

A Case Analysis of the Visibility of Sustainability in a TVE Teacher Training Program: Evidence from the Program Curriculum of an HEI

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Abstract. In the post-DESD (Decade of Education for Sustainable Development) era spearheaded by the United Nations, evidence of the progress of Education for Sustainable Development (ESD) integration across disciplines have been recorded. Developed nations have made substantial progress in reorienting their educational systems to reflect ESD. Some developing nations have also begun to integrate ESD into their education systems. Malaysia is one of such nations who has pledged commitment towards the ESD goal and has taken some steps to develop a general philosophy with which higher education institutions can begin to model best practices for ESD. Irrespective of this pledged commitment towards ESD by the Malaysian government through its Ministry of Education, evidence of the extent of ESD integration in Technical and Vocational Education (TVE) teacher training programs have not been reported. As a result, it is difficult to ascertain whether TVE programs were preparing future teachers for ESD. Therefore, this study explores through a Qualitative Documentary Analysis approach, the extent to which ESD is reflected in the TVE program curriculum using a university of education in Malaysia as a case study for the analysis. Findings revealed that some elements of ESD were minutely reflected in the TVE program. Meanwhile, several opportunities to embed ESD content and principles were identified through existing course offerings in the program. Hence it was recommended that TVE institutions begin to model best practices used by western universities in their attempt to embed ESD into TVE programs.

Keywords: curriculum review; education for sustainable development; sustainability integration; teacher education; Technical and Vocational Education.

INTRODUCTION

The Decade of Education for Sustainable Development (DESD) which officially ended in 2014 led to the inauguration of the post-DESD era, whose primary aim is to consolidate the efforts of the United Nations (UN) in further addressing the issues which threaten the viability, future and well-being of people and the planet earth. The DESD specifically sought to integrate the principles, values and practices that makes up Sustainable Development (SD) into all aspect of education and learning with the aim of fostering and

promoting behavioural changes that are crucial to creating a more sustainable future in terms of environmental integrity, economic viability and a just future for present and future generations [1].

Since the beginning of the DESD in 2005, the United Nations Educational, Scientific and Cultural Organization (UNESCO), has been consolidating efforts for Higher Education Institutions (HEIs) as well as other levels of education including Technical and Vocational Education (TVE) to reorient their programs to reflect the principles of SD as well as provide platforms and guidelines

to model their institutions and campuses as “living labs” for SD practices [2, 3].

While exemplary practices of ESD integration have been reported in developed nations such as the United Kingdom, Canada and Australia, the same cannot be said for some developing countries in terms of reorienting their educational programs for ESD. For instance, [4] reports that the University of Bristol (UoB) has made substantial progress in incorporating ESD in a range of programs offered at the university. This achievement was tracked using a methodological approach that saw UoB aligned its conceptualization of SD with that of UNESCO, to cover a range of areas such as social and economic justice, cultural diversity, human rights of future generations and the protection and restoration of the earth’s ecosystems. Findings from the analysis carried out by [4] revealed that ESD formed an integral component of UoB’s curriculum across its faculties. Similarly, using a sustainability audit approach, several UK universities [4, 5, 6, 7, 8, 9] have reported the extent of ESD penetration in their various university curricula, and research literature revealed that although ESD integration was not yet at an optimal level across all disciplines and programs, UK universities have undoubtedly made progress in making ESD an integral part of their curricular across the various Higher Education Institutions (HEI).

In Canada, some progress has been recorded in terms of determining the status of ESD in HEIs in some Canadian provinces [10]. Although some challenges still exist in preparing teachers for ESD, in terms of the lack of leadership, unfavourable view of the role of ESD held by educators and administrators alike, as well as the issue of isolating ESD from the primary field of study [10]. Despite these, notable restructuring of the formal curriculum is being undertaken across HEIs within various programmes.

