

Developmental indicators for adult technological and vocational education in Taiwan

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ABSTRACT: In this article, the authors consider the developmental directions and indicators of adult technological and vocational education in Taiwan. The research results obtained can be used to examine the current situation and outcomes of adult technological and vocational education in Taiwan, and can also provide references for educational institutions to advance and improve adult technological and vocational education. This research was carried out through qualitative document analyses and focus groups. In order to achieve the above objectives, recent related information from different technological and vocational schools in different regions of Taiwan were collected, and related national and international information was collected so as to establish a whole theory basis. The collection and analysis of related publications regarding different government issues were used to triangulate corrections. The first focus group discussion involved seven experts with professional technological and vocational education backgrounds, followed by a group of nine experts a week later. The research results were obtained through categorisation, rectification, analysis and generalisation. The development indicators generalised by this research were divided into six dimensions of 22 indicators.

INTRODUCTION

During the years 1950-1986, technological and vocational education played a very important role in the process of the economic development in Taiwan. The history of Taiwan's production can be divided into periods of *high labour density* and *medium and low skill density*. Taiwan's industry has fostered basic skills and managerial talents in innumerable businesses, and has contributed greatly to the establishment of the Taiwanese economy [1].

However, while entering the so-called *knowledge-based economy* society during the 21st Century, Taiwan has faced a lot of challenges, such as promoting the basis for the Taiwan's competitive strength, showing humane concern for the needs of an abundant society, dealing with the internationalisation trends of the information society, handling individual development needs of the knowledge-based economy, etc.

These challenges have generated many shocks. In facing these challenges, it is considered that education is the most important subject – even though there are many projects still to follow. Taiwan faces a sustained and explosive increase in technology knowledge. Its only when the government conducts feasible life-long education strategies that there can be an effective promotion of Taiwan's competitive strength, a reinforcement of the humanistic values of its abundant society, a reckoning of the assault of the internationalisation brought about by the global village, as well as satisfaction of individual developmental needs [2].

Adult education takes the *advancement of life-long learning to step into a learning society* as its main topic [3]. Adult technological and vocational education is one of the important loops of adult education. Now that Taiwan's production structure and human resources needs are faced with transformation and adjustments, the advancement of an adult

technological and vocational education strategy can serve to effectively solve the current imbalance between the supply and demand of human resources in the business world. It can also conform to the international development trend of life-long learning in the 21st Century [4].

Taiwan must establish a complete set of developmental indicators that are not only appropriate to the national condition, but also concrete and feasible. Only when referring to dependable developmental indicators can the development of adult technological and vocational education successfully reach the target of *yielding twice the result with half the effort* [5][6].

DEFINITIONS

Adult Technological and Vocational Education

As examined by the authors in this article, adult technological and vocational education includes continuing education, extended education, recurrent education and popularised education carried through different levels of technological and vocational education schools, and civil vocational education groups in Taiwan, including formal and informal education.

Developmental Indicators of Adult Technological and Vocational Education

The developmental indicators of adult technological and vocational education in this research relate to the set of objective estimation standards used to survey the developmental situations and the outcomes of adult technological and vocational education in these standards in Taiwan. Objective conclusions are used as references to advance and improve adult technological and vocational education. These are obtained by way of scientific data collection and quantitative analysis and estimation [7].

RESEARCH OBJECTIVES

Based on the background and motivations mentioned above, the objectives of this research are as follows:

- To inquire into the current situations and problems of adult technological and vocational education development;
- To inquire into the developmental trends and indicators of adult technological and vocational education of advanced countries around the world;
- To generalise the development indicators of adult technological and vocational education in Taiwan.

METHODOLOGY

This research was carried out through data analysis and focus groups. A literature review was conducted and data collected that was relevant to adult technological and vocational education throughout the regions of Taiwan. Related domestic and international publications were collected to provide information about the basics of related theories. Relevant governmental publications were gathered and analysed, and research designs and triangulation corrections were used as references for the research results. The research results were obtained through focus group discussions, data categorisations, triangulation corrections and comprehensive analyses. Lastly, the conclusions and suggestions were written.

RESEARCH STEPS

Collection, Referral and Analysis of Related Document Data

Domestic and international publications were collected, and the authors referred to the current situations of domestic and international adult technological and vocational education. After arranging and analysing these, triangulation corrections from focus group discussions were performed. The results were obtained and used as references. The research conclusions were then written in accordance with the results.

