Life and Career Skills amongst Technical and Vocational Education and Training (TVET) Students

Nurhanim Saadah Abdullah[a], Sri Sumarwati[b], Mohd Ismail Abd Aziz[c], Azidah Abu Ziden[d], Nordin Abd Razak[e], Siti Afiat Jalil[f], [a,b,c,f]University Tun Hussein Onn Malaysia, Parit Raja 86400, Batu Pahat, Johor, Malaysia, [d,e]University Sains Malaysia, Bukit Panchor 14300, Nibong Tebal, Pulau Pinang, Malaysia, Email: [a]nurhanim@uthm.edu.my, [b*]sri_fatoni78@yahoo.com

Unemployment is one of the problems faced by many countries. A gap between the skills required by employers and possessed by graduates is one of the factors affecting unemployment. In such situations, it is important to investigate whether life and career skills are embedded by higher education institutions, especially regarding technical and vocational education since they provide a semi-skilled and skilled workforce to compete in the global labour market. This study aims to investigate differences between life and career skills amongst technical and vocational education and training (TVET) students in various departments in Malaysia. The quantitative research involves TVET students who enrolled in diploma programs at Polytechnics in Malaysia. There are five departments involved in this study, Electrical Engineering (EE), Mechanical Engineering (ME), Civil Engineering (CE), Commerce (COMM) and Tourism and Hospitality (TH). A total sample of 821 diploma students from three types of polytechnics (Premier, Conventional and METrO) was selected using a disproportionate sampling method. Data was collected using a questionnaire with Likert Scale 5, consisting of 80 items. The collected data was analysed using the Statistical Package from the Social Science (SPSS) program version 21 with an analysis of variance (ANOVA) used as statistical analysis. The finding suggests that students in five different departments possess no difference in productivity and accountability as well as responsibility and leadership skills. Meanwhile, students from five different departments have similarities in terms of initiative, self-direction, social and cross-cultural skills. Various departments have their own way of embedding their teaching and learning process for their students. This study may be used to promote and assist in higher education, specifically polytechnics and industries to improve and enhance TVET programs. Students should be

provided with training and skills to survive and thrive in the real working environment.

Keywords: *21st Century Education, Life and Career Skills, Transferable Skills, TVET.*

Introduction

21st-century skills are defined as a set of skills needed by students in the areas of learning, work and life , which comprise of a variety of skills, including learning and innovation , digital literacy and life and career (Trilling and Fadel, 2009). There are several discussions concerning the transformation of Technical and Vocational Education and Training (TVET) in the 21st century. The main concerns are students and teachers, and the education challenges faced by them in the 21st century. The great challenges to TVET should be addressed to ensure that Malaysia can achieve a developed nation status (Hassan, 2010). The foundation of vocational education has undoubtedly already developed in the country and will enable Malaysia to plan and move towards that goal. However, the challenge that we will face in the coming years, especially in the economic crisis facing the country today, is that vocational educators should be more competitive and sensitive to the changes which are taking place (Yunos et al., 2019). They must have sufficient skills, and other employees or teachers must also be well-educated.

First and foremost, the process of transforming TVET students in the 21st-century requires educators to identify 21st-century learners and their environment. TVET is concerned with the acquisition of knowledge and skills for work. Throughout history, various terms have been used to describe those elements that are perceived to comprise of TVET － vocational and technical education and higher education sectors which have their own goals in producing a human resource for Malaysian development (Malaysian Qualification Agency, 2011). Currently, Malaysia has produced three types of polytechnics, Premier, METrO and Conventional (Department of Polytechnic Studies, 2014). Each type of polytechnic has its purpose and function. However, their main aim is to produce a skilled workforce for Malaysia, which can be achieved by producing graduates at a semi-professional level in Engineering, Commerce, Hospitality, ICT and Services, as well as providing an alternative route to higher education, to public or private institutions for post-secondary students (Department of Polytechnic Studies, 2014).

