Elements of Sustainable Development in Technical & Vocational Subjects in Secondary School in Malaysia

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Development of a high quality education system in Malaysia is among the country's priorities. The development of a high quality education system in Malaysia is among the country's priorities. It is focused on the development of human capital that is experienced, skilled, progressive, and exhibits high moral and ethical values. The Education Development Master Plan (IPIP) 2006-2010 adopted by the Ministry of Education introduced 22 elective vocational subjects (VS) to the secondary school curriculum to develop vocational skills that would prepare students for skilled and semi-skilled work after school to underpin economic development of the country. The Education Development Master Plan EDEMIP 2006-2010 adopted by the Ministry of Education introduced 22 elective Vocational Subjects (VS) to the secondary school curriculum in order to develop vocational skills that would prepare students for skilled and semi-skilled work after school to underpin the economic development of the country. This study is aimed at identifying key issues that support sustainable development of vocational subjects in secondary school in Malaysia based on the strategies outlined by the International Centre for Technical and Vocational Education and Training (UNEVOC) based in Bonn, Germany. This study is aimed at identifying key issues that support sustainable development of technical & vocational subjects in secondary schools in Malaysia based on the strategies outlined by the International Centre for Technical and Vocational Education and Training (UNEVOC) based in Bonn, Germany. These strategies specify economic, social and environmental conditions required to meet the Sustainable Development model in technical and vocational education (TVE). These strategies specify economic, social and environmental conditions required to meet the Sustainable Development model in technical and vocational education (TVE). The methodology used for this project is the Delphi study. The methodology used for this project is the Delphi study. Twelve experts in the field of technical and vocational education have been involved in this research. Twelve experts in the field of technical and vocational education were involved in this research. Some of elements identified through the project relate to such notions as creativity, generic skills, staff development programs, teaching methods, vocational counselling and industrial relations. The paper elaborates on the identified elements and interprets what does sit mean for the future policy formulation in this area. Some of the elements identified through the project are related to such notions as creative skills, staff development programs, teaching methods, vocational counselling and industrial relations. The paper elaborates on some issues identified and interprets their meaning for policy formulation.

Introduction

Konseling kelestarian (sustainability) adalah merupakan sebahagian daripada wacana pembangunan perdagangan saran dan senacara senja. Menurut Pavlova (2009), istilah Kebijakan Pembangunan atau Pembangunan Lestari (Sustainable Development) mempunyai pelbagai makna dan defini bergantung kepada sesuatu organisasi. Walau bagaimanapun konselor Kebijakan Pembangunan atau Pembangunan Lestari telah mula mula diawasi dan diterima sebagai langkah yang perlu. The concept of sustainability has been part of the discourse of international discussions since the 1980s. According to Pavlova (2009), the term Sustainable Development has various meanings and definitions, depending on different organisations. However, the concept of Sustainable Development was first defined in the Brundtland Commission Report, the World Commission on Environmental and Development, According to Brundtland (1987), Sustainable Development has been conceptualised in a variety of forms, one of them being.

"...Development that meets the needs of the present without compromising the ability of future generation to meet their needs."

Pendidikan Teknikal dan Vokasional dan Latihan (Technical and Vocational Education and Training [TVET]) adalah sebagai kunci utama atau "master key" untuk menyelesaikan beberapa permasalahan seperti pembangunan lestari, kualitas sejagat dan mengurangkan kemiskinan (Pavlova & Chunlin, 2009). Technical and Vocational Education and Training (TVET) is a key or "master key" to solving problems associated with unsustainable development. Sustainable Development is a critical issue for the 21st century community that is aimed towards peace and reduction of poverty (Pavlova & Chunlin Huang, 2009; Jallah, 2004). Mohamed Jallah (2004), walaupun berpendapat bahawa Pendidikan Teknikal dan Vokasional dan latihan (PTVL) sebagai "master key" kepada kelestarian pembangunan. Menurut mereka, Kebijakan Pembangunan atau Pembangunan Lestari adalah satu kunci bagi memasuki abad ke 21. Pendidikan Teknikal dan Vokasional dan Latihan (PTVL) untuk kelestarian pembangunan adalah satu bahagian yang sangat penting dalam Pendidikan untuk Pembangunan Lestari (Education for Sustainable Development [ESD]).