Performing focus group discussions entailed the following:

- Firmly established objectives: The objectives of this research have been clearly and definitely stated to the members of the focus groups;
- Selection of members: 16 experts of the same background, currently engaged in adult technological and vocational education and life-long education, were selected to carry out the discussions;
- Time duration: two hours for each meeting;
- The place of interview for the first discussion group was a conference room at National Chiayi Senior High School in Chiayi, while a discussion room in the Department of Industrial Technology Education at National Taiwan Normal University, Taipei, was utilised for the subsequent discussion;
- The conditions of the discussions: The experts were able to adequately understand the objectives and the topic of the discussions, and also enthusiastically give statements; the host properly controlled the contents of the discussions and did not deviate from the topic;
- Observations and records: The postgraduates present at the scene observed and made detailed records of the contents and conversations of the discussions so as to explore and seek clarity about the problems.

Carrying Out Triangulation Corrections

Through the collection of data, the results of comparing and analysing relevant documented data, and through the conclusions of the two focus group discussions, the correction of theories, viewpoints, sources and methods have been carried out.

Writing of Research Conclusions and Suggestions

Objective discussions were carried out based on the results of the triangulated corrections, with the research conclusions and suggestions then written up.

LITERATURE REVIEW AND ANALYSES

Trends of the Changes in Taiwan's Production Structure

Around 1986, after Taiwanese industries and manufacturing industries had reached their highest point, a long-term gliding trend began. According to the established economic statistics given by Council for Economic Planning and Development in 1985, the GDP ratio occupied by industries (including manufacturing industries) reached their highest point (47.1%), and the GDP ratio occupied by the service industries from 1982 to 1986 maintained a standard of around 47%, but then started to grow rapidly after 1987. In 2002, the GDP ratio occupied by the service industries reached a standard of 67.1%, while the GDP ratio occupied by industries (including manufacturing industries) decreased to 31%.

After 1987, the ratio of Taiwan's high labour density type production exports showed a rapid decreasing trend. In 1987, the ratio of high labour density type products reached their high point of 47.9%, but then decreased year by year until 2002, when it was left with a standard of 32.1%.

In fact, the highest ratio of Taiwan's export products is the high labour density type products. In 1986, among Taiwan's export products, the ratio of high technology density products occupied 18.4%, after which there was a rapidly increasing trend year by year. Till 2002, the ratio of high technology density products exports had reached 48.5%, almost occupying half of Taiwan's export products. In contrast, the ratio of low technology density products exports had their highest point of 47.9% in 1986, after which there was a rapid decrease to 13.3% by 2002 [8].

Imbalance between the Supply and Demand of High Technology Human Resources

Over the past 20 years, during the process of adjusting Taiwan's production structure, the talents needed by high technology density type products showed there to be a situation of supply not meeting demand year by year.

According to the established economic statistics given by the Council for Economic Planning and Development on 20 January 2003, the demands of high technology human labour report showed that, generally speaking, between 2003 and 2011, the number of talents needed by Taiwan's main 19 technology categories, lacked about 7,400 people every year. In particular, information engineering department required the most, with the lacking number of graduates for a Master's degree averaging about 3,300 people every year [9].

The imbalance between the supply and demand of human resources of course influences the development of related productions. This is because the planned and combined steps of the vocational education system cannot keep up with the needs of the current times, and this has resulted in there being an external movement trend towards high technology productions.

The Internationalisation Trend of Economic Development

In the past, Taiwan depended upon its outstanding technology, agile operating methods and ordered quality standard of labour. It created a worldwide, well-known *economical wonder*. Along with economical development, Taiwan's economic scope gradually developed Taiwan's standard.

However, after the mid-1980s, Taiwan's production environment produced large changes. This involved increased salaries, difficult acquisition of land, inadequate supply of water and electricity, as well as the universal recognition of environmental consciousness, brought considerable limitations to the development of high energy-consumption and high pollution production, bringing unfavourable influences to bear upon the operation of labour density production. Therefore, the government adopted a strategy for enterprises to transfer to south-east Asia and Mainland China in order to solve the problems. These measures involved the internationalisation trends of labour density production that had been brought about by different regional economic development and regional shifts around the world.