In Australia, several studies [11, 12, 13, 14] has been undertaken to gauge and measure the perception of students and academics alike about the concept of sustainable development as well as values, behaviours and attitudes that develop from learning about SD. The result inferred from these studies indicates that most academic programs have begun to incorporate ESD or as it is referred to in Australia-education for sustainability (EFS) into their programs and substantial progress is evident in student’s attitudes towards upholding environmental integrity, economic viability and social justice.

Malaysia, on the other hand, has made some progress in terms of committing to the SD agenda. For instance, [15] reviewed Malaysia’s historical prospects towards the evolution of policies with respect to developmental needs and environmental changes that occur locally. The authors were able to juxtapose between the western conceptualization of SD and Malaysia’s and provide an evaluation of the impact of Malaysia’s policies towards promoting a viable environmental society while supporting developmental needs. Similarly, [16] explored the relationship between environmental awareness, knowledge and attitudes of secondary school students in Malaysia and found that there was weak to moderate correlation between environmental awareness, knowledge and attitudes of environmental issues among secondary school students. It was hence concluded that knowledge and awareness of environmental issues may have been developed from teaching, personal study, relations with families and the media.

With regards to ascertaining the ESD status in Malaysia’s TVE teacher education programs, not much has been done. Only a handful of studies came close to potentially exploring ESD in TVE programs. Reference [17] assessed the implementation of ESD practices among polytechnics in Malaysia using the earth charter as a theoretical foundation for the analysis. The mixed method study evaluated the extent to which polytechnics in Malaysia included ESD in their curriculum, research and scholarship, operations, faculty, staff development and rewards, outreach and services, student opportunities and institutional planning. While 361 participants gave their perception on ESD in these areas, the authors found that there was a partial commitment to ESD by polytechnics in Malaysia, integration of ESD into the curriculum was still at the infancy stage and in some cases, were non-existent. Findings also revealed that faculty staffs and academics were not engaged in research and development with regards to ESD.

Several world forums, meetings and consultations have been held in an attempt to develop and produce guidelines for the reorientation of technical and vocational education for sustainability. Early foundations for the call for ESD in TVE can be traced back to the late 1970’s at the Tbilisi conference where it was recommended that “the curricula for those undertaking vocational and technical education should include information about the environmental changes that

result from the sort of work they will do” and “that emphasis should be given in vocational and technical education to: environmental applications for workers in each vocational area; the collective effect of related vocations upon the environment” [18].

Regardless of early attempts to mainstream ESD in TVET teacher education programs, acceptance and action on the Tbilisi recommendation came in August 2007 when UNESCO-UNEVOC assembled another International Consultation on Education for Sustainable Development: TVET Teacher Education towards Sustainability, in Chiang Mai, Thailand, to specifically focus on “identifying ways in which sustainability could be integrated into TVET teacher education (TE) and capacity building programs, and through them, into national TVET systems in general” [19]. This consultation built on recommendations from previously held meetings. For instance, UNESCO’s Second International Congress on Technical and Vocational Education held in Seoul, at the Republic of Korea, in April 1999, where participants recommended that “the role of the TVET teacher remains paramount and that changes were required in terms of training and qualification for the TVET teacher of the twenty-first century, including a balance in training held on campuses and those held in workplaces [20].

Recommendations from the Congress also stipulated that “a new orientation of ‘TVET throughout life’ to meet the new demands of achieving the objectives of a culture of peace, environmentally sound sustainable development, social cohesion and international citizenship of the world” was required [19].

In October 2004, this new orientation of TVET was further reinforced at the UNESCO International Experts Meeting Learning for Work, Citizenship and Responsibility, where the Bonn declaration was formally adopted [21], and where it was argued that

“Since education is considered the key to effective development strategies, TVET must be the master key that can alleviate poverty, promote peace, conserve the environment, improve the quality of life for all and help achieve sustainable development” [22].