The International Centre for Technical and Vocational Education and Training (UNEVOC) (2004) telah menggunakan beberapa strategi Pembangunan Lestari untuk PTVL. Antara ialah sokongan dan wawasan negara, mengikuti semula dasar dan pembangunan PTVL, perancangan gairah-gairah panduan bagi pelaksanaan PTVL, pembinaan kurikulum dan program latihan, membangunkan bahan, sumber sumber dan pelatihan untuk PTVL, penilaian dan pengetahuan di dalam PTVL, penggunaan, penilaian
Mata Pelajaran Vokasional Vocational Subjects

Kementerian Pelajaran Malaysia (KPM) menyediakan akses kepada pendidikan Teknik dan Vokasional (PTV) untuk meningkatkan kualitas dan kuantitas pendidikan. Dalam tahun 2020, Kementerian Pendidikan Malaysia (KPM) memberikan peluang kepada pelajar untuk belajar di sekolah-sekolah yang menawarkan pelajaran vokasional. Mata Pelajaran Vokasional (MV) yang ditawarkan 22 mata pelajaran yang menawarkan peluang kepada pelajar untuk belajar di sekolah-sekolah yang menawarkan pelajaran vokasional.


**Background research problems**

Kementerian Pelajaran Malaysia (KPM) telah menetapkan *National Key Performance Indicator (NKPI)* sebagai tujuan utama dalam pendidikan. Dalam NKPI yang ke-5, pendidikan Teknik dan Vokasional memainkan peranan penting dalam agenda Malaysia. *Minister Key Performance Indicators (MKPIs)*, Kementerian Pelajaran Malaysia menetapkan peningkatan pelajar sebanyak 100% dalam bidang vokasional dan kemahiran pada akhir tahun 2015. Menurut Ahmad Tajudin (2009), mata pelajaran vokasional (MV) adalah salah satu mata pelajaran dalam kurikulum teknik dan vokasional yang dikelola oleh Kementerian Pendidikan Malaysia (KPM) untuk meningkatkan kualitas dan kuantitas pendidikan. Dalam Kurikulum 2015, pelajaran vokasional di sekolah-sekolah yang menawarkan pelajaran vokasional menawarkan peluang bagi pelajar untuk belajar di sekolah-sekolah yang menawarkan pelajaran vokasional.

**Jadual 1: Mata Pelajaran Vokasional Mengikut Bidang**

<table>
<thead>
<tr>
<th>Field</th>
<th>Vocational Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Services</td>
<td>1. Domestic Electrical Equipment Servicing</td>
</tr>
<tr>
<td></td>
<td>2. Domestic Wiring</td>
</tr>
<tr>
<td></td>
<td>3. Repair Refrigeration and Air-Conditioning Equipment</td>
</tr>
<tr>
<td></td>
<td>4. Gas and Air Welding</td>
</tr>
<tr>
<td></td>
<td>5. Motorcycle Servicing</td>
</tr>
<tr>
<td></td>
<td>6. Basic Gerontology and Services</td>
</tr>
<tr>
<td>Construction</td>
<td>1. Domestic Construction</td>
</tr>
<tr>
<td></td>
<td>2. Furniture Making</td>
</tr>
<tr>
<td></td>
<td>3. Domestic Plumbing</td>
</tr>
<tr>
<td></td>
<td>4. Architectural Signs</td>
</tr>
<tr>
<td></td>
<td>5. Interior Design Basics</td>
</tr>
<tr>
<td>Home Economics</td>
<td>1. Clothing Design and Sewing</td>
</tr>
<tr>
<td></td>
<td>2. Catering and Serving</td>
</tr>
<tr>
<td></td>
<td>3. Food Processing</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1. Landscape and Nursery</td>
</tr>
<tr>
<td></td>
<td>2. Food Crops</td>
</tr>
<tr>
<td></td>
<td>3. Aquaculture and Animal Entertainment</td>
</tr>
<tr>
<td></td>
<td>2. Multimedia Production</td>
</tr>
</tbody>
</table>

Table 2: The paths chosen by the MCE VS Leavers in 2004 (across three secondary academic schools in Johor, Malaysia).

