PROBLEM-SOLVING STRATEGIES AMONG CULINARY ARTS STUDENTS IN COMMUNITY COLLEGES

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ABSTRACT

Culinary Arts is an area in Technical Vocational Education and Training (TVET) where students need to possess problem-solving skills besides having fundamental subject matter knowledge and hands-on skills required for the technical aspects of cooking. The key components for learning to solve problems are analogizing, modelling, reasoning causally, and arguing. The development of these strategies will assist students in completing numerous cognitive tasks. However, little research has been done which provide information on the level of these skills in the context of students at Community Colleges, particularly among Culinary Arts students. Drawing from a survey data, the paper examines problem-solving skills of 831 Culinary Arts students, most of whom were aged 18-24, from eleven Community Colleges offering Certificate in Culinary Arts Programme throughout Malaysia. The analysis results revealed that students had only medium level of problem-solving skills. The finding is of great significance as knowing the level of problem-solving skills of Culinary Arts students is essential before designing a suitable intervention for them. Specifically, the findings can be used to justify the design of new learning environments towards developing problem-solving skills more effectively.

Keywords: *Problem-solving, community college, culinary arts, first principles of learning*

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1. INTRODUCTION

Problem-solving is the most pervasive intellectual activity in our everyday lives (Popper, 1999). Our daily lives are peppered with small and large problems, ranging from making decisions on what to have for breakfast, driving in the traffic when commuting to work, handling a conflict with a colleague or dealing with a scientific problem – an endless list to emphasize the importance of and the frequency of problems we face daily. Thus, problem-solving also should be recognized as essential to the educational experience of students.

Is problem-solving being focused in education? It does not seem so. Despite the growing number of graduates passing out from higher education institutions, employers are being dissatisfied with graduates regarding their problem-solving skills. According to a report by Organisation for Economic Co-operation and Development (OECD), despite the increase in tertiary enrolment, employers have voiced out their dissatisfaction on the lack of skills required by industry (OECD, 2016). According to employers, the most relevant skills in the next 5-10 years are graduates' soft skills such as their communication skills; analytical and problem-solving skills; and ability to adapt to and act in a new situation (Jaaffar, Ibrahim, Annuar, Shah, & Zulkafli, 2016). In the local context, the National Graduate Employability Blueprint between 2012 to 2017 published by the Ministry of Higher Education (2012) reported that fresh graduates lack the depth of skills related knowledge (23.8%) and inability to solve problems (25.9%). Similarly, the Malaysia Education Blueprint 2013 to 2025 again depicts the concerns of employers about the lack of higher order thinking skills including problem-solving and creativity among graduates (MOE, 2012). The Blueprint also draws attention to the problem of graduate employment. It has been reported that the average figure for employment of graduates six months after graduation is at about 75% (Samuel, Tee, & Symaco, 2017). Thus, the poor performance on problem-solving tasks of graduates is also a primary concern in the Malaysian context. In response to this, producing quality Technical and Vocational Education and Training (TVET) graduates has been identified as the fourth pillar in the Malaysia Education Blueprint 2015-2025 (Ministry of Education Malaysia, 2015). The focus is on developing TVET graduates that are skilled in matching industry needs.

Problem-solving is deemed crucial by TVET graduates in the Culinary Arts as the culinary arts workplace environment has become increasingly challenging and competitive. This require graduates to possess skills such as problem-solving to adapt and transfer learning to different situations (Ko, 2015; Müller, VanLeeuwen, Mandabach, & Harrington, 2009; Thomas, 1992; Way, Ottenbacher, & Harrington, 2011; Yao-Fen & Chen-Tsang, 2014; Zahari, Jalis, Zulfifly, Radzi, & Othman, 2009). Specifically, foodservice operators and restaurant managers are looking for employees that can identify problems and take the initiative to come up with a workable solution or a creative solution especially when solving on the ground problems (Deutsch, Billingsley, & Azima, 2009). Without the ability to transfer knowledge and solve problems, culinary arts students are not prepared to participate in the "real-world of restaurant work" (Hegarty, 2004) and unable to meet the standards of the workplace (Foster, 1965; Hegarty, 2004; Ko & Chung, 2015; Meijers, 2008; Tóth, 2012). To meet these requirements, Culinary Arts students must acquire competencies in being better problem solvers.

