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Analysing Teaching Strategy, Reflection and Networking Indicators Towards Learning for Sustainable Development (LSD) of Green Skills

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Abstract: UNESCO-UNEVOC has reported that the levels of awareness towards the implementation of green skills amongst TVET teacher are at low level. Meanwhile, studies have shown that teacher have lack of skills and weak of knowledge about the concept of sustainable development. The study used quantitative approach and the structural equation model was used to measure the effect of the three indicators which are teaching strategy, networking, and reflecting towards learning of sustainable development. These indicators have been adapted from the Model of CSCT. The population of this study consisted of 202 TVET teacher trainee from the Institute of Teacher Education. Meanwhile the sample technique used is disproportionate stratified random sampling method and the sample size is 144. Findings show that networking and reflection were found to be positively related to learning for sustainable development, while teaching strategy was not significantly related to learning for sustainable development. The indicator of model was observed to be sufficiently solid and flexible to incorporate and measure the four construct which are cognitive, technology, emotional intelligence, and action competency. Finally, the results show that networking indicator have the strongest relationship to learning for sustainable development to develop green skills competency in industrial 4.0 amongst TVET teacher trainee.

Keywords: Learning for sustainable development, teaching strategy, reflection, networking, fourth industrial revolution (4IR), green skills competency, teacher trainee

1. Introduction

Green skills competency is skills for sustainable development and refers to the three main elements: skills, knowledge, and values to promote a sustainable environment, social and economic development (NCERT, 2015). EU Commission (2015) defines green as a skill to minimise resource consumption, reduce greenhouse gas emissions, recycle, use

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environmentally friendly products, protect the environment, and so on. It also refers to decision-making skills, including selecting processes and technologies in performing an activity considering environmental factors. Meanwhile (Council of Australian Governments (2009); UNESCO-UNEVOC (2017) defines green skills as the technical skills, knowledge, values, and attitudes required in a job and in turn supports the socio-economic outcomes and a more sustainable environment. This argument coincides with the statement of (CEDEFOP European Centre for the Development of Vocational Training (2014) that the balance of generic skills, green skills and the improvement of existing work-related skills is more important in developing a sustainable economy.

Green technologies and green skills are both interdependent and complementary. This is because green technology is one of the sustainable development mechanisms, thus meeting the needs of the 4.0 industrial revolution. According to (UNESCO-UNEVOC (2017), the basic requirement to realise green technology is to build people with green skills in the face of the 4.0 industrial revolution, and TVET plays an important role in the development of human resources with green skills and green knowledge (green knowledge) expertise to establish a more sustainable environment and greener economy in line with the challenges facing the industrial 4.0. Furthermore, green skills in the field of TVET are not a simple task, as they create conflicts that will interrupt existing work processes and planners, trainees and trainees are not yet ready for new technologies, particularly in the face of the industrial era 4.0 (UNESCO-UNEVOC, 2017). NCERT (2017) therefore proposed that green skills should be implemented through education, to organisational planners, teaching staff and students of all ages, to build a healthy human capital in all facets of life. Furthermore, the need to improve green skills through TVET is becoming increasingly clear as one of the eight key priorities of the Asia-Pacific Conference on Education and Training Kuala Lumpur (ACET) (2015) is to cultivate green skills for sustainable TVET programmed growth that needs to be implemented for sustainable development, including poverty eradication and inclusive economic growth (UNESCO; Ministry of Education, 2015)

This is also emphasised in the Malaysia Education Development Plan, 2013-2025, where all countries need to systematically standardise programs, supplement the TVET framework with a holistic institutional approach as a training and learning centre, and improve the technical capacity of teachers and coaches to enhance green skills. In addition, green skills are a definition of skills that need to be incorporated in the school curriculum. The basic aim is to make the community aware of the value of environmental sustainability through education. This is emphasised in the fourth strategy, RMK 11, where the culture of green technology needs to be nurtured among students at all levels through successful curriculum growth. Fostering this green technology community must also be in line with the plans to equip ourselves with industry 4.0 skills. This is because, to meet the needs of the 4.0 Industrial Revolution requires an organisational dedication to training and human resource development. According to Aulbur et al., (2016), industry 4.0 skills that need to be highlighted in human resource growth include five main components, namely strategic thinking and problem-solving, communication, teamwork, innovation, and emotional intelligence.