This statement was a call and a challenge to reinforce the contributions of TVET to Sustainable development with an impetus to design, adapt, implement, and evaluate approaches for pre-service and in-service TVET teacher education to

address sustainability” [19]. Since then, subsequent forums and meetings have been held with proposals and recommendations produced to further strengthen TVET as a vehicle for social transformation, poverty reduction and to curb equity issues. Although [22] argues that despite all these meetings and forums, the exact nature of teacher education for sustainable development within TVET remains elusive. Hence, it becomes a question of whether TVE teachers are really being prepared to develop capacities for teaching sustainability concepts and themes within the vocational subjects they teach? Or do TVE teacher training program curriculums reflect the principles of sustainability? of course answers to these questions are country-specific and institution based, however in Malaysia, little has been done to explore how technical and vocational teachers are been trained for sustainability teaching.

While ascertaining the extent of ESD integration in TVE programs by measuring the perceptions of students and academics may seem like a viable option to estimate the degree with which TVE programs may have been incorporated with ESD principles, modules and units, it must be noted that people’s perception about SD issues may have been influenced by several factors-including teaching and learning, the media, personal study and relationship with friends and families [16]. If students and academic’s perception are formed from individual study or engagement with the media about the issues which necessitate ESD, then there is the question of whether their program of study contributes in any measure to the perception they formed. It is our understanding that measuring perception is not sufficient to gauge the extent of ESD penetration in a program curriculum owing to the fact knowledge and opinions about a subject can be formed outside of teaching and learning contexts. Perhaps a more viable option would be to analyse and assess the curriculum of the TVE teacher education program and then cross-validate it with those of student’s and academic’s perceptions of ESD. However, this paper reports the extent of ESD integration in the TVE teacher education program using the documentary analysis method as an audit procedure for exploring the scope of ESD content in the program curriculum of the TVE teacher training program in Malaysia. More explicitly, this paper focuses on assessing ESD in the program outcomes, and course modules of the TVE teacher training program of our case HEI in Malaysia.

This study contributes to a more extensive research that aims at assessing ESD integration in TVE teacher training programs in Malaysia. Since the HEI, in this case study, is one of the four institutions in Malaysia offering the Bachelor of Education program in Technical and Vocational Education. This paper reports on the extent of ESD integration in the TVE teacher training program in the HEI. Given the underlying importance of TVE to the attainment of a sustainable future, it becomes pertinent to examine precisely how TVE teachers are being prepared to undertake teaching task with emphasis to sustainability in their specific occupational areas. To achieve this a documentary analysis of the TVE program curriculum was undertaken to explore ESD in the HEI's TVE teacher training program.

METHODOLOGY

This case analysis utilized the Qualitative Documentary Analysis (QDA) approach in ascertaining the extent of ESD penetration in the TVE program curriculum at this HEI in this case analysis. Reference [23] defined "documentary analysis approach as a systematic procedure for reviewing or evaluating documents—printed and electronic (computer-based and web-based) materials'. The process involves that textual data contained in relevant documents be examined and interpreted to elicit meaning, gain understanding about the issue being explored and develop empirical knowledge. Although [23] reports that the documentary analysis approach has often been utilized as a complementary research method to other research methods, several researchers [23, 24, 25] have argued that the QDA is a legitimate research method and should be recognized as such.

Since the modules for a program contained in the program's catalogue is a representative faction of the curriculum that provides information about the essential component of student's learning experiences in such program, it is therefore, a suitable document to be explored for relevant information regarding the sum of learning experiences that students are being provided with, in this case with particular emphasis to SD. Therefore, the program module for the TVE teacher training program was accessed via the HEI's faculty website and downloaded for this analysis.

DATA ANALYSIS

Data was analysed using a sustainability audit framework we developed [26] to ensure that a systematic process of exploration was followed and maintained throughout the analysis. To provide rigour and credibility in the analysis, a Computer Assisted Qualitative Data Analysis Software (CAQDAS) known as Atlas.ti version 7.5 was also employed in analysing the TVE program for ESD. The analysis was specifically aimed at determining the extent of ESD integration in the TVE teacher training program specified in the program learning outcomes, content and core competencies of the TVE teacher training program.

