

Measuring Technical and Vocational Education and Training (TVET) Teacher's Technical Competency and the Development of Programme-Specific-Directory

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Abstract--- Relevant competencies among Technical and Vocational Education and Training (TVET) instructors is important in the current development of education that necessitates the pedagogical skills and knowledge in the real world. The primary aim of this study is to (1) determine the relationship between Teaching Method (TM), Curriculum Module (CM), Learner's Knowledge (LK) with Pedagogical Skills and Knowledge (PSK), and (2) identify the mean differences of Teaching Method, Curriculum Module, and Learner's Knowledge with race, gender, age, industry involvement, instructor's highest academic, and types of position. Data is collected from a survey to 106 instructors from eight Technical Institutions. Findings analysed using SPSS v21 indicated that there is significant difference between TM with PSK ($r=0.595$, $p<0.01$), CM with PSK ($r=0.435$, $p<0.01$), and LK with PSK ($r=0.373$, $p<0.01$). It is highlighted from ANOVA findings that there is a mean difference significant (0.021) between PSK with gender, no mean difference significant (0.0180) between PSK with age, no mean difference significant (0.522) between PSK with industry involvement, and no mean difference significant (0.979) between PSK with instructor's highest academic ($p>0.05$). This study contributes towards the development of Programme-Specific-Directory amongst TVET instructors to be utilized in aligning constructively the schedule of curriculum in their particular technical institutions.

Keywords--- Programme-Specific-Directory, TVET, Competency

I. INTRODUCTION

Competency, according to Mulcahy (2000); Volmari (2009); Palaniappan (2003); Mulder (2001); Shippmann (2000); Bunning (2006); and Grosch (2017), is as an indicator of an individual's level of capacity, capability, and performance in duties/jobs; competency is necessary for an organization to be more competitive. Guthrie (2010); Brewer (2015); Axman (2015); and Drummer (2018) stated that a TVET teacher is someone who has been trained

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and is competent in the field and in the delivery and evaluation of teaching; has the ability to demonstrate skills; and continuously develops and progresses their career by gaining more knowledge and skills in the field.

The quality of education is influenced by the increase in competency of teachers (Hattie, 2015; Bourgonje & Tromp, 2011), it became one important part in improving the competence of teachers, especially vocational teachers. Qualities and qualifications in the field of TVET is a topic that is often discussed to develop and improve vocational education (UNEVOC, 2018). The ability and competence of educators expected to continue to grow and keep up with changes so rapidly, both in the areas of curriculum, learning, teaching methods, and the implemented evaluation process (Harmond, et all., 2019; Bidabadi, et all. 2016).

Specific focus has been given towards the development of 4IR in order to create a competitive labor force globally. To support this revolution, cooperation has been established between the Center for Skills, Polytechnics, Universities and Employers' Organizations with a total allocation of RM75 million (TVET Transformation, 2017), in line with the aspiration towards a high- income developed nation by providing training to 300,000 people from various groups until 2025.

Vocational teachers are effective in carrying out their duties must have competence in the learning process. Competence which is the ability of individuals to use "knowledge how, skills and knowledge to demands of work (Mulder, 2017) states that the competencies that must be owned by educators must meet the following criteria: Competency exists in a real-life setting, competence it is on condition that the real can be observed; Competency follows a progression from simple to complex, Competence was tiered of work the simple to the complex; Competency is based on a set of resources (Siarova, et all, 2017). Competence is based on a set of resources; Competency is based on the ability to Mobilize resources in situations requiring professional action, Competence is based on the ability to use the resources to support its performance; Competency is part of intentional practice, competence is part of an intensive practice; Competency is demonstrated as a successful, effective, efficient, recurrent performance, competence can demonstrated as successfully, effectively, efficiently; and Competency is a project, an ongoing pursuit, Competence is a kind of work that develop and continue. All these criteria should be interrelated with each other, it can support the improvement of the competence of teachers in the implementation of vocational learning (OECD, 2010).

The economic agenda outlined in the 11th Malaysia Plan expects employment opportunities in various sectors with the target of 60% of those jobs requiring TVET-related skills. Recognizing these needs and interests in building capacity among local people, and in support of realizing the status of developed and high-income countries by 2020, the Ministry has devised and implemented the Strategic Plan of Transformation in Vocational Education (SPTVE) in 2011 and further intensified when placed into System Aspiration in order to access to quality education in SPTVE 2011-2025.

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The purpose of this study was to investigate relevant competencies among TVET instructors in the current development of education pertaining to Pedagogical Skills and Knowledge in the real world.