There are many green issues rising involving teacher competencies. A study in Vietnam about Greening TVET by Klaus-Dieter and Huyen, (2016) mentions that teachers must be provided with green skills specifications, such as technological skills and expertise, pedagogical elements, work experience and appropriate environmental knowledge. This is because of the lack of qualified teachers in TVET to raise their students' environmental awareness. Besides that, UNESCO-UNEVOC (2017) has reported that the levels of awareness towards implementing green skills in TVET amongst TVET teachers in Tanzanian State are at a low level. Meanwhile, in Malaysia, a study by Hanifah Mahat et al., (2017) shows that teachers have a weak knowledge of the concept of education for sustainable development. Moreover, a study conducted by Lee, Muhtar and Lai (2018) on green knowledge among students of the TVET Master program at UTHM found that knowledge of green practice among students was at the mean level of 1.17, which is a low level.

Furthermore, a study conducted by Safran & Nasir (2016) to determine the level of high order thinking skills among trainee teachers showed that the level of high order thinking skills among trainee teachers was at a moderate level (mean = 2.83). This situation needs to improve as some of them are teachers in the service while some of them are teacher trainees. Competent educators can result in effective teaching and learning of the student (Roslan Abu Hassan, 2014). Teacher competence includes matters relating to personal, technical, and social teaching, subject matter expertise, teaching and learning theory expertise, group learning process management, adaptation, and personality management (Mohd Jalil et al., 2015). Therefore, in developing educational sustainability, teachers must have a set of competencies such as cognitive, technology application, emotional intelligence and action skills (Robinson et al., 2019). The competencies in green skills are to ensure that the teaching and learning process is smooth. For example, in the subject of TVET, Technology Design competent teachers in the green skills will expose to the students how to manage solid waste systematically to reduce the index of carbon dioxide emissions produced by humans into the air Kamis et al., (2017).

Hence, the focus of this paper is to predict the green skills competency development towards teacher trainees since they are playing a crucial role in achieving the Sustainable Development Goals (SDGs) 2030 for quality education as a prerequisite for sustainable learning and human development.

1.1 Conceptual Underpinnings and Hypothesis Development

1.1.1 Learning for Sustainable Development

Learning for Sustainable Development Learning (LDS) is one of the four indicators identified in the literature model review. In this study, LSD was based on the model of competency by Sleur (2008), Curriculum, Sustainable Development, Competences, Teacher Training (CSCT). The issues in sustainable development are complex as they can not only be solved with problem-solving competencies but require a high level of expertise in various knowledge domains. The CSCT competence model is centred on the teacher as an individual, as an agent in an educational institution, and as a member of a specific society. Teachers in these three fields should be able to foster sustainable development if they have the necessary competencies. This means that the competencies even touch on the realm of a teachers' personal and social behaviour, which should serve sustainable development. Therefore, the model incorporates a teachers' whole personality in sustainable development, rather than just his or her "professional self" (Cebrián & Junyent, 2015).

In addition, it also requires competence in identifying and linking each problem with ecological, economic and social dimensions. Thus, teachers need to relate knowledge skills and system thinking systems to achieve the Sustainable Development Goals (SDG) through the teaching and learning process (Sleurs, 2008). In addition, other green skills competencies such as technology, emotional intelligence and action should also be considered of this indicator. It is because these LSD indicators must provide a framework to align to the institutional operating system by accepting mitigation and adaptation trends within the scope of measurement CO2 emissions per student, percentage of recycled materials consumption, recycling of purchased materials, percentage reduction of toxic material consumption, percentage of renewable energy production and consumption, percentage of composted organic waste, water consumption and so on (Majumdar 2012). Thus, Learning for Sustainable Development (LSD) is the main indicator to develop a green skills competency model in the industrial revolution 4.0 for TVET trainee teachers. Meanwhile, the alternative hypothesis of this study is to seek the significant relationships between the indicator of teaching strategy, networking and reflection towards Learning for Sustainable Development (LSD) to develop green skills competency amongst TVET teacher trainees.