In the audit framework [26], the authors explained the procedures for auditing a curriculum document to determine the extent with which sustainability was reflected. This they did by first separating ESD into its three dimensions namely; environmental, economic and social dimensions, with each operationally defined to help identify aspects of the TVE program that represented any identified sustainability dimension in the TVE program at the HEI being explored. Thereafter we selected commonly used keywords/phrases from the literature to depict each dimension of sustainability and employed these keywords or depictions of these keywords in our exploration in the HEI's TVE program catalogue. We were also open to emerging themes not contained in our audit framework, as including all the possible list of keyword/themes representing each sustainability dimensions in the framework would not be feasible.

The next phase in the analysis utilized [27] approach for categorizing courses for sustainability in engineering education programs. Reference [27] report that courses in engineering education for sustainability can be classified according to one of three approaches namely according to (a) models-standalone or integrated model; (b) approaches-singular, dialectic and consensual approaches; and (c) orientations-disciplinary and interdisciplinary. The authors were interested in identifying whether identified course units in the HEI's TVE program catalogue reflecting some elements of sustainability were categorized according to Arsat's model, approaches and orientations. This was particularly useful to ascertain whether separate course units were addressing ESD in the TVE teacher training program at the HEI or whether ESD elements were integrated into courses, or whether they reflected one, two

or three dimensions of SD in a single course unit or whether the course synopsis described contained any elements of a disciplinary or an interdisciplinary orientation.

Furthermore, the analysis was carried out on the basis of Gregg [25] and Lincoln & Guba's [28] procedures for qualitative documentary analysis with the aid of Atlas.ti version 7.5 software. Preparation for data analysis began with the researchers first exploring the entire HEI's TVE program catalogue, reading through the program outcomes, learning outcomes and descriptions for each course unit. This was done to gain a general sense of what the TVE program at this HEI was designed to provide students with, as well as the competencies students, were expected to develop upon completing the program. Next, we developed an initial coding system to guide the analysis. Eight codes were initially created to help classify and group identified ESD elements in the TVE program catalogue into the SD dimensions they best represented. An additional code emerged during the data analysis process, making the total number of codes to become nine. While four code families were also created to classify these codes according to SD dimensions, SD models, SD approaches, and SD orientations. Results from the analysis are reported using suitable charts and inferences from the quotations linked to each of the already created code, to show their corresponding numerical quantity in the data.

RESULTS AND DISCUSSIONS

This study sought to explore and report the status of ESD in terms of its visibility in the TVE teacher training program at the HEI constituting our case analysis. To achieve this goal, a qualitative documentary analysis approach was utilised, and data was analysed qualitatively by means of a CAQDAS tool – Atlas.ti version 7.5. The study specifically sought to explore ESD in the TVE program and learning outcomes as well as in the content of the TVE the program. Findings from the study are presented and discussed under the following headings.

Overview of ESD in the TVE program

From the data analysed, the TVE program catalogue for the Bachelor of Education Program in Technical and Vocational Education at the HEI in our case analysis, reveals that ESD is barely reflected in the TVE program, ESD elements found

in the data were only implicitly defined in the TVE program catalogue. These identified ESD elements although do not explicitly represent the various SD dimensions, they, however, reflect minute depictions of ESD. For example, a critical analysis of the program's learning outcomes revealed two quotation with the first quotation linked to the code ESD competency where it was stated that graduates are trained to become teachers, trainers and educators who are knowledgeable and skilled in technical and vocational education to become leaders who are responsive and charismatic in leading technical and vocational education for the future. Similarly, the second quotation linked to the codes—economic dimension, social dimension and environmental dimension described one of the outcomes of the TVE program at this HEI as [*...initiating the community to be more aware of the importance of contributing to society and country, especially in cultivating the spirit of patriotism and nationalism that is pertinent to nation building as well as contributing to the overall peace and prosperity of the world*]. In the above description of the quotation which was linked to three SD dimensions, we see keywords and phrases such as nation building, contribution to society and country, patriotism and nationalism, peace and prosperity as depictions or elements of economic, social and environmental sustainability. Although not in its entirety, the program aim above at the very least are opportunities and avenues for TVE educators at the HEI to embed or talk about issues that contributes to nation building (social and economic sustainability), peace and prosperity (social, environmental and economic sustainability), patriotism and nationalism as national security elements which also reflects some aspects of sustainability principles. Although these descriptions do not in any way confirm that these identified elements are approached from a sustainability perspective reflecting the principles of sustainability, they can, however, be described as elements of SD dimensions. Figure 1 shows the overview of the visibility of ESD in the TVE teacher training program at the HEI.

