

**CHAPTER I**  
**INTRODUCTION**

## CHAPTER I

### INTRODUCTION

#### 1.0 Introduction

According to George Sarton (1952), the famed historian of science ‘No one should be recognized as a master in any subject that does not know at least the outline of its history.’ In a broad sense, vocational education is as old as civilization itself (**Ogden, William, R. 1990**).

Since human evolution, we are greatly depended on the skills for survival. During Stone Age hunting was the vital survival skill. Till then civilisation to civilisation we have developed various skills and mastered them over the period of time. For instance, we learnt how to cook, how to do farming, live in colonies, developed various equipment’s and instruments, etc. Since then we have developed many employability and livelihood skills. In fact, many civilisations used to segregate their societies on the basis of work and skills possessed by the respective communities. The skills make that community alienate from others because only their people have the specific ability to perform that activity in a competent manner. Some of these skilled based communities are the weaver, blacksmith, jewellers, pottery, medicine, foundry, carpentry, etc.

#### 1.1 Impact of Industrial Revolution on Vocational Educational and Training (VET)

**Benavot, Aaron (1983)** in his study, ‘the Rise and Decline of Vocational Education’, had explained the perspectives of Technical Vocational Educational and Training (TVET) which were borrowed from the literature of sociology and history of education. He outlined three perspectives which are generally thought to be the account of the historical growth of vocational education. The first perspective associates the rise in vocational education with technological changes generated by the industrial revolution.

The mechanisation of production resulted in the increased and the expedite process of production in larger factories. In turn, industrialisation generated demands for skilled workers. Thus, the jobs transformed into more specialised and complex than traditional modes, which requires on-the- job training. This resulted into the gaining of the important skilled positions by the highly skilled people.

The second perspective, discussed at the rise of vocational education as a natural effect of progressive societies bent on integrating and socialising new citizens. In this argument, the major precipitating factors are unchecked immigration. Thus, Policy makers are seeing TVET programs, as the rational approach for national integration. Integrating recently arrived immigrants as well as working class youth into the economy via means of training.

The third perspective, explicitly vital of assumptions, sight the upgradation of vocational schools as class-based solution invented by businessmen and industrialists to control the emerging economies. This was done to meet the demands for a technically proficient labour force, integrating children from lower socio-economic backgrounds as disciplined workforce.

In the contemporary world, the vocational education continues to be known by many names: industrial education, technical education, manual education and more recently, career education. What is common to all these forms is the practical and applied character of instruction usually in vocational programs. The condensed secondary education is segregated into two categories: technical-vocational education and academic-general education. The heading of vocational education includes students in post-primary courses in technical, industrial, arts and crafts, trade, commercial, agricultural, fishery, forestry, and domestic science programs. The student's enrolment trend in vocational school over the last 30 years has been studied by **Benavot (1983)**. Which was based on the UNESCO data reported by the independent countries.