1.1.2 Teaching Strategy

This study has focused on trainee teachers, competence in teaching strategies should be emphasised towards preparing these trainee teachers before becoming a teacher. A teachers' competence is greatly influenced by the beliefs and values he or she has. The problem of environmental sustainability, for example, cannot be solved with scientific evidence alone (Summers et al. 2005). For example, a teacher is convinced that global climate change is a natural phenomenon that is not affected by human activities and may not encourage students to participate in Agenda 21, which focuses on reducing CO2 emissions. Therefore, the need for green skills competency in teaching strategies is important because it will change the actions of an individuals' learning outcomes (Clark & Mayer 2016; Mayer 1989). Study by Norazizah Abdullah & A and Ali (2014) is to identify the level of readiness of Design and Technology trainee teachers in Johor shows that the level of knowledge and readiness of Design and Technology trainee teachers is high, with a mean score of more than 3.67 in design subjects. However, the teaching skills of trainee teachers are at a low level, with a mean score of less than 2.33. Therefore, trainee teachers are advised to increase their knowledge to deliver effective teaching in the current industrial 4.0 needs. In addition, trainee teachers can also take part in recent workshops on programs related to the new technologies, inspiration and even pedagogy to influence actions and inspire students to take meaningful action. Hence, the alternative hypothesis of this study is that there will be a significant direct relationship between the indicator of Teaching Strategy and the indicator of Learning for Sustainable Development (LSD) in influencing green skills development amongst TVET teacher trainees.

1.1.3 Networking

According to Edo Ronchi (2018), networking with other partners in and out of school is also necessary to create a learning environment with an ongoing spiral containing visioning, planning, acting and reflecting. ESD concerns real life problems and issues and requires the creation of learning opportunities in society. Also, with networking publishing competences are important. Therefore, competences in networking such as cognitive, technology, emotional intelligence and action are required to develop green skills competency amongst teacher trainees. Hence, the alternative hypothesis of this study is there will be a direct significant relationship between indicator of Networking and indicator of Learning for Sustainable Development (LSD) in influencing green skills development amongst TVET teacher trainee

1.1.4 Reflecting

Cebrián and Junyent, (2015) has described in CSCT Model that Reflection on the teachers' actions, conscious steering of his/her own professional development, 'reflection' about work attitude and reflection about the concept of education are also features of the professionalism of teachers. Be able to imagine alternative futures and new, creative solutions; be able to act as an "agent for changing"; know the practice and principles of SD; know that SD calls for critical thinking

and reflection; know that SD calls for individual and social responsibility; be able to reflect critically on ones' lifestyle and choices; be able to explain his own position and have civic courage; be able to work in a project and problem-oriented way; be able to deal with uncertainty; be persistent and be deal with counter-arguments; be able to network to establish teams and partnerships; be able to share the responsibility for the teaching process with the learners; and be able to think in systems.

However, in the educational institution, teachers should be able to regard the action as an educational value, not only as a way to solve problems, find the possibilities/opportunities for learning processes in the real world especially these topics which fit for action towards SD, define relevant (learners, societies and curriculum) topics for action towards SD and break it down into steps for action; describe conditions in society that can be the reason for action. Organise and facilitate local and global action as an individual, in small groups or communities. Organise and accompany learning as a participation process. Organise settings which allow learners to experience different perspectives of SD; find different solutions for topics of SD; identify the direct and indirect consequences and effects of their decisions and actions. Organise settings which facilitate the ability of students to experience success and self-efficacy. Organise and facilitate learners' comprehensive reflection on different action possibilities and on the action process (meta-knowledge - meta reflection). Organise and facilitate vision processes among learners as the basis for action towards sustainability (imagine a better/another future) and promote critical thinking (Murga-Menoyo 2014). Thus, the teacher should apply the competency in cognitive, technology, emotional intelligence and action in order to develop green skills competencies in industrial 4.0. Hence, the alternative hypothesis of this study is there will be a significant direct relationship between the indicator of Reflection and indicator of Learning for Sustainable Development (LSD) in influencing green skills development amongst TVET teacher trainee

2.0 Methodology

2.1 Research Strategy

The study used a quantitative survey using a questionnaire and tested using structural equation modelling. A structural equation model is a multivariate statistical technique used to explore the causal and correlational relationship between observed and latent variables. This technique simultaneously tests the relationships in a model using a holistic approach (Anderson & Gerbing,1988).

2.2 Instrument

The survey instrument was a questionnaire developed through adaptation of the model in the literature review, as illustrated in Table 1. The questionnaire consists of four constructs: Learning for Sustainable Development (LSD), Teaching Strategy, Networking and Reflection. This construct has been identified by adaptation from the Model of CSCT. Each construct has four sub-constructs: cognitive, technology, emotional intelligence and action. Those sub-constructs were developed from the adaptation of three models: the CSCT model, Pavlova Green Skills model, and skills in industrial 4.0 (see table 1).