Specifically, the study seeks to:

1. Determine the relationship between Teaching Method (TM), Curriculum Module (CM), Learner's Knowledge (LK) with Pedagogical Skills and Knowledge (PSK), identify the mean differences of Pedagogical Skills and Knowledge with race and gender.
2. This study employs quantitative method to provide a better understanding of the research problem and research question. Research Objective 1 deals with determining the relationship between Pedagogical Skills and Knowledge among TVET teachers; is identified using Pearson Correlation, and Research Objective 2 deals with identifying the mean differences of Pedagogical Skills and Knowledge with race and gender; is identified using ANOVA

Empirical data were collected in this study by using a set of questionnaires. A total number of 130 respondents from eight Technical Institutions completed questionnaires. Selected skills institution in different areas of Malaysia operating mechanical programs were invited to participate in the survey.

II. METHODOLOGY

This study employs quantitative method to provide a better understanding of the research problem and research question. Research Objective 1 deals with determining the relationship between Pedagogical Skills and Knowledge among TVET teachers; is identified using Pearson Correlation, and Research Objective 2 deals with identifying the mean differences of Pedagogical Skills and Knowledge with race and gender; is identified using ANOVA.

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III. RESULTS AND DISCUSION

i. To determine the relationship between Teaching Method (TM), Curriculum Module (CM), and Learner's Knowledge (LK) with Pedagogical Skills and Knowledge (PSK)

Table 1: Correlation Variable with Pedagogical Skills and Knowledge

Variable	<i>r</i>	<i>p</i>
Teaching Method	0.595**	0.000
Curriculum Module	0.435**	0.000
Learner's Knowledge	0.373**	0.000

Table 1 shows the connections between variables in this research, which involved the correlation between Teaching Methodology, Curriculum Module, students' Knowledge with the Pedagogical Skills and their knowledge.

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The results of this study showed that all the variables involved are in the moderate and strong connection according to the table of correlation strength by Albert and Davis (1971).

The results indicated that there was a positive significant correlation between Teaching Methodology with Pedagogical Skills and knowledge ($r = 0.595$, $p < 0.01$). Based on the correlation strength of Albert and Davis's (1971) the link between Teaching Methodology with Pedagogical Skills and knowledge is strong. Positive correlations indicated that there was a positive correlation which showed the higher level of teaching methodology resulting the higher level of pedagogical skills and the knowledge of the respondents. The results also showed that the respondents who regularly implementing the Teaching Methodology activities would feel the importance of contributing Pedagogical skills and Knowledge towards the teacher's success.

Furthermore, there was a positive significant correlation between the Curriculum Module and Pedagogical Skills and knowledge that supported by coefficients correlation ($r = 0.435$, $p < 0.01$). Based on the strength correlation by Albert and Davis's (1971) relationship between the Curriculum Module and Pedagogical Skills and knowledge was moderate. Positive correlations indicate that there is a positive correlation that the higher the Curriculum Module level by adding the new material and information in the module resulting the higher the level of Pedagogical Skills and Knowledge of respondents. The findings of this research showed that the respondents who regularly improve the basic information content in the modules used in the classroom also feel that the contribution of Pedagogical skills and Knowledge to the success of a teacher is significant.

Similarly, there was a significant relationship between students' knowledge with the Pedagogical Skills and Knowledge with correlation coefficients ($r = 0.373$, $p < 0.01$). Based on the strength correlation by Albert and Davis's (1971) the value of r indicated that the relationship between students' knowledge and Pedagogical Skills and Science is a moderate positive relationship. The results showed that respondents who frequently allowed students to voice their own assessment are respondents who feel that Pedagogical skills and Knowledge are both significant to a teacher's success.

ii. To identify the mean differences of Teaching Method (TM), Curriculum Module (CM), and Learner's Knowledge (LK) with race and gender.

Table 2(a): ANOVA Descriptive Schedule on Pedagogical Skills and Knowledge (Gender)

	N	Min	Standard Deviation	Standard Error
Female	93	4.1275	.65625	.06805
Male	13	4.5824	.66102	.18333
Total	106	4.1833	.67064	.06514

Table 2(b): ANOVA Descriptive Schedule on Pedagogical Skills and Knowledge (Gender)

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	The sums of The square	df	Average Squared	F	Sig.
Between Group	2.360	1	2.360	5.472	.021
In Group	44.864	104	.431		
Total	47.225	105			

Tables 2 (a) and 2 (b) show the results for the ANOVA analysis and the results show that there are significant mean values between the groups. It can be seen that the significant value is 0.021 which is less than 0.05 ($p < 0.05$), so there is a significant difference in the implementation of pedagogical skills and knowledge between Men and Women. The Female Group felt the importance of higher contributions to pedagogical skills and knowledge (Min = 4.1275) compared to the men's group (Min = 4.5824)

Table 3(a): ANOVA Descriptive Schedule on Pedagogical Skills and Knowledge (Age)

	The sums of The square	df	Average Squared	F	Sig.
Between Group	3.405	5	.681	1.554	.180
In Group	43.819	100	.438		
Total	47.225	105			

Table 3 shows the results of the ANOVA analysis it shows no significant mean value differences between groups. It can be seen that the significance value is 0.180 which is greater than 0.05 ($p > 0.05$), so there is no significant difference in the importance of pedagogical skills and knowledge between age-level. All groups feel that pedagogical skills and knowledge are important.