TVET's goal is to become a skilled and semi-skilled workforce, whereby the skills to obtain jobs and live amidst 21st-century challenges are balanced between life and career. Skill gaps which exist between employer requirement and the skills possessed by graduates or job seekers are the concerns which have been consistently raised around the world (Husain et al., 2014; Robinson, 2000; Zaharim et. al., 2009). Findings from statistical reports regarding the

unemployment rate also prove that the issue of unemployment needs to be seriously addressed to produce future workforce (International Labour Organisation, 2014; Statistician Malaysian Department of Statistics, 2014). When talking about studying and graduating, graduates' biggest aspiration is to become employed. Due to the assumption that every graduate will be employed, each educational institution needs to work hard so that this assumption can be realized. However, the current economic climate does not promise easy realisation of this ideal.

The real problem is that employers find it difficult to find workers who have the skills or job readiness that can help them to fit into and remain in the work environment (Robinson, 2000). The ideal perception of students studying in higher education institutions is that they will obtain a suitable job upon graduation. This may come true if, during learning, students are nurtured with life and career skills that enable future work survival. Therefore, the research questions of this study are as follows:

i.   Is there any difference between flexibility and adaptability skills amongst TVET students enrolled in various courses within different polytechnics departments?
ii. Is there any difference between initiative and self-direction skills amongst TVET students enrolled in various courses within different polytechnics departments?
iii. Is there any difference between social and cross-cultural skills amongst TVET students enrolled in various courses within different polytechnics departments?
iv. Is there any difference between productivity and accountability skills amongst TVET students enrolled in various courses within different polytechnics departments?
v.   Is there any difference between responsibility and leadership skills amongst TVET students in various courses within different polytechnics departments?

Life and Career Skills

Living in the 21st century urges people to have current skills, especially higher education students who think that ideally, they will be employed upon graduation. If so, students should take the initiative to enhance and learn skills needed to be employed. Life and career skills comprise of knowledge needed to expand opportunities in gaining employment. Life and career skills consist of what most employers consider as employability skills but from a broader perspective. These skills cater for more than employability skills, they include soft skills, technical skills and academic skills to survive in the 21st century. The new learning paradigm is the formulation of essential 21st-century skills with the direct aim of teaching students to learn and work well with 21st-century skills. According to the new learning paradigm, in order to produce job-ready students, the following four domains need to be taught to students. Each domain has specific elements that need to be emphasised in each teaching and learning process.

Table 1: An example of each element in the domain of a New Learning Paradigm

Domain	Example
Traditional Core Skills (TCS)	Reading, writing, and arithmetic or basic literacy and numeracy.
Learning and Innovation Skills (LIS)	Critical thinking, problem solving and creativity
Career and Life Skills (CLS)	Flexibility, adaptability, initiative, teamwork and leadership
Digital Literacy Skills (DLS)	Technological proficiency, digital fluency, computing, media and information literacy

This study only emphasises life and career skills. This domain has five important skills that contribute to the answers of research questions and fulfil the study objectives .

Methodology

Research Design

A quantitative approach using a cross-sectional survey design is employed to determine life and career skills from respondents. This research design is usually used by researchers due to its advantage in providing a current overview of variables that become the focus of the study (Lim, 2007). Hence, this research design guides the researcher to systematically collect data using a questionnaire as an instrument towards a specific population in which the respondents are students from three types of polytechnics in Malaysia for a specific purpose of determining life and career skills of   polytechnic students. The data analysis commenced when all questionnaires were returned to the researcher. Data was analysed using a Statistical Package for version 21 of the Social Science (SPSS) program with Analysis of variance (ANOVA) used as statistical analysis.

Population and Sampling

This study involves TVET students who enrolled in diploma programs in three types of polytechnics in Malaysia. Currently, there are a total of 33 established polytechnics in Malaysia. These are divided into three different types, which include Premier , Conventional and METrO (Maximising Education and Training Opportunities) polytechnics. To find the

sample size, this study applies stratified random sampling strategy, which is suitable for those researchers who are interested in particular groups or strata within the population (Laerd, 2012). A total sample of 821 diploma students from three types of polytechnics (Premier, Conventional and METrO) was selected using a disproportionate sampling method.