The questionnaires were distributed to the respondents using Google Form. The assessment was based on a quantitative method using statistical procedures. Quantitative work can be conducted using descriptive or inferential studies (Chua, 2015). The questionnaire was administered to the teacher trainees and they were required to respond to 70 items using a five-point Likert-type scale (from 1- for 'very unimportant' to 5- for 'very important'). The teacher trainees were briefed on how to answer the questionnaire. In this study, the structural equation model was used to measure the effect of the three constructs: teaching strategy, networking and reflecting towards learning sustainable development.

Table 1 - Details of indicator developed in the questionnaire

Model of CSCT					Model of Green Skills by Pavlova				Skills in Industrial 4.0							Combination of elements
Knowledge	**System thinking**	**Ethics and value**	**Emotional**	**Action**	**Cognitive**	**Technology**	**Intrapersonal**	**Interpersonal**	**Complex problem solving**	**Technical competency**	**Knowledge of ICT**	**Data skills**	**Emotional intelligence**	**Coordinating with others**	**Communication skills**	
√	√				√				√							**Cognitive**
√						√				√	√	√				**Technology**
		√	√				√	√					√	√	√	Rename: **Emotional intelligence**
				√												**Action**

2.3 Participant and Procedure

The population of this study consisted of 202 TVET teacher trainees at Institute of Teacher Education in Malaysia. Of the 27 campuses, three campuses offer TVET courses which are Campus A, B and C. The sampling process was performed by a disproportionate stratified random sampling technique method. Raosoft Software has been used to get the minimum sample from the population targeted. From the 202 TVET teacher trainees surveyed, 201 (99.5%) teacher trainees have responded. This response rate was adequate since it was just 133 minimum samples required based on Raosoft Software with a margin error of 5% and confidence level of 95%. However, 34 were outliers (having values well below or well above the other scores, i.e., 1.5 times the interquartile range in the SPSS boxplot); 11 showed extreme cases (more than 3 times the interquartile range), and 12 were straight-line cases (indicating their answers with only one preferred scale point; i.e. 5 or 4), and were therefore discarded. Thus, the effective response sample was 144. The participants were predominantly female (59.1%), with ages ranging from 18 to 23 (99.40%). Table 2 shows the frequency and percentage distribution of the demographic data. Five technical and vocational experts carried out the face and content validity of this instrument.

Table 2 - Respondent demography

No.	Demographics	Item	Frequency	Percentage
1	Gender	Male	63	40.9%
		Female	91	59.1%
2	Age	18 -23	153	99.4%
		24 - 29	1	0.6%
		30 above	0	0%
3	Campus	Campus A	43	27.9%
		Campus B	97	63.0%
		Campus C	14	9.1%
4	Intake	2015/2016	49	31.8%
		2018	71	46.1%
		2019	34	22.1%
5	Practical teaching experience	Practical teaching undergone and taught RBT subjects	49	31.8%
		Practical teaching undergone but has not taught RBT subjects	0	-
		Not yet practical teaching	105	68.2%

2.4 Methods

This study applied partial least squares (PLS) modelling using the SmartPLS 3.2.8 version (Ringle et al., 2005) as the statistical tool to examine the measurement and structural model as it does not require normality assumption and survey research usually is not distributed (Chin et al., 2003).

2.5 Data Analysis

2.5.1 Multicollinearity Test

Since data was collected using a single source, this study first tested the issue of Common Method Bias by following the suggestions of Kock and Lynn (2012), and Kock (2015) by testing the full collinearity. In this method, all the variables will be regressed against a common variable and if the VIF ≤ 3.3, then there is no bias from the single source data. Table 3 shows the analysis yielded VIF less than 3.3 thus single source bias is not a serious issue with our data.

Table 3 - Full collinearity testing

TS	Net	Ref
3.060	3.054	2.605

Note: TS= Teaching Strategy, Net = Networking, Ref = Reflecting

2.5.2 Validity and Reliability: Measurement Model Analysis

This study followed the suggestions of Anderson and Gerbing (1988) to test the model developed using a 2-step approach. First, this research tested the measurement model to assess the validity and reliability of the instruments used in accordance with the guidelines of Hair et al., (2019) and Ramayah et al., (2018) and then the structural model was used to test the hypothesis developed. This study has assessed the loadings, average variance extracted (AVE), and the composite reliability (CR) for the measurement model. The values of loadings should be ≥0.5, the AVE should be ≥ 0.5 and the CR should be ≥ 0.7. As shown in Table 4, the AVEs are all higher than 0.5 and the CRs are all higher than 0.7. The loadings were also acceptable, with only one or two loadings less than 0.708 (Hair et al., 2019). Since it has 4 constructs which are second order namely 1. Learning for Sustainable Development, 2. Teaching Strategy, 3. Networking and 4. Reflecting, this study also assessed the validity and reliability of the second order constructs as shown in Table 5. The second order measurements were also valid and reliable.