IV. CONCLUSION

TVET teacher competence development could be a concept in providing contribution towards skills development and TVET instructors. As a support in the development of TVET teacher competence, teachers must be prepared to teach. Preparations that need to be undertaken by TVET teachers start learning tools tailored to the curriculum, teaching methods, knowledge and competence especially pedagogy. This study contributes towards the development of Programme-Specific-Directory amongst TVET instructors to be utilized in aligning constructively the schedule of curriculum in their particular technical institutions.

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REFERENCES

- [1] Axmann, M., Rhoades, A., Nordstrum, L., La Rue, J.A. and Byusa, M., 2015. Vocational teachers and trainers in a changing world: the imperative of high-quality teacher training systems (No. 994879203402676). International Labour Organization

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- [2] Bidabadi, N. S., Isfahani, A. N., Rouhollahi, A., & Khalili, R. (2016). Effective teaching methods in higher education: requirements and barriers. *Journal of advances in medical education & professionalism*, 4(4), 170.
- [3] Bloom, J. A., Cox, I. J., Miller, M. L., Wu, M., Lin, C. Y., & Lui, Y. M. (2001). U.S. Patent No. 6,282,300. Washington, DC: U.S. Patent and Trademark Office
- [4] Bourgonje, P., & Tromp, R. (2011). *Quality educators: An international study of teacher competences and standards*. Oxfam Novib
- [5] Brewer, L. and Comyn, P., 2015. Integrating core work skills into TVET systems: Six country case studies. Geneva: ILO [International Labour Organization]. Available online also at: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_470726.pdf [accessed in Jakarta, Indonesia: December 27, 2018]
- [7] Bunning, F. and Zhao, Z. Q. (2006). TVET Teacher Education on the Threshold of Internationalisation. UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training.
- [8] Chen, S., Mulgrew, B., & Grant, P. M. (1993). A clustering technique for digital communications channel equalization using radial basis function networks. *IEEE Transactions on neural networks*, 4(4), 570-590.
- [9] Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B. and Osher, D., 2019. Implications for educational practice of the science of learning and development. *Applied Developmental Science*, pp.1-44.
- [10] Davis J.A (1971). "Elementary survey analysis". Englewood, NJ: Prentice-Hall.
- [11] Drummer, J., Hakimov, G., Joldoshev, M., Köhler, T. and Udartseva, S. eds., 2018. *Vocational Teacher Education in Central Asia*. Springer International Publishing.
- [12] Duncombe, J. U. (1959). Infrared navigation—Part I: An assessment of feasibility. *IEEE Trans. Electron Devices*, 11(1), 34-39.
- [13] Guthrie, H. (2010). "Professional development in the vocational education and training workforce". National Centre for Vocational Education Research, Australia.
- [14] Grosch, M., 2017. Developing a competency standard for TVET teacher education in ASEAN countries. *Jurnal Pendidikan Teknologi dan Kejuruan*, 23(3), pp.279-287
- [15] Hattie, J., 2015. The applicability of Visible Learning to higher education. *Scholarship of Teaching and Learning in Psychology*, 1(1), p.79.
- [16] Mulder, M. (2001). Competence development - some back- ground thoughts. The "Journal of Agricultural Education and Extension" 7(4): 147–158.
- [17] Mulder, M. (2017). Competence and the Alignment of Education and Work. In *Competence-based Vocational and Professional Education* (pp. 229-251). Springer, Cham.
- [18] Mulcahy, D. (2000). Turning the contradictions of competence: competency-based training and beyond. "Journal of Vocational Education & Training" 52(2): 259–280
- [19] Palaniappan, R. (2003). "Competency Management: A Practitioners's Guide". Percetakan Suma, Kuala Lumpur.
- [20] OECD Publishing, 2010. *OECD Reviews of Vocational Education and Training Learning for Jobs*. OECD Publishing.
- [21] Siarova, H., Sternadel, D., & Masidlauskaite, R. (2017). Assessment practices for 21 st century learning: review of evidence. NESET II report.
- [22] Shippmann, J.S., Ash, R.A., Hesketh, B., Pearlman, K., Sanchez, J.I., Battista, M., Eyde, L.D., Koeho, J, Prien, E.P. (2000). The Practice of Competency Modeling. "Personnel Psychology". 53: 703–740.
- [23] UNEVOC. (2018). *Improving the image of TVET*. Germany: World Youth Skills Day UNEVOC and UNESCO.
- [24] Volmari, K., Helakorpi, S. & Frimodt, R. (2009). *Competence Framework For VET professions: Handbook for practitioners*. Finnish National Board of Education, CEDE- FOP. p. 58. "Technical Education and Training". 1(1): 1–16.

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