Research Instrument and Validation

 Questionnaires were administered to encourage respondents to respond regarding variables inspected, which include the elements of 21st-century life and career skills. The contents of the questionnaire were checked by an expert beforehand, whereby he or she provided comments for improvements to be made to achieve desired objectives. A total number of 250 polytechnic students from several polytechnics in Perak, Malacca, Perlis, and Selangor were involved in the pilot study that was carried out to test the instrument. Several items were deleted because the Cronbach Alpha value was lower than 0.7. The total initial items were 94 and after deleting 14 items, the total finalised items consisted of 80 items.

Findings

A one-way between-group analysis of variance (one-way ANOVA) was conducted to explore the difference between departments, where students had both life and career skills. The total respondents involved in this study were 475 (57.9%) male and 346 (42.1%) female students. A total of 214 (26.1%) of the respondents were from Premier polytechnic (PUO) that consist of 168 (20.5%) male and 46 (5.6 %) female students. There were five departments involved in this study, including   Electrical Engineering (EE), 376 (45.8%); Mechanical Engineering (ME), 115 (14.0%); Civil Engineering (CE), 155 (18.9%); Commerce (COMM), 153 (18.6%) and Tourism and Hospitality 22 (2.7%).

i.   *Is there any difference between flexibility and adaptability skills amongst TVET students enrolled in various courses within different polytechnic departments?*

Levene's test for homogeneity of variance was conducted and the Sig. value was $p = 0.508 > 0.05$ as shown in Table 2. Therefore, there was no significant difference between group variances. Table 3 shows that there was a statistically significant difference at the $p < 0.05$ level in the score for the five departments regarding the skill elements of flexibility and adaptability $F (4, 816) = 3.514$, $p = 0.007$. Post-hoc comparison using Tukey HSD test (refer to Table 4) indicates that the mean between COMM and EE is found to have a significant difference (Mdiff = 0.14602, $p = 0.033$) and COMM and ME were also found to have significant differences (Mdiff = 0.19219, $p = 0.027$) in the skill dimensions of flexibility and adaptability.

Table 2: Homogeneity Test of Variances for Flexibility and Adaptability skills

Levene Statistic	df1	df2	Sig.
.827	4	816	.508

Table 3: ANOVA table for Flexibility and Adaptability skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.928	4	.982	3.514	.007
Within Groups	228.012	816	.279		
Total	231.940	820			

Table 4: Post-hoc test using Tukey HSD for Flexibility and Adaptability skills

(I) Department code for student	(J) Department code for student	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
EE	ME	-.04617	.05633	.925	-.2002	.1078
	CE	.06416	.05046	.709	-.0738	.2021
	COMM	.14602*	.05069	.033	.0074	.2846
	TH	.21365	.11595	.350	-.1033	.5306
ME	EE	.04617	.05633	.925	-.1078	.2002
	CE	.11033	.06506	.437	-.0675	.2882
	COMM	.19219*	.06524	.027	.0138	.3705
	TH	.25982	.12301	.216	-.0765	.5961
CE	EE	-.06416	.05046	.709	-.2021	.0738
	ME	-.11033	.06506	.437	-.2882	.0675
	COMM	.08186	.06024	.654	-.0828	.2466
	TH	.14949	.12043	.727	-.1798	.4787
COMM	EE	-.14602*	.05069	.033	-.2846	-.0074
	ME	-.19219*	.06524	.027	-.3705	-.0138
	CE	-.08186	.06024	.654	-.2466	.0828
	TH	.06763	.12053	.981	-.2619	.3971
TH	EE	-.21365	.11595	.350	-.5306	.1033
	ME	-.25982	.12301	.216	-.5961	.0765
	CE	-.14949	.12043	.727	-.4787	.1798
	COMM	-.06763	.12053	.981	-.3971	.2619

*. The mean difference is significant at the 0.05 level.

ii.   *Is there any difference between initiative and self-direction skills among TVET students enrolled in various courses within different polytechnic department?*

Table 5 shows that the homogeneity of variances is contravened, so the correction of the degree of freedom was performed using Brown-Forsythe with p = 0.025 (refer to Table 7). The ANOVA test in Table 6 shows significant differences in initiative and self-direction amongst students studying in different courses F (4, 509.316) = 2.406, p = 0.048). A post-hoc test using Tamhane Multiple Comparison procedure (refer to Table 8) was conducted, and the only meaningful difference was found between EE and TH (Mdiff = 0.26626, p = 0.028).