Table 4 - Measurement model for the first order constructs

First Order	Items	Loadings	AVE	CR
Learning for Sustainable Development (LSD)	LSDcog	0.365	0.660	0.920
	LSDTech	0.415		
	LSDact	0.339		
Teaching Strategy (TS)	TScog	0.531	0.576	0.966
	TStech	0.117		
	TSei	0.201		
	TSact	0.205		
Networking	Netcog	0.170	0.647	0.971
	Nettech	0.171		
	Netei	0.374		
	Netact	0.348		
Reflecting	Refcog	0.178	0.545	0.956
	Reftech	0.252		
	Refei	0.405		
	Refact	0.234		

Table 5 - Measurement model for the second order constructs

Second Order Constructs	Subconstruct	Loadings	AVE	CR
Learning for Sustainable Development (LSD)	LSDcog	0.921	0.797	0.922
	LSDtech	0.866		
	LSDact	0.891		
Teaching Strategy	TScog	0.967	0.864	0.962
	TStech	0.890		
	TSei	0.904		
	TSact	0.955		
Networking	Netcog	0.936	0.873	0.965
	Nettech	0.906		
	Netei	0.927		
	Netact	0.966		
Reflecting	Refcog	0.918	0.866	0.963
	Reftech	0.929		
	Refei	0.950		
	Refact	0.923		

Table 6 - Discriminant validity (HTMT)

	1	2	3	4
1. Learning for Sustainable Development				
3. Networking	0.773			
4. Reflecting	0.753	0.796		
4. Teaching strategy	0.726	0.873	0.780	

3. Results

As suggested by Hair et al., (2019), this study has assessed the multivariate skewness and kurtosis. The results showed that the data have collected was not multivariate normal, Mardias' multivariate skewness ($\beta = 19.977$, $p < 0.01$) and Mardia's multivariate kurtosis ($\beta = 81.558$, $p < 0.01$), thus following the suggestions of (Hair et al., (2019), this study reported the path coefficients, the standard errors, t-values, and p-values for the structural model using a 5,000-sample re-sample bootstrapping procedure (Ramayah et al. 2018). Also, based on the criticism of Hahn and Ang (2017) that p-values are not good criteria for testing the significance of a hypothesis and suggested using a combination of criteria such as p-values, confidence intervals and effect sizes.