**Table 1.1**  
**Proportion of full-time Secondary Students in Vocational Programs, 1950-75**

<b>Region of the World</b>	<b>1950</b>	<b>1955</b>	<b>1960</b>	<b>1965</b>	<b>1970</b>	<b>1975</b>
<b>Africa</b>	19 (21)	20.7 (26)	16.2 (30)	13.1 (34)	8.1 (32)	7.9 (37)
<b>Asia</b>	10.1 (12)	10.9 (16)	10.1 (17)	11.4 (18)	10.6 (18)	11.2 (19)
<b>Middle East/ North America</b>	15.8 (11)	12.0 (14)	12.1 (15)	10.9 (16)	8.8 (17)	10.4 (15)
<b>Latin America / Caribbean</b>	29.9 (19)	28.4 (23)	23.0 (23)	19.2 (24)	18.2 (22)	18.8 (20)
<b>Eastern Europe</b>	50.5 (5)	54.0 (6)	58.4 (6)	59.2 (9)	64.1 (8)	66.1 (8)
<b>Western European*</b>	33.4 (14)	29.0 (17)	26.2 (17)	25.2 (20)	22.3 (21)	20.2 (18)
<b>Total, all regions</b>	24.2 (82)	23.1 (102)	20.0 (108)	19.2 (121)	16.8 (118)	16.5 (124)
<b>Totals, (Eastern Europe Excluded)</b>	22.5 (77)	21.1 (96)	17.8 (102)	16.0 (112)	13.4 (110)	12.8 (108)
<p>*Western Europe includes Australia, New Zealand and Canada</p> <p><sup>a</sup>The Following procedure were used in constructing table:</p> <ol style="list-style-type: none"> <li>1. Only independent countries were included: data or 1950, 1955 and 1960 were taken from the 1969 UNESCO Statistical yearbook; data for 1965 and 170 were taken from the 1975 yearbook; and data for 1975 was taken from the 1981 yearbook.</li> <li>2. Enrollment figures close to 1975 were used for Angola (1972); Dahomey and South Vietnam (1973); Ivory Coast, Peru, Zaire, Bhutan, Sarawak, Malaysia, and Nepal (1974) and Sri Lanka (1976).</li> <li>3. Portuguese Guinea, Maldives Island, Kuwait, and Mozambique were excluded at all time points due to the small number of secondary students in their educational system.</li> <li>4. Data for Papua is included in estimates for New Guinea for the entire period; the United States is a missing case at all time points.</li> </ol>						

**Source:** Benavot, Aaron (1983).

Table 1.1 presents the enrolment data of vocational students at the secondary level in five-year intervals. The table covered the six geographical regions. During 1950 the average proportion of full-time vocational students was about 25 percent of all secondary students (24.2 percent). There was a decline during 1965 to 1975 (19.2 percent to 16.5 percent). There was a declining trend in the vocational education at the secondary level (Benavot, Aaron, 1983).

## **1.2 Historical background of VET**

According to UNESCO, roughly 120 countries provide some form of technical or vocational secondary education, as distinct from a pure generalist curriculum. In 2010, 11% of the world's secondary school students attended such institutions – a figure that has remained static over a decade. However, in the south and west Asia, the figure is 2%. Studies have shown that vocational education increases school engagement and reduces the risk of pupils leaving the education system with no qualifications. (**Dunbar, Muriel, 2015**).

### **1.2.1 Vocational Education and Training School in the USA**

The Technical and Vocational Education and Training (TVET) is defined by the UNESCO as “those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic life”. This definition also incorporates technical education, vocational education, vocational training, on-the-job training, and apprenticeship training (or any combination thereof). (**Tripney, J.S. and Hombrados, J.G. 2013**)

The place for vocational education and training in school education system especially secondary and higher secondary is debatable. Should TVET be the part of school education system or shouldn't be still required to be answered. In 1984 as reported by the Tuli, Rosalie L. 24000 high schools in the United States offered a mixture of vocational and non-vocational courses. Only 6,000 of them offer five or more vocational courses. This makes up 25 percent of the total number of schools are referred as comprehensive high schools. (**Tull, Rosalie I. 1984**).

Thus, Vocational education, perhaps more than any other area of the curriculum, has had to struggle, both within the educational community and society for its proper place. In an address in 1985 to the Annual Convention of the American Vocational Association (AVA), William J. Bennett, then-U.S. Secretary of Education defined the three major purposes of education as civic, personal, and utilitarian. He emphasised the need for general skills, general knowledge, and respect for values. A report by the Committee for Economic Development in 1985 noted that curricula stressing literacy,

mathematical competency, problem-solving skills, and the ability to learn and adapt to change were preferred by employers (**Ogden, William R., 1990**).