Table 5: Homogeneity Test for Variances between Initiative and Self-direction skills

Levene Statistic	df1	df2	Sig.
2.643	4	816	.033

Table 6: ANOVA table for Initiative and Self-direction skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.029	4	.757	2.406	.048
Within Groups	256.814	816	.315		
Total	259.843	820			

Table 7: Robust test of Equality means for Initiative and Self-direction Skills

	Statistic[a]	df1	df2	Sig.
Welch	3.386	4	138.470	.011
Brown-Forsythe	2.804	4	509.316	.025

a. Asymptotically F distributed

Table 8: Post-hoc test using Tamhane Multiple Comparison for Initiative and Self-direction skills

(I) Department code for student	(J) Department code for student	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
EE	ME	.06977	.05639	.914	-.0898	.2294
	CE	.11343	.05783	.407	-.0498	.2767
	COMM	.10355	.05260	.401	-.0448	.2519
	TH	.26626*	.08132	.028	.0189	.5136
ME	EE	-.06977	.05639	.914	-.2294	.0898
	CE	.04366	.06952	.999	-.1526	.2399
	COMM	.03379	.06523	1.000	-.1505	.2180
	TH	.19650	.09001	.299	-.0701	.4631
CE	EE	-.11343	.05783	.407	-.2767	.0498
	ME	-.04366	.06952	.999	-.2399	.1526
	COMM	-.00987	.06648	1.000	-.1974	.1776
	TH	.15284	.09092	.652	-.1158	.4214
COMM	EE	-.10355	.05260	.401	-.2519	.0448
	ME	-.03379	.06523	1.000	-.2180	.1505
	CE	.00987	.06648	1.000	-.1776	.1974
	TH	.16271	.08769	.524	-.0984	.4238
TH	EE	-.26626*	.08132	.028	-.5136	-.0189
	ME	-.19650	.09001	.299	-.4631	.0701
	CE	-.15284	.09092	.652	-.4214	.1158
	COMM	-.16271	.08769	.524	-.4238	.0984

iii. *Is there any difference between social and cross-cultural skills amongst TVET students enrolled in different courses within various polytechnic departments?*

Levene's test for homogeneity of variance was conducted, and the Sig. value is p = 0.111 > 0.05 as shown in Table 9. Therefore, the homogeneity of variance assumption is not contravened, and it can be concluded that there is no significant difference between group variances. For social and cross-cultural skills and respondent department variables, there is a statistically significant difference at the p > 0.05 level in the score for the five departments regarding initiative and self-direction: F (4, 816) = 4.108, p = 0.003 as shown in Table 10.

Post-hoc comparison using Tukey HSD test (refer to Table 11) indicates that the mean between CE and EE is found to have a significant difference (Mdiff = 0.15695, p = 0.043) and CE and COMM were also found to have significant differences (Mdiff = 0.23738, p = 0.004) in the social and cross-cultural skill dimension.

Table 9: Test of Homogeneity of Variances for Social and Cross-cultural skills

Levene Statistic	df1	df2	Sig.
1.887	4	816	.111

Table 10: ANOVA table for Social and Cross-cultural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.698	4	1.424	4.108	.003
Within Groups	282.942	816	.347		
Total	288.639	820			