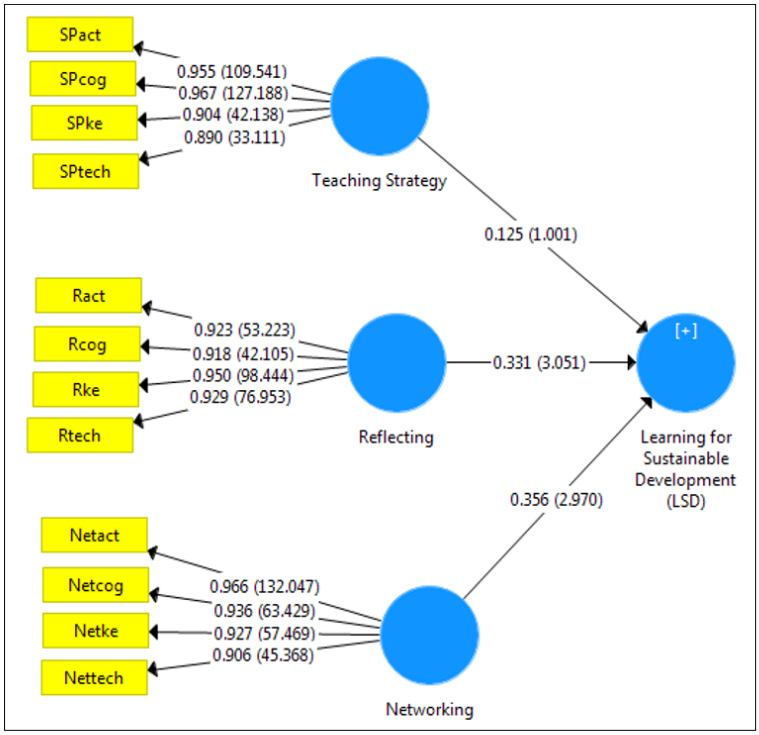

Fig. 1 - Results of structural model

From the figure 1 above, the indicator of networking (β= 0.356, t=2.970) is the strongest predictor of the LSD to develop green skills amongst TVET teacher trainees. While action competency is the main contributor to the predictor of Networking with value (β = 0.966, t=132.047). Followed by Reflection with score (β = 0.331, t=3.051) and lastly Teaching Strategy with (β = 0.125, t=1.001). For the Reflecting predictor, emotional intelligence competency shows the highest contributor (β = 0.950, t=98.444). Meanwhile, cognitive competency is the most contributing factor to the Teaching Strategy predictor (β = 0.967, t=127.188).

Table 7 shows the results of hypothesis testing direct effects of three predictors: teaching strategy, reflection and networking towards Learning for Sustainable Development (LSD). Reflection (β = 0.331, p< 0.01) and Networking (β = 0.356, p< 0.01) were positively related to LSD except for Teaching Strategy (β = 0.125, p> 0.01). Thus, the hypothesis of H_2 and H_3 were supported. It means that the Reflection and Networking indicator directly correlates with Learning for Sustainable Development (LSD). However, the hypothesis of H_1 for the Teaching Strategy indicator is not supported. This means there are no significant relationships between Teaching Strategy and Learning for Sustainable Development (LSD).

Table 7 - Hypothesis testing direct effects

Hypothesis	Relationship	Std Beta	t-values	p-values	f^2	VIF
H_1	Teaching Strategy LSD	0.125	0.994	0.318	0.010	3.518
H_2	Networking LSD	0.356	2.984	0.003	0.078	3.757
H_3	Reflecting LSD	0.331	3.002	0.002	0.097	2.605

Note: with 95% confidence interval with a bootstrapping of 5,000

3.1 Predictive Accuracy (Coefficient of determination, R^2)

Coefficient of determination (R^2) measures the accuracy of the model prediction and is calculated as the square correlation between the actual value and the predicted value of the dependent variable. The determination coefficient explains the variation (change) in the endogenous variable, which is explained by the number of changes in the independent variable (exogenous). In other words, it represents the amount of variation that relates to each other by sharing the same pattern systematically. The value of R^2 is between 0 and 1; the higher the value of R2, the higher the expected accuracy level will be. According to Chin (1998), the value of R2> 0.67 is strong, R2> 0.3 is moderate, and R3> 0.19 is weak. Figure 2 shows the R^2 from this study. The value of R^2 was 0.566, which shows that all the three predictors explained 56.6% of the variance in LSD.