It is argued that vocational education belongs to the common core knowledge. The distinction is made between vocational education for jobs and vocational education about work. The former aspect, it is argued, beyond the secondary schools. In proposing vocational education as general education within a unitary curriculum, **Lewis, T. (1998)** offered three arguments that namely (a) a meaning-of-work argument; (b) a practical-knowledge-as-knowledge argument; and (c) a situated-cognition argument

So, a new vocationalism was emerged in the United States, as elsewhere in the industrialised world, in response to economic motives. To change old perceptions, countries have been resorting to the approaches intended to raise the level of prestige attending vocational education to that of academic education (**Lewis, T. 1998**).

However, there are few comparative studies exploring why technical-vocational educational programs emerged as a distinct form of public schooling. What factors generated, sustained or hindered the growth of vocational education in different regions of the world. Establishing systems of vocational education were exported to less developed countries throughout the post-war period. The International Labour Office (ILO) and UNESCO played a significant role in the evolution of vocational education during the post-war period. (**Benavot, Aaron, 1983**).

### **1.2.2 Development of VET in European Continent: An overview**

As per the survey of Global National Qualifications Framework Inventory shows that the more than 142 countries and territories are involved in the development and implementation of qualifications frameworks (**European Training Foundation, 2013**).

At the beginning of 2015, 38 European countries had developed/were developing NQFs. (**Cedefop, 2015**). In the European countries, reforms are influenced by the common labour market and the need for qualifications to be referenced against the European Qualifications Framework (EQF). In England, although there is a trend towards increasingly distinct vocational and academic routes in secondary schools, the

majority of pupils still complete their secondary education in institutions which accommodate both academic and vocational options and at which students choose the combination of subjects they will pursue. In Germany also, students are introduced to the world of work in lower secondary but initial vocational education does not really become available until age 16, at which time students must choose whether to continue their academic education or transfer to a vocational school. Vocational schools continue to offer general education subjects alongside vocational ones and include practical training. The German National Qualifications Framework (DQR) is being developed and will extend to non-formal and informal learning. Poland has experienced a significant increase in interest in vocational education in recent years and is working on developing a national qualifications framework. A major reform of the school education system has recently been completed in Scotland, where the breadth of education is favoured over specialisation. All qualifications are contained within the Scottish Credit and Qualifications Framework (SCQF) which is one of the oldest established. Therefore, less influenced than others in its design by the introduction of the EQF.

### **1.2.3 National Vocational Qualification Framework in Asia**

International Labour Organisation (ILO) during the year 2006 reported that the Asian countries are initiating the education and training reforms. The report reflected that the Asian countries are transforming their National Qualification Framework (NQF) or National Vocational Qualifications (NVQ) into industry specific National Vocational Qualification Framework (NVQF). The countries which are in transformation phase include:

- Malaysia, the Maldives, Tonga and Papua New Guinea, implementing NQF;
- Vietnam, Bangladesh and India are implanting NVQF; and
- Afghanistan, Bhutan, Nepal and Pakistan are developing NVQs. **(Paul, Comyn., 2009)**

#### 1.2.4 Vocational Education and Training in India

India is growing at an economic growth rate of 7-9%. In India about 17 Ministries/ Departments of Government of India are providing or funding formal/ non-formal VET programmes. To accelerate the economic growth the Planning Commission had identified 20 high growth sectors. Education and Skills are also major policy thrust are. Here, we should know that among the unemployment 69% are of educated people. In Indian labour market, 93% of the workforce is engaged in the unorganised sector. Every year about 12.8 million workers join the labour force. The vocational training capacity of the country is estimated to be about 5 million. As far as the question of imparting the formal vocational education and training is concerned with the age group of 15-29 only 2% had formal training and 8% had non-formal vocational training. About 90 percent of employment opportunities require vocational skills.

The Director General of Employment and Training under the Ministry of Labour and Employment conducts vocational training courses through 8,687 Industrial Training Institutes/Centres with a seating capacity of 12.14 lakh in 114 trades for learners and through a Central Apprenticeship Council and six Regional Directorates. In Indian system, VET courses are regulated through National Council for Vocational Training at the national level and State Council for Vocational Training in the states. Further, non-governmental organisations training centres privately managed ITCs also imparting VET.