A total of 27 quotations reflecting three SD dimensions (environmental, economic and social dimensions) and an emerged SD dimension (cultural dimension) were linked to the codes initially developed throughout the data analysis process. In the entire TVE program catalogue at this HEI, there were 8 quotations linked to the code social dimension.

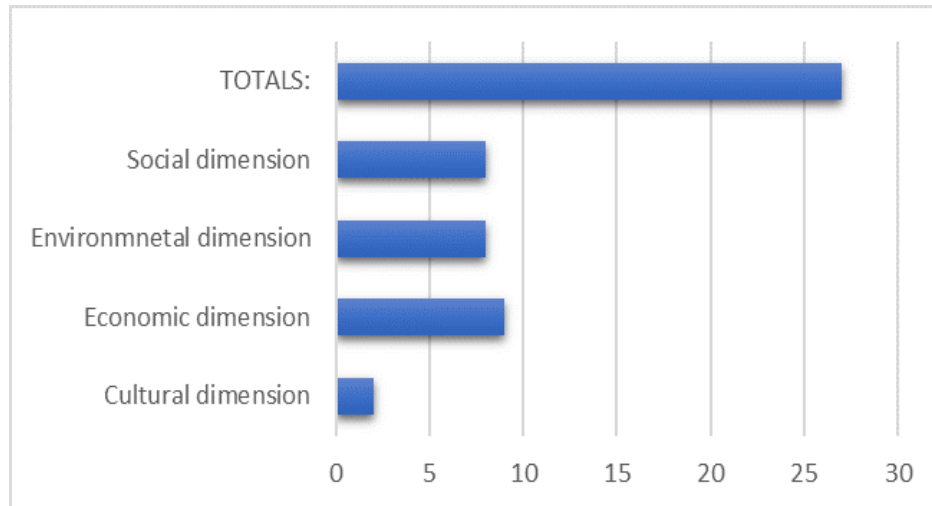


Figure 1 – Overview of the ESD Visibility in TVE Program

For example, quotation 10:10 reads [*...this course discusses stress, types of stress, adapt stress based on the changing of lifestyle, causes of stress, counselling and psychotherapy and physical treatment to avoid stress from everyday life*]. The above quotation linked to a course titled stress management describes exposing students to knowledge of managing stress to improve wellbeing. We see from the synopsis provided in the form of a quotation that the course exposes students to developing knowledge and skills that enhance their health, improve well-being and prepare them for a stressed free life, and ways they can improve functionality. The keywords wellbeing and health depicts the social dimension of sustainability. Other quotations on the social dimension of SD were associated with keywords such as community service, national transformation agenda, safety awareness and maintenance, accident prevention and crisis management.

Similarly, the code environmental dimension was linked to 8 quotations from the analysis. For instance, quotation 10:11 in the analysis reads [*...the course discusses resources and water supply and identifies the importance of clean water resources in life. It also identifies human activities which threaten the quantity and quality of water and the implementation of the best practices to conserve the availability of clean water resources within ecosystem*]. The course titled water conservation was designed to expose students to the knowledge of environmental sustainability with water conservation. Water being a valuable resource and assumed to be abundant in some areas and scarce in some other areas is an essential resource that is crucial not just for the present

but also for future generations. Therefore, knowledge of how to conserve clean quality water in the ecosystem is required. The course sufficiently aims at exposing students to developing such capacities for environmental sustainability by providing them with knowledge of human activities that threaten the quantity and quality of water and best practices for conserving water. Other keywords found in the quotations associated with environmental sustainability include waste management, storage principles, energy conservation in the areas of electrical, mechanical and automotive, wood and metal technology.