The Internationalisation Trend of Life-Long Learning in the Era of the Knowledge-Based Economy

At present, globally advanced countries are initiating advancing life-long education to move to becoming learning societies. Life-long learning is the most effective prescription that can direct people to deal with the challenges caused by the rapid changes occurring around the world. *Learning: the Treasure Within*, published by UNESCO in 1996, clearly and definitely pointed out that *Life-long learning is humans' key to entering the 21st Century* [10]. It has also been stated that *Life-long learning is the centre position of future societies* [2].

In 1990, Japan passed the *Life-Long Learning Development Law* so as to encourage the public to participate in life-long learning activities. The European Union (EU), in order to advance life-long learning activities regionally, decreed 1996 to be the *European Life-long Learning Year*. It also addressed a *Memorandum of Life-long Learning* in October 2000. In order to promote life-long learning qualities, the European Union addressed 15 life-long learning quality indicators in the *European Life-Long Learning Quality Indicators Report* in 2002.

Taiwan determined 1998 to be the *Life-long Learning Year*. It also announced the white book of *Stepping into a Learning Society*, addressing eight development targets and 14 concrete channels of a life-long learning society, and clearly pointed out the related cases of *establishing a recurrent education system, opening up resilience and diverse entering channels and developing technology colleges*, etc, with adult technological and vocational education [2].

After the *Life-Long Learning Rule* was announced on 26 June 2002, life-long learning had already progressed from being practiced at a conceptual level to a strategic level. To provide a

comprehensive examination of the developmental movements of domestic and international life-long education in this era of knowledge-based economy, life-long learning can be generalised into the following 10 developmental trends:

- The public actively participate so as to form a perfect life-long learning strategy and plan;
- Investigation and use of an appropriate life-long learning model;
- Development of a new learning culture;
- Mutual connection of life-long learning and knowledge economics;
- Regional cooperation to hold life-long learning festivals;
- Development of innovative life-long learning concepts and movements;
- Expansion of international flow and cooperation so as to strengthen life-long learning systems;
- Use of information and news technology to expand life-long learning opportunities and channels;
- Promotion of everyone to become self-leading life-long learners;
- Establishment of modernised learning societies [11].

From the analyses of the contents of the above 10 major developmental trends, life-long learning in this era of knowledge-based economy has been demonstrated through diverse international developmental trends, and is also a modernised and global connection. In particular, the approval system of knowledge skills and the establishment of the record card of individual skills are worthy to be made as reference points for Taiwan to advance adult technological and vocational education.

Developmental Directions of Adult Technological and Vocational Education in Taiwan

Along with the arrival of the high technology era, any technology growth that is related to vocations occurs at a tremendous pace. An example is the shortening of the half-life of information technology to 2 or 3 years, driving workers to increased pressure and the need for further studies. Therefore, it is truly necessary to provide them with the opportunities for recurrent learning through the establishment of a proper technological and vocational education system.

Furthermore, a recurrent education system for higher technological and vocational education satisfies a professional person's expectations and needs. Indeed, the establishment of a vocational recurrent education system helps vocational business members, or people in society generally, to complete their required technological and vocational education through full-time or part-time studies at any stage of their lives [12]. On 14 March 1998, the Ministry of Education of Taiwan issued the white book of *stepping into a learning society*, with the target of *establishing a learning society through the advancement of life-long education* [2]. On 19 April 2000, it issued a report on *The Pursuit of Excellent Technological and Vocational Education to Establish a Science and Technology Island of Humanism, to Promote the Country with Competitive Strength*, which also emphasised on the establishment of higher level technological and vocational recurrent education.

Life-long education is a continuous function. Indeed, life-long learning is a more important promotion for a learning society. In view of current worldwide trends and the needs of the

domestic society, the government should raise funds in order to integrate different grades of technological and vocational schools and various resources so as to combine communities, the civil and business strengths of public and private vocational training organisations. This will help the government to plan for the subsidisation of different educational organisations in order to open classes, and continue to advance practically technological and vocational recurrent education to solve the following pressing issues:

- The present serious problem regarding the inadequacy of talents in high technology production;
- The settling problem of structural jobless employees;
- Fostering all the people to possess the capacity for life-long learning.