The Ministry of Human Resource Development is another important ministry imparting and administering VET responsibilities. This TVET system for development of human resource through a three-tier system in the country consists:

1. **Higher Level:** UG and PG level (e.g. IITs, NITs, and engineering colleges) trained as engineers and technologists.
2. **Middle Level:** Diploma graduates passing from the polytechnics as the technicians and supervisors.
3. **Lower Level:** students trained and certificate in vocational and craft streams by NCVT/ SCVTs.

Further, Four Boards of Apprenticeship Training (BATs) are also imparting apprenticeship training (**Sirohi, Vineeta, n.d.**).



### 1.3 Origin of Knowledge

Plato in his view described as in *'Theaetetus'* immortalised knowledge as consists of justified and true belief also called 'the traditional analysis of knowledge'. Thus, human knowledge can naturally be categorised into various categories: empirical (or, a posterior) knowledge, non-empirical (or, a priori) knowledge, knowledge by description (a kind of propositional knowledge), knowledge by acquaintance (a kind of non-propositional knowledge), and knowledge of how to do something (Moser, P.K. and Nat, A. 2010). It is assumed that about 80% of the Worlds knowledge is in tacit form lies in the brains of living beings which is difficult to transfer, only 10-20% of the Global knowledge is assumed to be in the documented form known as explicit knowledge.

#### 1.3.1 Process of Knowledge Diffusion

The Nonaka and Takeuchi in their Knowledge Management model had explained in detail the process of knowledge transformation from tacit knowledge (subjective and experience based knowledge cannot be recorded in words) into explicit knowledge (objective and rational knowledge) that could be expressed in words (context free).

- **Step One: Specialisation (tacit to tacit):** This knowledge can be collected through socialisation (i.e. a process of sharing knowledge through social interactions).
- **Second step: "Externalisation" (tacit to explicit)** externalisation is a process of converting and transforming tacit knowledge to explicit knowledge into a visible explicit form of knowledge. Nonaka and Takeuchi in 1995 defined it as "a quintessential knowledge creation process in that tacit knowledge becomes explicit taking the shapes of metaphors, analogies, concept, hypotheses, or models".
- **Third step: "combination" (explicit to explicit):** the combination is the process of improvement, recombining, re-synthesis improvement of discrete pieces of existing explicit knowledge into a new understanding form for knowledge.
- **Fourth step: "Internalisation" (explicit to tacit):** internalisation is a process of diffusion and embedding of newly acquired and consolidated knowledge. Internalisation is strongly linked to "learning by doing". Thus, internalisation

process converts or integrates shared/individual experiences and knowledge into individual mental models.

The whole process of knowledge management is the process of knowledge diffusion. The phenomenon of knowledge diffusion may also be called the 'social learning' (**Morone and Taylor, 2000**). The knowledge diffusion studies the growth of knowledge during a specific period, related and interlinked aspects, leading producers of knowledge, consumers of the knowledge. The computational Scientometrics (application of mathematical and statistical methods used in bibliometric/scientometric to study large datasets) might help to answer these questions (**Boyak, Borner and Klavans, 2007**).

Thus, to examine the knowledge diffusion and collaboration structure bibliometric/scientometric research methods can be employed to study the diffusion of knowledge, through focusing on main deliberations such as (i) nature of knowledge, (ii) chain of knowledge process, and (iii) modes of knowledge transfer (**Ozel, 2012**) and other aspects too i.e. patterns of knowledge diffusion: (1) geographic localisation of knowledge, and (2) concentration of knowledge flows (**Singh, J. 2005**). Their formal and Informal knowledge collaboration between the knowledge producer/diffuser in different organisations is argued to be one of the main carriers of knowledge between organisations in a cluster. In modern day language, we used to call this knowledge diffusion process as a scientific collaboration. Citation databases such as Science Citation Index (SCI), Social Science Citation Index (SSCI), Arts & Humanities Citation Index (AHCI), Scopus, etc. reveal that the international collaboration leads to higher impact as the knowledge network expands. Thus, the relationship between the numbers of citations (impact) and the number of coauthors (diffuser) are the important aspects of knowledge diffusion process.