The economic dimension of sustainability was more represented in the TVE program curriculum at this HEI than the other two SD dimensions-social and environmental. A total of 9 quotations were linked to the code economic dimension. For example, quotation 10:8 reads [*...this course focuses on entrepreneurship studies and business skills with emphasis on the implementation of interactive learning. The course covers theories, concepts and effective entrepreneurial practices. Students are required to conduct one innovative project and prepare a Business Plan to materialise an innovation*]. Similarly, quotation 10:9 reads [*...this course discusses primary aspects of family financial planning such as savings, insurance, planning of children education and investment strategies to improve the economic status of a family. Emphasis is extended on analysis of family expenses, tax management, financial management before retirement and the importance of time value of money*]. These quotations are linked to two-course units titled “entrepreneurship culture” and “personal financial management” re-

spectively. Analysing the content of these quotations we find keywords such as financial management, investment, business planning, theories of entrepreneurship practices, innovation, savings, time value of money and so on. These reflect some minute factions of economic sustainability, indicating that the TVE program at this HEI exposes students to developing knowledge, skills and capabilities with respect to becoming financially and economically stable. The economic dimension of SD was more reflected in the TVE program at this HEI perhaps for the reason that TVE prepares individuals to become skilled professionals in an occupational area capable of becoming gainfully employed, create jobs while also remaining financially stable and independent [29, 30, 31]. Perhaps this HEI's conception of TVE inspired a more economically prone TVE program.

The cultural dimension of SD, on the other hand, emerged from the data as two quotations were

associated with the emerged code cultural dimension. Quotation 10:20 reads [...the course critically discusses the philosophy and education by analysing it in the context of the development of education in Malaysia. This course also explores and discusses the development of national education as a continuum and continuous ideal based on the interaction and thoughts which have taken place in the country's development process. Philosophy, policies, curriculum and regulations in education are also given an emphasis in order to equip the students with the knowledge and skills to carry out their responsibility effectively in the teaching profession...]. The description above in the quotation reflects Malaysia as a cultural context for learning about the national development of education. This reflects some elements of culture indicating the cultural dimension of sustainability. See Figure 2 for a network view of quotations linked to the SD dimension they best reflected.