The specific cases are as follows:

- Establishing for all people a universal type of vocational recurrent education institution;
- Expanding education opportunities at higher level technological and vocational education schools;
- Integrating the educational resources of technological and vocational colleges and universities to train young graduates of junior colleges who are still jobless;
- Integrating the educational resources of technological and vocational training organisations to train refined talents as required by traditional production techniques;
- Integrating the educational resources of vocational high schools to train and settle unemployed labourers from the low skill stratum;
- Integrating team strengths between the government and people to jointly advance the conduct of adult technological and vocational education;
- Integrating community resources to advance social adult technological and vocational education;
- Encouraging businesses, communities and different levels of technological and vocational educational organisations to establish recurrent education partnerships;
- Providing diverse learning styles for people in order to increase learning opportunities;
- Integrating professional license systems to promote learning outcomes;
- Planning the establishment of e-learning Intranets to provide people with fast and effective learning requirements.

Developmental Indicators of Life-Long Learning in Europe, the USA and Japan

Besides being increasingly requested for, life-long learning development is considered as the promoting of qualities. The learning indicators for life-long learning are used to examine the current state of development and to advance outcomes, as well as to amend strategies so as to provide references for strategy improvements. Reports from Europe and the USA provide information related to learning indicators, but this mainly consists of the 1997 report on *Indicators of Transition towards Life-Long Learning*, and the 2002 report called *European Report on Quality Indicators of Life-long Learning*, which are elaborated on in more detail below [13][14].

Indicators of Transition towards Life-Long Learning

In 1997, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the National Institute

for Educational Research of Japan united to issue a report titled *Research of Strategic Comparisons of Life-Long Learning*, which suggested transition indicators for life-long learning [13]. This included the following five key dimensions:

- Basic education indicator;
- Higher level education indicator;
- Supply and participation types of changes in adult education and training;
- Learning environmental indicators;
- Global transition indicators of life-long learning.

There was a total of 29 indicators that could be utilised to examine the development of adult education.

European Report on Quality Indicators of Life-Long Learning

In 2002, the European Union (EU) invited experts from 35 European countries, UNESCO and the Organization for Economic Cooperation and Development (OECD) to meet together. After several meetings, they issued the *European Report on Quality Indicators of Life-long Learning* [14]. The report pointed out 15 quality indicators along four dimensions. These dimensions are specifically:

- Skills, competences and attitudes;
- Access and participation;
- Resources for life-long learning;
- Strategies and systems development.

The 15 quality indicators were differentiated as follows:

- Literacy;
- Numeracy;
- New skills for the learning society;
- Learning to learn skills;
- Active citizenship, cultural and social skills;
- Access to life-long learning;
- Participation in life-long learning;
- Investment in life-long learning;
- Educators and learning;
- ICT in learning;
- Strategies for life-long learning;
- Coherence of supply;
- Guidance and counselling;
- Accreditation and certification;
- Quality assurance.

These are used to measure the current situation and achievements of the development of life-long learning among different European countries [14][15].

RESEARCH RESULTS

Due to differences in national conditions, economy, culture, and social and educational backgrounds among different countries, the indicators used to examine different educational systems are, therefore, different. Because of the changes in the social environment, the upgrading of production structures, as well as the adjustment of human resources, adult technological and vocational education in Taiwan directly involves life-long education.

The methods used in this research include the following:

- The collection of related governmental literature reviews in addition to analysis;
- Inviting experts to carry out focus group discussions;
- Triangulation corrections.

The results have been generalised into six dimensions of development indicators. These are: policies, finances, the qualifications of teachers, educational resources, learning desires and educational outcomes. The indicators of the different dimensions are explained in more detail below.

Policies cover the following:

- The ratio of diverse entrance channels provided by adult technological and vocational education colleges;
- The ratio of linkage systems for adult technological and vocational education colleges;
- The ratio of employees' study leaves provided by governmental organisations;
- The ratio of employees' study leaves provided by civil organisations.

Finances include the following:

- The ratio of finances of adult technological and vocational education to central education;
- The ratio of finances of adult technological and vocational education to regional education;
- The ratio of finances of civil adult technological and vocational education to central adult technological and vocational education.

The qualifications of teachers involve the following:

- The ratio of professional backgrounds possessed by teachers of adult technological and vocational education;
- The ratio of professional licenses possessed by teachers of adult technological and vocational education;
- The ratio of participation of professional advanced study by teachers of adult technological and vocational education.