<table>
<thead>
<tr>
<th>Item</th>
<th>Subject</th>
<th>No. of Students</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Continued education to Form 6</td>
<td>6</td>
<td>5.71</td>
</tr>
<tr>
<td>2.</td>
<td>Continued education to Public/Private Institutes in the same field of study</td>
<td>15</td>
<td>14.29</td>
</tr>
<tr>
<td>3.</td>
<td>Continued education to Public/Private Institutes in different fields of study</td>
<td>7</td>
<td>6.67</td>
</tr>
<tr>
<td>4.</td>
<td>Pursued careers related to VS</td>
<td>9</td>
<td>8.57</td>
</tr>
<tr>
<td>5.</td>
<td>Pursued careers not related to VS</td>
<td>48</td>
<td>45.70</td>
</tr>
<tr>
<td>6.</td>
<td>Worked independently</td>
<td>3</td>
<td>2.86</td>
</tr>
<tr>
<td>7.</td>
<td>Did not work</td>
<td>17</td>
<td>16.19</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>105</td>
<td>100.00</td>
</tr>
</tbody>
</table>


Method

Delphi Study

The study reported in this paper used a Delphi method to achieve a high level of consensus among a panel of experts (established by the researcher) to include elements of sustainable development in the implementation of the VS in the secondary schools in Malaysia. This research methodology has been used extensively to predict and identify the needs in education. For example, in clinical education, Delphi studies have been used in various ways, including predicting, planning, and curriculum development (Thangaratinam & Redman, 2005).

The study sample

Pemilihan sampel kajian ini adalah dalam kalangan individu yang mempunyai tabah pengalaman yang tinggi dalam bidang pendidikan teknikal dan vokasional di Malaysia. Namun, Helmer (1968) dalam Steward et al. The panel of experts used for this study consists of individuals who embodied a high level of technical and vocational education in Malaysia. Helmer (1968) in Steward et al. (1999) mengataskan sukar bagi pengkaji Delphi
untuk memberikan pelajaran "pakar" kepada teseorang individu hanya berdasarkan penilaian
masamkant ke atas kelayakan akademi, upah sambungan dan pencapaian karirnya semata.
Bagi tajuk persampapan sampel kajian, kerana-kriteria seperti mane berikut: sebahagian sebab
pembahasan untuk penerapan panel pakar kajian Delphi itulah: al (1999) stated the difficulty
researchers faced when imposing the title of "expert" upon an individual based solely on
the communal assessment of their academic qualifications, the level of contribution and
career achievements. For the purpose of panel selection the following criteria were used:

1. The individual be a holder of a Doctor of Philosophy (Ph.D) degree in technical
   and vocational education (TVE); lecturers of the Institute for Teacher Education
   (ITE); should have served between 10 to 15 years in the field of TVE or teachers
   who have taught more than 10 years in the TVE.

2. The individual possesses knowledge of the curriculun and implementation of TVE
   subjects at university, ITE or school level.

3. The individual is directly involved in the implementation of the VS, particularly
   individuals from the Ministry of Education.

4. The availability of the individual to partake in the Delphi study round sessions
   that has been set. (Dalkey et al, 1972)

Panel pakar dipilih adalah berdasarkan keterlal dan kepuasan mereka menyaksikan
pendapat tentang topik yang akan dibincangkan serta mempunyai pengalaman mendalam
berhubung perkara-perkara tersebut (French et al, 2002) . Berdasarkan dengan kriteria-
kriteria yang telah ditetapkan, semasa 12 orang panel pakar telah terpilih (Dalkey et al,
1972). Untuk mendapat elemen-elemen kelebihan pembangunan MPV pengkaji telah
menunjukkan satu tema sudut bersekelma berdasarkan protokol temubual yang telah
disusun oleh pengkaji.Pan expert were selected based on their willingness and ability
to express an opinion and encompass extensive experience on matters being discussed
(French et. Al, 2002). In accordance with the criteria set, the panel of 12 experts was
selected. Initially, to acquire the issues that could influence a sustainable development of
VS, the researcher conducted personal interviews based on interview protocols developed
for this study. Then the agreement between the experts were searched.

Final Results
Delphi Study Participant Profile
Semasa lapan orang staf akademik dari Institut Pengajian Tinggi, secara spesial IPG,
da orang pegawai pelajaran dari Kementerian Pelajaran Malaysia dan seorang guru pakar
telah dilantik menjadi panel pakar kajian Delphi. A total of eight academic staff from
Institutes of Higher Education, a lecturer from the ITE, two education officers from the
Ministry of Education and a specialist teacher were selected to be members of the review
panel for this Delphi study.

Dapatkan Tembusan Kajian Delphi Interview Findings
Sebanyak 17 elemen telah dikenalpasti hasil daripada temubual dengan panel pakar
mengenai elemen-elemen kelebihan pembangunan untuk Mat Pelajaran Vokasional di
sekolah menengah harian di Malaysia. Seventeen issues were identified by the panel of
experts as important for sustainable development of vocational subjects in secondary
schools in Malaysia. These elements, in tehnese, iulah seperti Judul 3:Elements are
displayed in Table 3.
changes in government educational policies. In lieu of the above, staff development programs are a key element in improving the implementation of the VS in particular to improving the knowledge and skills of teachers specializing in VS.