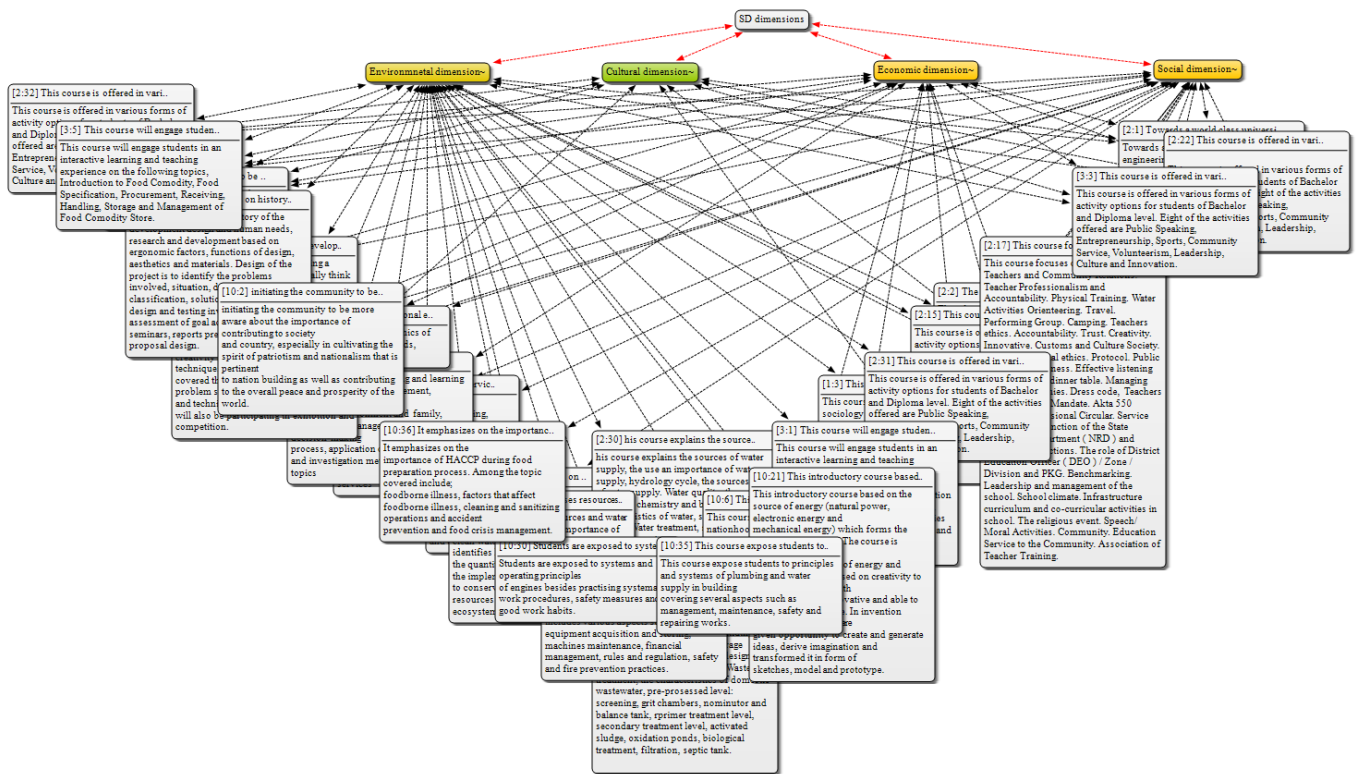


Figure 2 – Network View of Quotations Linked to the Four SD Dimensions

Models, Approaches and Orientations of ESD Content in the TVE program

Figure III shows a chart of the models, approaches and orientations of ESD content in the

TVE teacher training program of our case study based on [27] categorization for classifying courses for sustainability in engineering education.