Table 11: Post-hoc test using Tukey HSD for social and cross-cultural skills

(I) Department code for student	(J) Department code for student	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
EE	ME	-.02091	.06275	.997	-.1925	.1506
	CE	-.15695*	.05621	.043	-.3106	-.0033
	COMM	.08043	.05647	.612	-.0739	.2348
	TH	.20860	.12916	.488	-.1445	.5617
ME	EE	.02091	.06275	.997	-.1506	.1925
	CE	-.13604	.07247	.331	-.3342	.0621
	COMM	.10135	.07267	.631	-.0973	.3000
	TH	.22952	.13703	.450	-.1451	.6041
CE	EE	.15695*	.05621	.043	.0033	.3106
	ME	.13604	.07247	.331	-.0621	.3342
	COMM	.23738*	.06711	.004	.0539	.4208
	TH	.36555	.13416	.051	-.0012	.7323
COMM	EE	-.08043	.05647	.612	-.2348	.0739
	ME	-.10135	.07267	.631	-.3000	.0973
	CE	-.23738*	.06711	.004	-.4208	-.0539
	TH	.12817	.13427	.875	-.2389	.4952
TH	EE	-.20860	.12916	.488	-.5617	.1445
	ME	-.22952	.13703	.450	-.6041	.1451
	CE	-.36555	.13416	.051	-.7323	.0012
	COMM	-.12817	.13427	.875	-.4952	.2389

*. The mean difference is significant at the 0.05 level.

iv. *Is there any difference between productivity and accountability skills amongst TVET students enrolled in various courses within different polytechnic departments ?*

Table 12 shows that the homogeneity of variances is contravened, so the correction of the degree of freedom was performed using Brown-Forsythe with p = 0.147 (refer to Table 14). The ANOVA test in Table 13 shows no significant differences in productivity and accountability between students studying in different courses $F_{(4, 448.265)} = 1.485$, p = .205. The post-hoc test was not necessary since there is no significant difference between the five departments regarding the dimensions of productivity and accountability .

Table 12: Test of Homogeneity of Variances for Productivity and Accountability skills

Levene Statistic	df1	df2	Sig.
2.416	4	816	.047

Table 13: ANOVA table for Productivity and Accountability skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.048	4	.512	1.485	.205
Within Groups	281.420	816	.345		
Total	283.468	820			

Table 14: Robust Test of Equality of means for Productivity and Accountability

	Statistic[a]	df1	df2	Sig.
Welch	1.835	4	136.124	.126
Brown-Forsythe	1.708	4	448.265	.147

a. Asymptotically F distributed.

v. *Is the*re any difference between responsibility and leadership skills amongst TVET students in various courses within different polytechnic departments ?

Table 15 shows that the homogeneity of variances is contravened, so the correction of the degree of freedom was performed using Brown-Forsythe with p = 0.010 (refer to Table 17). The ANOVA test in Table 16 shows significant differences regarding responsibility and leadership skills between students studying various courses $F_{(4, 419.575)} = 3.076$, p = 0.016. The post-hoc test using Tamhane Multiple Comparison procedure (refer to Table 18) was conducted and the only meaningful difference was found between COMM and CE (Mdiff = 0.20773, p = 0.018) concerning the dimension of responsibility and leadership skills .

Table 15: Test of Homogeneity of Variances for Responsibility and Leadership skills

Levene Statistic	df1	df2	Sig.
2.418	4	816	.047

Table 16: ANOVA table for Responsibility and Leadership skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.742	4	.935	3.076	.016
Within Groups	248.189	816	.304		
Total	251.931	820			

Table 17: Robust Test of Equality of means for Responsibility and Leadership skills

	Statistic[a]	df1	df2	Sig.
Welch	3.052	4	134.482	.019
Brown-Forsythe	3.367	4	419.575	.010

a. Asymptotically F distributed.

Table 18: Post-hoc test using Tamhane Multiple Comparisons for Responsibility and Leadership skills

(I) Department code for student	(J) Department code for student	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
EE	ME	.00797	.05601	1.000	-.1506	.1666
	CE	-.06883	.05740	.928	-.2309	.0933
	COMM	.13891	.05142	.071	-.0062	.2840
	TH	.11429	.09375	.931	-.1731	.4017
ME	EE	-.00797	.05601	1.000	-.1666	.1506
	CE	-.07680	.06976	.958	-.2737	.1201
	COMM	.13094	.06492	.368	-.0525	.3143
	TH	.10632	.10179	.973	-.1980	.4106
CE	EE	.06883	.05740	.928	-.0933	.2309
	ME	.07680	.06976	.958	-.1201	.2737
	COMM	.20773*	.06613	.018	.0212	.3942
	TH	.18312	.10256	.578	-.1228	.4890
COMM	EE	-.13891	.05142	.071	-.2840	.0062
	ME	-.13094	.06492	.368	-.3143	.0525
	CE	-.20773*	.06613	.018	-.3942	-.0212
	TH	-.02462	.09933	1.000	-.3234	.2742
TH	EE	-.11429	.09375	.931	-.4017	.1731
	ME	-.10632	.10179	.973	-.4106	.1980
	CE	-.18312	.10256	.578	-.4890	.1228
	COMM	.02462	.09933	1.000	-.2742	.3234