As, India is focused on skill based teaching and learning and had launched National Vocational Education Qualification Framework and National Skill Qualification Framework to achieve the target of skilled manpower in the country by 2020. These quality assurance frameworks will organise the required qualifications of a learner according to a series of levels of knowledge, aptitude and skills. These levels are defined

according to the learning outcomes which the learner will possess regardless of whether they were acquired through formal, non-formal or informal learning. This study is going to facilitate policy makers and educational administrators, and planners in making of policies as comparing the situation of VET in other countries.

#### **1.4 Background of the study**

Two Russian scientists coined the term “naukometriya” in 1969. Nalimov and Mulchenko used this terminology to study the measurement of science. Since its evolution, the scientometrics in last six decades has become the standard research method. It is used by the scientists to describe the various phenomenon i.e. philosophy of science, history of science, structural and temporal analysis of science, science communication etc. Thus, scientometrics is regarded as prominent research method for quantitative analysis. It is capable of doing metrics analysis like journals, authors and articles in a subject domain, data visualisation, mapping, policy evaluation, impact assessment. The core objective of all the above analysis is to study the communication process in science. The publication data is the prime source for scientometric studied. The citations attracted by these publications is a common practice across the globe to draw quantitative evaluation. Scientometric analysis is the day to day practice for evaluation of research performance in universities (teaching departments) and public sectors organisations/labs (i.e. NISCAIR, NISTADS). Also by the policy makers and administrators (i.e. National Institute of Statistics, UNESCO, OECD, European Commission, NII-Japan, NISTEP-Japan, etc), information specialist, librarian and researchers themselves. Thus, counting, measurement, comparison and analysis of these quantitative data are the prime activity.

The accurately made measurements and evaluations are the core activities of science. Therefore, gathering and organising data for interpretation is the prelude for research. Individuals who produce research articles are now have become the object of measurement in the field of scientometrics. The primary metrics for measuring the performance of an individual in any subject is by studying their published work. There is a drastic change in the measurement of individual’s performance since last years. Nowadays it is common practice to use citation counts, journal impact factor, individual’s performance index (i.e. h-index) as measurement and evaluation of research. A spurt in the field of scientometrics based studies is seen now a day because

it is very easy to gather the data by using various databases of international standards i.e. the Web of Science (WoS), Scopus (Elsevier) etc. and individual's research could be traced easily. (Balram, P., 2008). During reviewing of literature, it was found that most of the scientometric studies are conducted by the organisations for themselves. This study is an attempt to evaluate global Vocational Education and Training (VET) research performance, as reflected in Web of Science Core Collection Database.

### **1.5 Need for the Study**

The intention of the present work is to explore the way in which knowledge (literature) is diffused at the global level in vocational education and training, the identification of prolific countries, organisations/departments, and individuals. What is the pattern of collaboration and frequency distribution of publications in vocational education and training. These are the two fundamental needs to pursue this study as mentioned below:

- To study the diffusion of knowledge in vocational education and training.
- To understand the collaboration relationship in vocational education and training.