Halubandi industry is a separate element that did not receive attention in terms of making the industry more competitive with the big players. The expert panel unanimously agreed that industrial relations were a key sustainable element in regards to the development of the VS. Each student, for a certain period of time, will be placed in an industry related to their field of study. Billet (2001) emphasized the importance of the time period which they saw as a golden opportunity for the students. Billet (2001) viewed learning in the workplace as not only being very useful to students, but a matter which could not be avoided. Many students found the experience of working, pastaking in discussion and gaining advice and knowledge from experienced employees pivotal in acquiring the knowledge and skills necessary for carrying out actual tasks. Siastan terhadap pembelajaran di tempat kerja oleh Billet (1996, 1999, 2001) mendapat aktiviti hari-hari pada persentiran penerapan adalah sangat penting sebagai sumber pembelajaran dan pengalaman untuk bekerja. Seterusnya ia mengatakan bahwa yang dipelajari pelajar sebenarnya terdiri dari pelajar kerja di tempat terhadap kemahiran dan pengalaman daripada pengalaman dalam aktiviti di tempat kerja. Further studies of learning in the workplace by Billet (1996, 1999, 2001) found that day-to-day activities in the work environment were a very important source of learning and experience to work. It was found that students received guidance in both direct form through interaction with other employees and indirect form through observation and discussion of activities in the workplace.

Conclusion
The reported study identified a number of issues required to increase the quality of VS and therefore, to increase sustainability of these subjects at school. These issues will be used to guide an effort to improve the implementation of VS in accordance with the Tenth Malaysia Plan (10th MP) that put a special emphasis on technical education and vocational training at the secondary schools to contribute to the human capital development. The economic aspects of Sustainable Development could be partly achieved through TVET and work in the area of training to improve the quality of life for the people of this country.

References
Redesigning Education for Earthquake Disaster Mitigation as Stem Education

Hiroshi Morikawa, Toshiki Masuda, Masachika Tanigawa, and Sonoko Hori

Tokyo Institute of Technology

In recent years, earthquakes of great magnitude have occurred in several countries around the world, such as Chile, Haiti, China, Indonesia, and so on. It is impossible to avoid earthquakes as natural hazards; however, we can reduce the resulting disasters using knowledge from the fields of science and engineering. For this purpose, we have to carry out high-cost preparations, which are invisible to the average citizen.

Unfortunately, Japan is also located in a region where earthquakes strike very frequently. In the present paper, we discuss topics regarding education for earthquake disaster mitigation in this decade and describe some limitations when it comes to educating adults.

Due to these limitations, it is necessary to educate children as the potential persons who can help develop new technologies for disaster mitigation, based on scientific, technological, engineering, and mathematical knowledge, referred to as STEM. Education for earthquake disaster mitigation is an important and useful application of STEM.

We discuss the results and the newly recognized problems with respect to education and the goals of earthquake disaster mitigation. Furthermore, we intend to redesign the curriculum, from the viewpoint of STEM, in order to introduce topics related to earthquake disasters to students in primary and secondary schools.

Introduction

Large-scale natural disasters, such as deluges, forest fires, tornadoes, and so on, pose potential risks, which threaten human lives and properties. The mitigation of the damage done by natural disasters and the establishment of a safe society are important motivations for humankind to develop various technologies.

Earthquakes can cause severe and destructive damage to our society; thus, we have to prepare for the possible disasters caused by these earthquakes. For this purpose, we have been continuing efforts to develop various technologies for hardware, such as seismic structures. It is impossible, however, to completely avoid all losses due to earthquakes, even though we can certainly develop ideal earthquake-resistant systems for various structures. It is important, therefore, for individuals to know appropriate behavior in times of earthquakes. For example, people should support each other in the form of public assistance, and they must realize that rescue services are sometimes delayed by the simultaneous occurrence of various events over the widespread area that surrounds the epicenter.

In general, appropriate behavior is learned through education for earthquake disaster mitigation, which is hereafter abbreviated as EEDM. Unfortunately, the research and implementation of EEDM do not always work well. In addition, we struggle with EEDM, as it is gradually becoming clear that there are limitations when it comes to EEDM for adults. Thus, it is now recognized that we have to provide a program of studies for