*. The mean difference is significant at the 0.05 level.

Discussion

The findings for this final research question show that there is a significant difference between various courses enrolled by students regarding flexibility and adaptability skills, initiative and self-direction, as well as social and cross-cultural skills. The findings also show that there is no significant difference concerning productivity and accountability skills, or responsibility and leadership skills within courses enrolled by polytechnic students. This study focuses on a range of departments of polytechnic students which represent the courses enrolled in by

students. Based on the analysis, there are five departments involved in this study, including Electrical Engineering (EE), Mechanical Engineering (ME), Civil Engineering (CE), Commerce (COMM) and Tourism and Hospitality (TH).

The findings suggest that students in the five departments possess no difference in productivity and accountability skills, or responsibility and leadership skills. Meanwhile, students from the five different departments have similarities in terms of Initiative and Self-direction and Social and Cross-cultural skills. Different departments have their own way of embedding their teaching and learning process within their students. A study conducted by (Gut, 2011), shows that life and career skills have been included 75 times by pre-service teachers during 167 lessons. In the present study, the most frequent skills identified are productivity and accountability . The other skills identified include are flexibility and adaptability , which are included 14 times in their lessons, followed by social and cross-cultural skills and responsibility and leadership skills, which are included 10 times. Initiative and self-direction skills are also included eight times in their lessons. The study shows that pre-service teachers have embedded life and career skills into lessons to strengthen their students' growth in the 21st century. The study emphasises that embedding a combination of life and career skill elements in each lesson can help student growth. Therefore, the current study reveals that the students in the five departments also possess life and career skills through the process of learning in their individual departments despite the mean differences in life and career skill between each department.

Conclusion

Throughout this study, the findings prove that TVET students in Premier Polytechnic have higher life and career skills compared to students in Conventional and METrO polytechnics. As discussed earlier, this may be due to initial entry requirements for diploma programs that are different from Premier, Conventional and METrO polytechnics. Premier puts higher requirements than both Conventional and METrO polytechnics on students. Therefore, it can be concluded that TVET students learning in Premier, Conventional and METrO polytechnics possess different levels of life and career skills even though they study the same diploma courses. Higher education institutions must provide more effort to improve 21st-century skill sets of students to help them to become successfully employed . This study may be used to promote and assist with higher education, specifically polytechnics and industries to improve and enhance TVET programs. As clients, students should be equipped with appropriate training and skills to survive in the real working environment. They need to be physically and mentally prepared by embedding life and career skills within the curriculum in each program offered by the polytechnic. By doing so, both students and polytechnics will benefit when graduates become employed and are in demand by employers. Therefore, to produce a 21st-century workforce, educational institutions must thoroughly understand current skill

requirements , especially life and career skills, and subsequently nurture them to produce a workforce which meets employers demand. This study can contribute in helping policymakers, program developers and communities gain information regarding the quality of programs offered; specifically, Diploma programs in polytechnics since an estimated 46% of jobs that will be created in the year 2020 require vocational or diploma qualifications as highlighted in the National Graduate Employability blueprint 2012-2017 which was adapted from the Economic Transformation Program 2010 (Ministry of Higher Education, 2012). This study helps to widen the scope for TVET education by promoting student skills that are needed to prepare a career after completing their polytechnic studies . Finally, by profiling life in the 21st-century life and the career skills of polytechnic students in Malaysia, it is hoped that this study can provide insights to decision-makers in the Malaysian Higher Education to minimise the issues faced by employers in the workplace and to strengthen TVET programs.

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