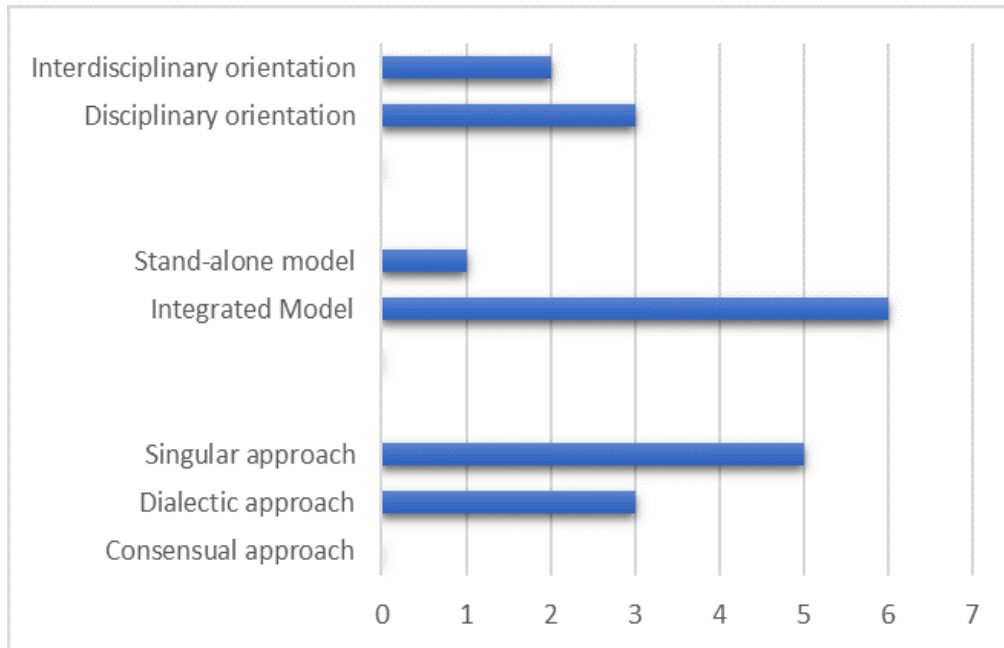


Figure 3 – Models, approaches and Orientations of ESD

Based on [27] descriptions, courses for sustainability in engineering education programs can be classified as models, approaches and orientations. By these, the authors mean that classification of SD courses by models indicates that either a separate course unit (standalone model) has been created to teach SD issues within the program or existing courses have been embedded (integrated model) with topics and concepts reflecting ESD. Researches [27] also explain that SD courses utilizing a singular approach reflect only one dimension of SD, while those using a dialectic approach reflects two SD dimensions and those reflecting three SD dimensions use a consensual approach. Furthermore, courses with a disciplinary orientation were those that were limited in scope to a specific discipline, while those reflecting an interdisciplinary approach are those courses that ideas and perspectives from other disciplines have been brought into the course relating to SD. So, we were interested in identifying the SD courses in the TVE program at this HEI which reflected the models, approaches and orientations described by [27]. From Figure III, we see that 6 courses contained SD elements reflecting the integrated model, while only one introductory course reflected a standalone model where students were exposed to fundamentals of design principles and invention necessary to creating sustainable designs and product that could generate economic value. Similarly, 5 courses reflected a singular approach in the TVE program at this HEI indicating that those courses only re-

flected one dimension of SD, while 3 courses reflected the dialectic approach suggesting that these 3 courses reflected at least two dimensions of SD in the TVE program at the HEI. No course was however found to reflect all three dimensions of SD at the same time indicating that the consensual approach for categorising SD courses was not utilized in the TVE program at this HEI. In Figure III, it can be seen that for ESD orientation in the TVE program at the HEI, only 2 courses in the program reflected an interdisciplinary approach, that is perspectives from other disciplines relative to TVET were only evident two courses. While 3 courses reflected a disciplinary approach, that is ideas and perspectives were directly from TVE.

CONCLUSIONS

In summary, from the data provided by the HEI's program catalogue, the TVE program is structured for a 134-credit unit including university courses, majors and minors. Only 17 credit unit courses contained minute elements of SD, indicating that students are not sufficiently being prepared to undertake teaching task in their occupational and trade areas in relation to sustainability efficiently. We observed that there are deficiencies in the TVE program in the areas of holistic ESD integration into the program, whereas in terms of program strengths, the program is evidently enriched with technical and vocational aspects of learning. Evidently, the practical impli-

cation of this case analysis is that Malaysia's goal of attaining a sustainable human capital may be threatened since the teachers who would train technologists, technicians and craftsmen to carry out SD practices in their workplaces may not have sufficient knowledge of ESD to do so. In addition, if other TVE institutions have similar dispositions regarding the learning experiences they provide students in relation to education for sustainability, then this further reiterates Malaysia's inability to meet its goal of a sustainable human capital as well as its contribution to the SD agenda. Since it is not possible for teachers to give what they do not have [32], TVE teachers who are not trained to embed and teach SD issues in their vocational subjects would not do so upon graduating and taking up job roles as vocational and technical teachers /educators. Therefore, it is highly recommended that the TVE pro-

gram is reoriented by utilizing appropriate models and best practices from other institutions in nations who have successfully refocused their TVE program for Sustainability. This should be done with the attendance of TVE stakeholders to ensure that vivid attention is given to every aspect of the program including the sum of learning experiences that students should undertake. The limitation of this study is that results and findings are bound to a particular case i.e. an HEI which offers the TVE teacher training program at the Baccalaureate level, hence, findings may not apply to other TVE teacher training programs in Malaysia. Therefore, a future direction would be to explore how other HEIs are incorporating ESD in their TVE programs, thereby a foundation with which to make valid recommendations that applies to all TVET institutions will be feasible.

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