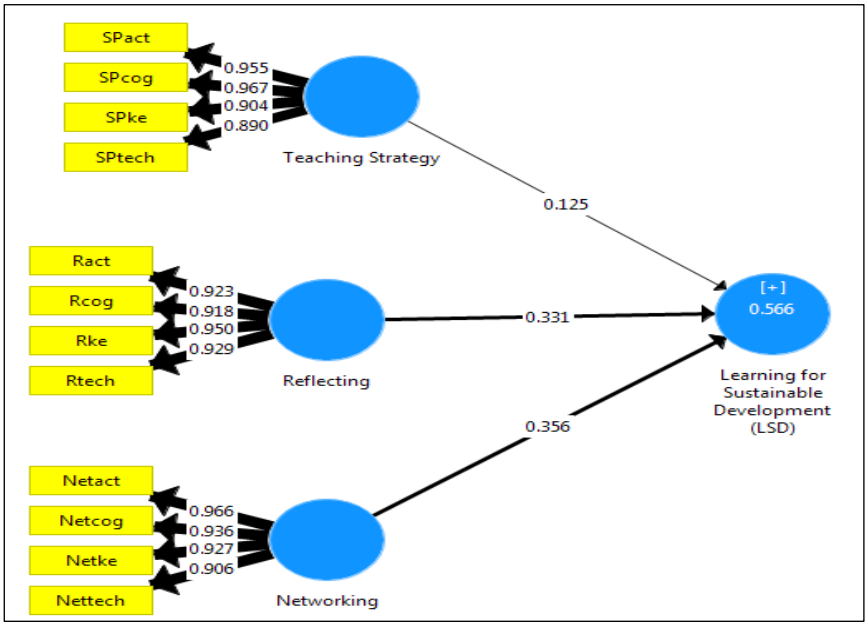

Fig. 2 - R^2 from the measurement model

In addition to referring to R2 values, predictive sample reuse techniques (Stone, 1974; Geisser, 1975) can be used to assess the accuracy of forecasting (Q2). Through PLS 3.0 software, this study uses a blindfolding method to obtain predictive accuracy value. For relative reference, Q2 values equivalent to 0.02, 0.15 and 0.35 indicate low, medium and high relevant levels. The blindfolding analysis shown in Figure 3 is a value of Q2 = 0.432 that met the criteria of Q2> 0 (Hair and colleagues, 2010; Henseler et al., 2009). The value obtained also exceeds the value of 0.35. Therefore, this model has relevant predictions at a high level.

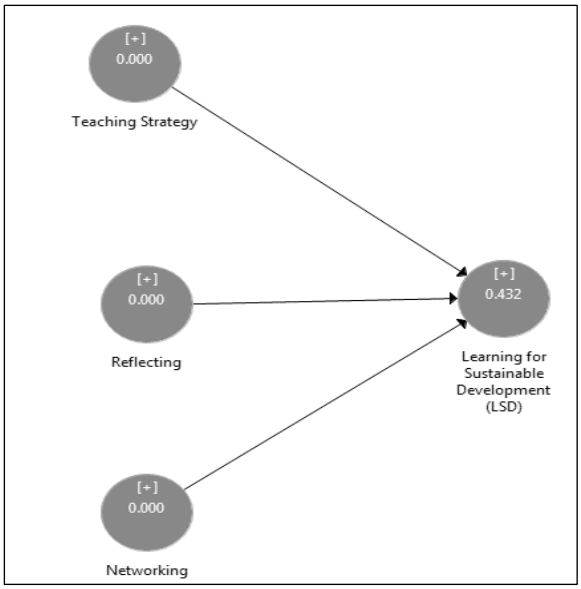

Fig. 3 - Blindfolding

4. Discussion

The analysis began by testing the reliability and validity of the items from the three variables related to learning for sustainable development. All four factors, namely learning for sustainable development, teaching strategy, networking and reflecting, could explain sufficient variation in the measured constructs, indicating that the survey instrument was reliable. Based on the PLS structural equation modelling analyses, the measurement model demonstrated adequate reliability, convergent validity and discriminant validity. Thus, the model proved to be not only solid but also flexible enough to incorporate and measure four types of scales evaluated as part of the same model. The research hypotheses deal with the relationships between predictor variables (networking and reflecting) and learning for sustainable development (LSD) except for variable teaching strategy. This shows that teacher trainees lack competencies in cognitive,

technology, emotional intelligence and action in teaching strategy towards learning for sustainable development. Pertaining the innovative practices in lecture rooms such as the extensive use of computers and LCD projectors, e-learning implementation and the awareness of electricity saving are some examples of inculcating generic green skills in teaching and learning. Concurrently, students are encouraged to use smartphones. To record students' attendance in the lecture room, QR codes were used extensively. This indicates that the ingenuity of students in the use of smartphones showed that digital skill is another complement to green skills (Hamid et al., 2019).

Overall, the analysis results demonstrate that teaching strategy, networking and reflecting are related to learning for sustainable development. This clearly indicates that teacher trainees should have competencies in cognitive, technology, emotional intelligence and action to apply in teaching strategy, networking and reflecting in the process of learning for sustainable development. This is to develop green skills competency of industrial 4.0 amongst teacher trainees. These findings support the statement in the CSCT model where teachers acting as individuals, agents in institutions and community representatives need all these competencies so that sustainable development can be nurtured through these three roles relationship between technology and the environment in a particular context can provide a rich source of knowledge and understanding of how it is in line with the natural environment (Edo Ronchi 2018). This is also emphasised in the CSCT model where a teacher needs to have knowledge in planning teaching strategies to implement research-based learning, real-life learning, project learning, learning methods through games and discussion forums (Sleurs 2008). According to (Arasinah et al. 2017), teachers should be wise in identifying teaching strategies to inspire students to develop green skills. A little constructive emotion should be used by teachers to inspire students to create materials. All these attempts will attract students to be part of the campaign for green talent (Hamid et al., 2019)

