powerful instruments for eradicating poverty and improving our knowledge is education. Investing extensively in education is necessary for the progress of a nation or social environment. Only through investing in education will an individual be able to think for themselves and make their own decisions. Students, however, require vocational training or specialized education even after receiving basic education. This additional training is necessary to equip them with the appropriate skills in their chosen field or area of interest. Vocational training has gained widespread recognition, leading to a surge of interest in establishing dedicated facilities worldwide. Vocational education and training are the teaching of skills and knowledge relevant to a specific trade, occupation, or vocation in which the student or employee intends to engage. China has already developed the world's largest vocational education system, with 11,500 institutions and over 28 million students by the end of 2019, according to the Ministry of Education in China. Vocational schools offering courses in 1,200 professions train approximately 10 million professionals each year. China has emerged as the country with the

largest vocational education system in the world, and it has developed a unique path for modern vocational education with Chinese characteristics [1].

Vocational education and training (VET) are essential for optimizing the talent supply structure in response to industry and market changes, and for effectively meeting the needs of key areas [2]. Not to mention, in the transitional period of the national economy, new technologies, industries, and forms of business are mushrooming more than ever before, representing a new era in China. In this era, China's economy has shifted from a stage of high-speed growth to one of high-quality development. The acceleration of industrialization, informatization, marketization, urbanization, and internationalization have created an urgent need for the high-quality development of vocational education. This also presents a significant challenge for preparing vocational talent. However, the quality of vocational education in China does not meet the demands of the job market. According to the Central Institute of Career and Technical Education (CICTE), the causes of low vocational education quality include a lack of government financing and uneven development across China's regions. Furthermore, outdated curriculum design and a lack of trained teachers in vocational schools are unable to meet the demands of advanced knowledge training in a rapidly changing environment, exerting a negative impact on the quality of the VET system. China must enhance the quality and professionalism of vocational education to address the impact of globalization on product quality competitiveness. Furthermore, the articulation of the VET system is not well established within the education systems. The relationship between vocational education and general education is poor [1]. According to officials and experts, China's latest drive to encourage the high-quality growth of vocational education would help shore up its industrial base and meet the increasing demand for industry upgrading [3].

In response to the current mismatch between the skills required by industry and the skills of graduates entering the labor market, researchers aim to establish links between vocational education and training and industry development by introducing competency standards and competency-based training and encouraging schools to collaborate with industry to improve the quality and relevance of the labor market. This study focuses on how vocational education and training contribute to cultivating talents for industrial development and its importance to industrial development in the new era.

2. Methodology

2.1. Research design

Six types of mixed-method research designs were presented: explanatory sequential, exploratory sequential, transformative sequential, concurrent triangulation, concurrent nested, and concurrent transformative [4]. An explanatory sequential design is appropriate for the current study. An explanatory sequential design involves first collecting quantitative data and then collecting qualitative data to complement or further elucidate the quantitative results [5,6]. This strategy was chosen because it allows for additional in-depth analysis, particularly through the collection of qualitative data, to clarify, expand, or explain the overall picture that the quantitative data and findings provide of the study topic.

2.2. Study sample

According to the nature of the study, this study was conducted with three different population groups. They were the administrative vocational education institutions, lecturers, and students who had undergone training in vocational education at these institutions. Five vocational education institutions in China were selected, specifically targeting the administrative sections of those institutions and the graduating students.

2.3. Data collection

Data were collected from primary and secondary sources. In the mixed studies, the commonly utilized methods of data collection were questionnaires and interviews. These methods were used to collect essential data, allowing for the generalization of the study results. All 200 completed questionnaires were collected and 12 interviews were conducted. These data sources were used for further analysis in order to produce the final output and conclusions for the study.

2.4. Standard of quality

Results from qualitative studies that can be trusted are those that are high in both quality and authenticity. It has to do with how much faith (or assurance) readers place in the findings. The standard of quality confirms the standard questionnaire.

3. Results

Mostly, administration, teachers, and students are surveyed on the frequency of school and government factors, and strategies can be used to address the challenges of attaining quality vocational education and training in Chinese institutions.

Descriptive statistics involve transforming raw data into a useful model to describe a set of variables in a situation. The raw data that was gathered has been organized and modified to accomplish this. Descriptive statistics are created using frequencies, measures of central tendency, and measures of dispersion. The mean, which measures central tendency, offers a broad overview of the data collection without being overwhelmed by specific observations. A dataset's standard deviation (SD) serves as a measure of its distribution or range. According to **Table 1**, the descriptive analysis standard deviation of all questions for students is more than 0.500, which is also shown in both the administration and teachers' questions.

Table 1. Descriptive statistical analysis

Descriptive statistics	N	Sum	Mean	SD
1	59	216	3.66	1.027
2	59	217	3.68	1.025
3	59	199	3.37	1.158
4	59	216	3.66	1.044
5	59	220	3.73	1.014
6	59	221	3.75	0.975
7	59	195	3.31	1.103
8	59	197	3.34	1.044
9	59	198	3.36	1.013
10	59	206	3.49	0.972
11	59	193	3.27	1.014
12	59	208	3.53	0.989
13	59	209	3.54	0.988
14	59	208	3.53	0.989
15	59	202	3.42	1.021
16	59	214	3.63	0.998

Table 1 (Continue)

Descriptive statistics	N	Sum	Mean	SD
17	59	215	3.64	0.996
18	59	217	3.68	0.990
19	59	214	3.63	0.998
20	59	213	3.61	1.000
21	59	196	3.32	1.025
22	59	203	3.44	1.038
23	59	213	3.61	0.983
24	59	217	3.68	0.990
25	59	216	3.66	1.027
26	59	216	3.66	1.010
Valid N (listwise)	59			

According to the findings illustrated in **Table 2**, the regression coefficient *R* of the variables "challenge of attaining quality vocational education and training" in Chinese institutions, that means, student factors, school and government factors, and strategies can be used to address the challenge of attaining quality vocational education and training in Chinese institutions. This evaluation is conducted from the perspective of the graduating students. Furthermore, the perspectives of administrators and teachers illustrate that school and government factors and strategies can be used to address the challenges of attaining quality vocational education and training in Chinese institutions. Therefore, the summary indicated that students' perspective and the administration and teachers' perspective differ.