### **1.6 Statement of the Problem**

“Global Knowledge Diffusion in Vocational Education and Training: A Scientometric Study”

### **1.7 Problem Formulation**

The statement of research to be investigated has its contemporary relevancy because any Nation's biggest wealth is its youth. When the youth is adequately equipped with the knowledge and competent skills can contribute more towards socio-economic development of that nation. “India is a country of young people out of 1.1 billion people, 672 million people are in the age group of 15-59, which is treated as working age population”. India realised the importance of vocational education in the country when Kothari Commission (1964-66) advocated vocationalisation of education at school and secondary level in the country. In India, more than 17 ministries and departments are engaged in imparting the vocational education in formal mode at the three levels UG and PG Level (higher), Diploma Level (middle) and certificate level. (lower) at secondary and higher secondary standard. The non-governmental organisation (NGOs) are imparting vocational education and training in India in

informal mode. There is a disparity in both formal and informal mode of education e.g. in terms of course duration, educational pre-requisite, hours of training, course content, etc. To standardise vocational education, country had already launched National Vocational Education Qualification Framework (NVEQF) and National Skill Qualification Framework (NSQF) consisting the provision of vertical and horizontal mobility (school and secondary level to UG and PG level) with multiple entries and exit options. In this process National Occupational Standards (NOS) and Sectoral Skill Council (SSCs under National Skill Development Council) were established. NVEQF and NSQF ensure maximum participation from both academics and industry. South Asian developing countries like India could be referred as the young nation because millions of populations of youth are being added every year. We only have provision for vocational education and training for nearly about 2.5 million people in the country, knowing the fact that whereas about 12.8 million persons enter the labour market every year. About 90 percent of employment opportunities require vocational training and skills, something that which is not taught in schools and colleges often alongwith general education system. There are around more than 250-member states in UNESCO-UNEVOC International Centre work, working in the field of vocational education and training. The study will be helpful in identification of research trend in vocational education and training at the global level. Further, identification of major knowledge producers will facilitate collaboration among the front runners and underachievers.

### **1.8 Hypothesis**

- Journals are the preferred source of knowledge diffusion than other sources.
- Is there any direct or indirect relation between country's GDP and its publication productivity.

### **1.9 Objectives of the study**

The objectives of the study as follows:

- To explore the growth of publications and citations in VET
- To analyse the geographic distribution of publications and citations in VET.
- To examine the Publication Efficiency Index and Relative Citation Index in VET.
- To determine the prolific Authors and Organisations in VET.
- To find out highly preferred journals and in VET.
- To identify highly cited publication in VET.
- To identify research domain of documents diffused in VET.

### **1.10 Scope and Limitations of the Study**

The scope of the Study is limited to the data available pertaining to the vocational education and training in Web of Science Core Collection database. This study is limited to the publications indexed in Web of Science Core Collection database brought out from 1992 to 2016.

### **1.11 Research Design**

Selection of most suitable research methodology for a studying a problem in a systematic manner is very important and most indispensable step. In order to accomplish the research topic “**Global Knowledge Diffusion in Vocational Education and Training: A Scientometric Study**” major issues related to the comprehensive accomplishment of the above study has been focused and analysed. To accomplish the study scientometric research design of quantitative research method mentioned below is decided to use to execute the study.

A research design is an anatomical framework or blueprint for conducting the research by identifying the appropriate methods and procedures. This study is based on exploratory scientometric research design attempting to explore the growth of knowledge and collaboration among knowledge producers. The scientometric research design is analytical that adopt the detailed analysis of secondary data using a range of scientometric tools, techniques and formulas and laws along with standard statistical techniques. The detailed methodology is discussed in Chapter III.

### **1.12 Organisation of the Thesis**

The thesis is well organised and presented in six chapters as follows:

Chapter I: **Introduction**, provide historical background and impact of the industrial revolution in the VET domain. Further, it gives introduction and background of the research, the need for the study, formulation of the problem. It also reports the hypothesis formulated for testing. It also describes the objectives of the study, its scope and limitations and methodology applied to fulfil the objectives.

Chapter II: **Review of Literature** has provided a theoretical background of the study by reviewing the prior studies by doing the literature review. The review of the

literature has been done thematically. This includes reviewing selected studies in VET domain, knowledge creation, diffusion and scientometrics.

In Chapter III: **Research Methodology**, the detailed description of the research methodology and research design applied to fulfil the objectives of the study is presented.