In this study, cognitive competence is seen as the biggest contributor to teaching strategies. It is in line with research by Pavlova (2016), the aspect of cognitive competence is one of the important aspects in the development of green skills that includes elements of environmental awareness and readiness in sustainable development; have skills in risk analysis to assess and interpret changes occurring in the environment, economy and social; innovation skills to identify opportunities and create new strategies to respond to green challenges and how to create solutions in a green environment; thinking skills about different things; skills on how to deal with complexity and relate one thing to another. This is supported by (Clark & Mayer, 2016; Mayer 1989) where the application of various elements of green skills in teaching strategies is important because it will change the learning outcomes of an individual and as a solution to complex problems to face future complexities and challenges (Aulbur, CJ & Bigghe 2016)

As for the evaluation results of the network indicator structure model, it was found that the network has a most significant positive relationship with developing green skills competencies. It also shows that the relationship between networking indicator and learning for sustainability is strong compared with reflecting and teaching strategy. Furthermore, if we look at the relationship between the network and green skills competencies, namely cognitive, technology, action and emotional intelligence, it is clear that the four competencies have a strong positive relationship. The action competencies of green skills have the strongest relationship, followed by cognitive, emotional intelligence and finally technological competencies. This shows that when a teacher has action, technology, cognitive, and intelligence competencies in the network, then it will further enhance the development of teacher green skills competencies. In this case, action competence is the biggest contributing factor in developing the green skills competency of a trainee teacher in the network system. This study was aligned with the statement from Vuorikari and Brecko (2016) where technology and action of teachers is one such competence, especially now that social networking services increasingly are becoming part of educational scenarios, for example, as a means of communication between teachers and students, as part of collaborative tools in the classroom and as a means of teachers Continuous Professional Development (CPD) and networking activities. It is also highlighted by Kokkonen and Almonkari (2017), where adapting network competence is a more explicit part of many fields of study that should benefit both students and teachers. To do so, one should however have a comprehensive understanding of the processes and nature of networks as social phenomena. Furthermore, understanding interpersonal relationships, their development and maintenance would enable teachers and students to grasp the communication and more specifically, the interpersonal approach to networking.

Finally, the results of the structural model evaluation for reflection indicators show that there is a significant positive relationship between the learning for sustainable development. The four constructs which are cognitive, technology, emotional intelligence and action shows that all these four have a strong positive relationship with the reflection indicator. The emotional intelligence competency has the strongest relationship, followed by technology, action and finally, cognitive technological competencies. In this case, intelligence competence is the biggest contributing factor in the learning for sustainable development competency of a trainee teacher in reflection. Reflection for a teacher as an individual not only needs to use the basic concepts of ESD, but also be able to apply to students in various situations and problems (Yee et al., 2020). Teachers also need to make judgments on every decision and action. This requires good imagination skills (Mogensen & Schnack 2010). Emotional intelligence is closely related to one's reflection individually. This is evidenced in a study by Dolev and Leshem, (2016) against trainee teachers where emotional intelligence training has changed their self-reflection as prospective teachers. Because emotions are very influential in a person, then the development of emotional intelligence competencies for trainee teachers is very important in reflecting themselves when they become a teacher in school.

5. Conclusion and Recommendations

Overall, the results of the study have provided valuable new insights regarding the development of green skills competency in industrial 4.0 for TVET trainee teachers in Malaysia. This study reveals that networking and reflecting have a significant effect on TVET teacher trainees in learning for sustainable development. However, teaching strategies have an indirect effect on TVET teacher trainees in learning for sustainable development. In developing green skills competencies in industrial 4.0, it has also been determined that networking is the most influential factor in learning for sustainable development., followed by reflecting and teaching strategy. Further analysis identified competency in networking as the most important factor, though its performance needs to be enhanced. The results and conclusions of the present study must be considering its limitations, to inform directions for future research. First, this study statistically explored four indicators (teaching strategies, networking, reflection and LSD) and four competencies (cognitive, technology, emotional intelligence and action). In this regard, it is proposed to expand further studies among trainee teachers from various fields other than TVET and expanded to other education such as in public universities, vocational colleges and others to obtain a larger and more diverse scale. Secondly, the further study should be on the production of a complete profile of each element of green skills. Third, the involvement of industry workers in different areas of green element skills can be expanded comprehensively to all areas of employment. In addition, this study applies the quantitative basis of various methods in one study. Therefore, it is recommended for further study, using qualitative methods to obtain more accurate information on the practice and competencies of green skills.

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