Table 2. Analysis of variance

	Sum of squares	*df*	Mean square	*R*	Significance
Between groups	3.379	1	3.379	0.006	0.938
Within groups	31645.570	57	555.185		
Total	31648.949	58			

As this study employed a mixed-method approach, focus group interviews and random interviews were conducted with students, administrators, and lecturers. Based on these interviews, several problems with the existing practices of the vocational education system in China were identified. Particularly, there are some discrepancies when comparing these practices with the industrial requirements of China. After conducting the interviews with the respondents, the content was transcribed and themes and categories were created. Based on the ideas expressed by the respondents, the common challenges in vocational education and training institutions in China were identified.

(1) Poor curriculum design of VET programs
(2) Weak connections to the industry
(3) Structural barriers
(4) Mismatch between employers' needs and graduates' capabilities
(5) Limited experience in the industry
(6) Insufficient materials and resources in institutions
(7) Issues regarding the planning and involvement of relevant authorities

According to the ideas expressed by the respondents, it was identified that many of the observed programs seemed to primarily focus on entry-level skills required for a first job. However, these programs did not provide the necessary depth and breadth of skills needed for career advancement. This partly reflects the manpower planning model that had underpinned the development of some of the schools. As the lifecycle of work skills becomes shorter and shorter, and as China's economy changes, vocational education and training will need to incorporate more general education. This will enable workers to be more adaptable and capable of acquiring new skills. Although there have been efforts to broaden vocational education and training curricula, the skills acquired are generally insufficient to meet the demands of a rapidly changing economy or to facilitate upward mobility within the economy. Furthermore, it appears that curriculum development is not designed with the most advanced companies or cutting-edge aspects of the economy in mind. Nor was there a strong focus in the curriculum on innovation and entrepreneurship, which are increasingly prevalent in the world's strongest education systems.

Graduates were also seen as lacking the kind of general employability skills needed in modern settings, such as the ability to work in teams, think critically, and solve problems without constant direction. Children in China spend their childhood focused on studying; there is limited opportunity for formal or informal work experience, which is how students in other countries develop general skills.

Furthermore, during the discussion, it was identified that the program provides students with training on the most up-to-date machinery, extensive supervised job experience in the second and third years, and prospects for career advancement through further in-depth training. However, the practice of industry-run schools is being phased out due to the outdated and inefficient nature of many state-owned firms, which has led to a significant decrease in their contribution to the economy. Moreover, there is a severe lack of communication between the VET system and companies, and few incentives for businesses to collaborate with VET schools.

According to ideas from some students, the backgrounds of the majority of VET faculty are another factor contributing to the gap between the VET system and industry. In China, instructors' primary responsibilities are to guide students in the development of their moral character and intellectual quality. However, the majority of VET professors lack industrial experience, industry knowledge, and methods for staying up-to-date with technological and scientific developments in the industry.

4. Conclusion and implications

Although vocational education has progressed alongside general education, it has lagged behind. Secondary vocational schools were initially established in the 1960s, but this approach was altered in the 1970s due to the perception that these institutions promoted social differentiation and elitism. The 1980s saw a renewed emphasis on vocational education, and since then, VET has grown significantly. Vocational education in China is provided through separate secondary schools and tertiary institutions, rather than through vocational programs within a general secondary school or community college.

As discussed earlier, there are several challenges and barriers faced by students, administrators, and lecturers in vocational education institutions in China. It is evident that these challenges have not been addressed by the government or relevant authorities. Planning to meet the needs of the labor market is insufficient. Provinces manage some schools directly through the education commission, some through other government bodies such as the agriculture bureau, while many schools are also managed at the district and county levels. This creates a formidable coordination problem. On the demand side, data on labor market demands is often lacking. It is necessary to create a standard expectation for a minimum duration of workplace

training as a component of upper secondary vocational education and training, as well as to develop a standard agreement or contract for workplace training to confirm the rights and obligations of trainees and training firms. Additionally, given the significant regional discrepancies in available funding for education, extra resources should be allocated to the poorest localities. This will help remove financial barriers to participation in vocational education and training and improve its quality.

The study findings can be used for industrial development in any country by promoting vocational education. As well, it will be possible to develop a vocational educational system in China. The country has undergone significant urbanization, driven by a policy of industrial expansion in metropolitan areas. This has resulted in a large portion of the population being employed in labor-intensive, export-oriented manufacturing. Due to the efforts of the People's Republic of China government to rebalance the economy, there has been a steady shift towards high-value-added industries. Reforms in state-owned firms and the growth of the services sector have both contributed to the economy, with some progress being made. The economy is becoming more diverse, with new types of jobs and labor patterns emerging. Furthermore, there has been an increased focus on policy awareness and direction in recent years to promote ecologically sustainable development and inclusive growth. This includes initiatives such as researching green growth businesses, low-carbon technologies, and investing in technological advancements.

Acknowledgements

We would like to thank City University Malaysia for providing the funds and facilities to make this research possible.

Disclosure statement

The authors declare no conflict of interest.

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