Sadly, pedagogical and educational approaches in Culinary Arts education are

underdeveloped (Mack, 2012). Current teaching practices in foundational Culinary Arts courses focus more on technical skills, rather than affective or cognitive knowledge (Brown, Mao, & Chesser, 2013; Kraiger, Ford, & Salas, 1993) as the students are expected to become a trained cook especially on their first job (Ko, 2012). The issue is that technical skills such as knife skills and cooking skills are deemed as no longer sufficient for survival in the industry (Horng & Lee, 2009; Müller et al., 2009; Rinsky, 2012; Shani, Belhassen, & Soskolne, 2013). For the two to three years diploma programme, students usually have formal theoretical in-class sessions and coupled with laboratory or kitchen work, externship assignments and on the job training at selected establishments(Khamis Mohammad Nor, 2005). Similarly, the current teaching practices in the foundational culinary arts courses at Community College lack of emphasis on developing students' problem-solving skills as instructors focus more on developing students' technical skills (Umawathy Techanamurthy, Norlidah Alias, & Dewitt, 2015). This resulted in students unable to transfer their knowledge to new environments or solve related problems (Reezlin, Ishak, Zahari, & Inoormaziah, 2012). Instead, there should be more focus on developing problem-solving skills, especially in foundational culinary arts courses. This is because problem-solving skills are more needed than ever before for today's ill-structured nature of work (Bereiter & Scardamalia, 1993; Jonassen, 1997; Lohman, 2004; Mohamed, Omar, & Romli, 2011; Muhd Khaizer Omar, Ab. Rahim Bakar, & Abdullah Mat Rashid, 2012).

For problem-solving, there have been modes of thinking identified (analogizing, modeling, reasoning causally, and arguing). It is not known to what extent students employ these strategies, especially in the Malaysian context. Moreover, it seems necessary to investigate the current level of problem-solving skills are before immersing students in problem-solving activities during instruction. The reason this research is needed is that although there is growing acknowledgment that problem-solving skills are crucial for employment, very little research has been done on the use of problem-solving strategies especially in the context of developing countries such as Malaysia. Malaysia, for one, makes an interesting setting of study as Malaysia was ranked in the bottom third out of 74 and 65 countries participated in PISA 2009 edition and PISA 2012 respectively, and below the Organisation for Economic Co-operation and Development (OECD) average in the mathematics, science and reading literacies (Thien, 2016). These results have suggested the inadequate levels of problem-solving skills among 15-year-olds which have been the subject of intense debate with the education fraternity. Existing research recognizes that problem-solving skills which are highly sought after by employers are best trained as early as possible so that Culinary Arts students can internalize the process earlier (Brown, 2006). The current study is significant because it provides a real account of problem-solving strategies used by Culinary Arts students in TVET settings from the perspective of the students themselves. This can assist stakeholders in gauging the level of students' problem-solving skills to help them better design instructional support and strategize teaching and learning accordingly. In that regard, the following research questions were investigated:

i. What are students' perception of their level of problem-solving skills?
ii. What are students' level of problem-solving skills according to the different regions in Malaysia?

2. PROBLEM-SOLVING STRATEGIES: PRACTICE OF FIRST PRINCIPLES OF LEARNING (JONASSEN, 2013)

Jonassen (2013) in his First Principles of Learning argues that the key epistemic components for learning to solve problems or otherwise engage meaningful learning are analogizing, modeling, reasoning causally, and argumentation. The development of these problem-solving strategies will assist students in completing numerous cognitive tasks. This claim is the focus of this study. If opportunities to engage in problem-solving activities are opportunities for learning, it is crucial to be aware of the problem-solving strategies. The description of the variables used in the study are the First Principles of Learning by Jonassen (2013) as follows:

2.1 Analogizing

Analogizing is the use of similar problems or previously encountered problems as analogies to assist the development of the ability to solve related problems. A common method used is to compare analogically the problems being solved to one or more structurally similar problems (Jonassen, 2013). The other method is to analogize using past experiences of previously solved problems to solve more recently encountered problems (Jonassen, 2013).

2.2 Modeling

Models are conceptual systems that comprise of elements, relations, operations and rules governing interactions that are expressed using external notation systems such as modeling tools and computer-based tools. Images, structural diagrams, metaphors and demonstrations are examples of modeling tools that can be utilized. Databases, concept maps, spreadsheets, expert systems, hypermedia and visualization tools are computer-based tools that can be employed for modeling depending on the type of knowledge that needs to be constructed (Jonassen, 2013).

2.3 Reasoning causally

Causality that implies cause and effect binds together reasoning processes that are common to all disciplines, including making predictions, drawing implications, making inferences, and articulating explanations (Jonassen, 2013; Jonassen & Ionas, 2008). Problem solvers must develop an understanding of the causal relationships that comprise the problem space for any problem (Jonassen, 2013; Jonassen & Hung, 2006). To enhance causal reasoning, influence diagrams, question prompts, simulations and modelling tools can be used (Jonassen, 2013; Jonassen & Ionas, 2008).