Chapter IV: **Knowledge Diffusion Methods**, gives an account of existing Knowledge Diffusion Methods, Further, the methods and techniques of collaboration and measurement of science are also discussed.

Chapter V: **Data Analysis and Interpretation**, present the account of the analysis of data to fulfil the set objectives of the study and testing of hypothesis.

Chapter VI: **Findings and Suggestions** describes the summary of the data analysis. Findings based on the analysis to fulfil objectives are reported in this section of the thesis. Further, the study recommends some suggestions for further research.

## References

- Benavot, Aaron. 1983. "The Rise and Decline of Vocational Education." *Sociology of Education* 56 (2): 63–76.
- Boyack, Kevin W., Katy Börner, and Richard Klavans. 2009. "Mapping the Structure and Evolution of Chemistry Research." *Scientometrics* 79 (1): 45–60.
- Comyn, Paul. 2009. "Vocational Qualification Frameworks in Asia-Pacific: A Cresting Wave of Educational Reform?" *Research in Post-Compulsory Education*, August.
- Sirohi, Vineeta. n.d. "TVET System in India: An Overview." [www.tda.edu.au/cb\\_pages/files/India\\_TVET%20system\\_16%20Dec%202012.pdf](http://www.tda.edu.au/cb_pages/files/India_TVET%20system_16%20Dec%202012.pdf).
- Dunbar, Muriel. 2015. "Secondary Vocational Education International Experience: Final Report April 2015." 103893. New Delhi: The World Bank. <http://documents.worldbank.org/curated/en/470241468000264353/Secondary-vocational-education-international-experience-final-report-April-2015>.
- European Centre for the Development of Vocational Training (Cedefop). 2015. *National Qualifications Framework Developments in Europe: Anniversary Edition*. Luxembourg: Publications Office of the European Union.
- European Training Foundation. 2013. "Global National Qualifications Framework Inventory." Kuala Lumpur: ASEM Education Ministers Conference. <http://www.cedefop.europa.eu/en/publications-and-resources/publications/2211>.
- Hoeckel, Kathrin. 2017. "Costs and Benefits in Vocational Education and Training." OECD. Accessed September 4. <http://www.oecd.org/education/country-studies/41538706.pdf>.
- Lewis, Theodore. 1998. "Vocational Education as General Education." *Curriculum Inquiry* 28 (3): 283–309.
- Morone, Piergiuseppe, and Richard Taylor. 2004. "Knowledge Diffusion Dynamics and Network Properties of Face-to-Face Interactions." *Journal of Evolutionary Economics* 14 (3): 327–51.
- Moser, Paul K., and Arnold vander Nat. 2009. "Knowledge." Edited by Bates, M. J and Maack, M. N. *Encyclopedia of Library and Information Sciences, Third Edition*. CRC Press.
- Ogden, William R. 1990. "Vocational Education: A Historical Perspective." *The High School Journal* 73 (4): 245–51.



- Ozel, Bulent. 2012. "Collaboration Structure and Knowledge Diffusion in Turkish Management Academia." *Scientometrics* 93 (1): 183–206.
- Balaram, P. 2008. "Scientometrics: A Dismal Science." *Current Science* 95 (4): 431–32.
- Singh, Jasjit. 2005. "Collaborative Networks as Determinants of Knowledge Diffusion Patterns." *Management Science* 51 (5): 756–70.
- Tripney, Janice S., and Jorge G. Hombrados. 2013. "Technical and Vocational Education and Training (TVET) for Young People in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis." *Empirical Research in Vocational Education and Training* 5 (December):3.
- Tull, Rosalie I. 1984. "Vocational Education — Does It Belong in the High School Curriculum?" *American Secondary Education* 13 (4): 26–27.
- UNESCO. 1996. "Financing Technical and Vocational Education: Modalities and Experiences." Berlin: UNESCO.  
<http://www.voced.edu.au/content/ngv%3A6111>.