Educational resources incorporate the following:

- Universal ratio of different levels of adult technological and vocational educational organisations;
- Universal ratio of the sustaining systems of different levels of adult technological and vocational education;
- Equipment investment of different levels of adult technological and vocational educational organisations;
- Enrolment announcement expenses of different levels of adult technological and vocational educational organisations;
- The ratio of providing learning achievement identification organisations.

Learning desires include the following:

- The ratio of participation of professional learning of employees of governmental organisations;
- The ratio of participation of professional learning of employees of civil enterprise organisations;
- The level of importance given to learning by employees of governmental organisations;
- The level of importance given to learning by employees of civil enterprise organisations.

Educational outcomes cover the following:

- The ratio of promoting professional licenses;
- The ratio of promotions in occupations;
- The ratio of promoting job capabilities.

CONCLUSIONS

The 21st Century is a rapidly changing environment; human society will continue to progress. The authorities of advanced countries around the world are aware that people's knowledge and skill levels will soon become conditions for the development of individual potential and self-actualisation. Skill levels are also key factors for a society's continuing development and important indicators for that country's competitive strengths. In other words, the driving force of a country's competitive strength is derived from continuing improvements in the qualities of its human resources. A future progressive society must be a learning society. Further, learning will become the centre of the people's conceptions of life [2].

At present, structural unemployment problems have emerged due to great changes in the production structure, the low level of people's work motivation in labour intensive jobs, as well as internationalised competitive pressures from joining the World Trade Organization (WTO).

Besides overseeing economic policies, the government should integrate educational resources among the different levels of technological and vocational schools, vocational training organisations and civil groups, based on the development indicators of adult vocational technological and education. Such practical integration will advance adult technological and vocational education, continuously improve the skill levels of the people and effectively break through the current imbalance problem between the demand and supply of human resources.

This will serve to accomplish the following phase missions:

- Training unemployed young graduates above junior colleges to become technicians as needed by high technology production firms;
- Coaching unemployed persons from traditional businesses to continuously accept higher levels of technological and vocational education, and helping them to add value to refined traditional businesses;
- Training those unemployed labourers, who have basic skills and who are structurally unemployed to possess other skills, and helping them to find work in service industries so as to accomplish the effective utilisation of human resources.

SUGGESTIONS

Establishing Evaluation Organisations to Carry Out Practical and Effective Evaluations

In the USA, civil groups are the main operational units that evaluate and accredit universities. The accreditation method utilises qualitative evaluation. The evaluation characteristics are voluntary, diversified and non-authoritative. Self-evaluations, as well as interview-based evaluations of colleagues, are used. The objectives are to guarantee and promote the quality and quantity of high level education.

In Australia, the Australian Universities Quality Agency (AUQA) takes the responsibility of the evaluations of the teaching, research and administration at each university. In Japan, the arrangement committee of the university evaluation institution was established in 2001.

University evaluations in Taiwan began in 1975, conducted by the Department of Education. This was then continually expanded to colleges, with different college evaluations being conducted, such as physics, engineering, medical, agricultural, law, commercial, literature and teacher training colleges. From 1991 to 1992, the Department of Education delegated evaluations for related academic fields to professional academic organisations. In 1997, the first overall university comprehensive evaluations were conducted as an experiment [16].

Evaluations of the domestic adult technological and vocational education are being conducted by the Ministry of Education (formerly the Bureau of Education of the Taiwanese Provincial Government) to advance life-long learning in order to establish a learning society. In addition, as of 1997, second professional specialty classes and vocational high school evaluations were conducted, evaluating a single level of local technological and vocational colleges. However, comprehensive national evaluations have not yet been carried out.

To counter the assaults of great international competitive pressures, the government should appropriately raise funds to subsidise different levels of technological and vocational colleges; it should plan to start classes and should also grant learner credits. At the same time, in order to improve deficiencies of conduct, the government should establish an evaluation system so as to achieve the mandated objectives. The feasible cases are stated as follows:

- Entrusting learning units to establish evaluation indicators;
- Entrusting technological and vocational colleges to plan the carrying out of matters concerning annual evaluations;
- Establishing management and evaluation organisations to conduct continuous evaluations.

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