2.4 Argumentation

Learning to argue is a critical skill to rationally resolve questions, issues, disputes and solve problems. Among the components of argumentation as highlighted by Kuhn (1991) are as follows: (a) using causal theories to support claims, (b) providing evidence to support theories, (c) alternative theories, (d) counterarguments that would undermine the theories held and (e) rebuttals to alternative theories. Cho and Jonassen (2002) argued that argumentation skills are more necessary to solve ill-structured problems due to the nature of ill-structured problems which are

harder to solve as they have multiple solution paths and non-convergent answers. Because argumentation is an implied component in every kind of problem-solving, students' argumentation about how and why they solved problems as they did provide perhaps the most powerful form of problem-solving assessment. If students can efficiently argue about their solutions to problems, how they solved the problem, or why they did what they did, they provide confirmatory evidence about their problem-solving ability (Jonassen, 2014).

In conclusion, problem-solving strategies can be developed when students learn beyond content knowledge. By using authentic and meaningful tasks, students can apply the concepts learned to solve real-world problems that may face in the reality. The principles of learning provide a framework to find out the strategies used in problem-solving.

3. METHODOLOGY

The study is a survey of perceptions of the population of Culinary Arts students at Community College settings to determine their views on the problem-solving strategies used.

3.1 Sample

The respondents comprised of Culinary Arts students from all the 11 Community Colleges offering the Certificate in Culinary Arts programme enrolled for the March 2016 cohort. Students were from different years of study from semester one to semester four Certificate level Culinary Arts program. Their participation in the study was on a voluntary basis. These students were from 11 Community Colleges offering Culinary Arts Certificate in all six regions in Malaysia (Northern, Central, Southern, East Coast, Sabah and Sarawak region) which comprised of nine states i.e. Northern (Kedah, Pulau Pinang and Perak), Central (Selangor), Southern (Melaka and Johor), East Coast (Pahang), Sabah and Sarawak. The rest of the states did not have any Community Colleges offering Culinary Arts namely the states of Perlis, Kelantan and Terengganu whereas there are no Community Colleges at Federal Territories of Kuala Lumpur, Putrajaya and Labuan. The need to study the different regions were to get the overall picture of the levels of problem-solving skills among Culinary Arts students representing the different regions in Malaysia. Proportionate stratified simple random sampling technique was used to determine the number of subjects to be sampled in each selected community college since some strata are too small and some are large (Sekaran & Bougie, 2013) and it is necessary to have a fair representation of each strata (Bernadette Nambi & Werner, 2013). The goal of the proportionate sampling method for this proposed study is to get at least 285 respondents from different geographical areas. This sampling design is more efficient than simple random sampling as the population from each region is better represented for the sample size. This can provide more valuable and differentiated information concerning each cluster (Sekaran & Bougie, 2013). The instrument was distributed to the students through the Head of Programmes of the Culinary Arts programme from the respective Community Colleges. From the 1,025 surveys administered, a total of 854 surveys were returned, indicating a response rate of 83.3%. There were 831 suitable questionnaires which were from 380 male students and 451 female students.

3.2 Instrument

In this study, The Learning Skills Questionnaire was used to gather responses on the specific practices which best described his/her typical problem-solving practices. Self-report data are acceptable when the data measure individuals' perceptions (Ensher, Grant-Vallone, & Marelich, 2002).The items for problem-solving practices pertained to the following variables: analogizing (five items), modeling (five items), reasoning causally (11 items), and argumentation (four items) as outlined by Jonassen's First Principles of Learning (Jonassen, 2013). The items or measures for all these variables were adapted from (Jonassen, 2013; Palraj, DeWitt, & Alias, 2016) anchored on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). A possible score for each of the four domains ranged from 25 to 125 points. From the possible total score, the mean score and standard deviation were calculated for each of the problem-solving stages to measure the level of skills developed, and interpreted as low when the mean score is 1.00-2.33, medium when the mean score is 2.34 – 3.66 and high when the mean score is 3.67 – 5.00(Mohamed et al., 2011). The internal consistency of the Learning Skills Questionnaire was high with a Cronbach's alpha coefficient of 0.931 (> 0.7) indicating good item reliability in the items of the Learning Skills Questionnaire (Field, 2009) which was consistent with the previous reliability of 0.962 reported in Palraj et al. (2016). See Table 1. This instrument was validated by three experts in instructional technology.

Table 1: Reliability analysis of constructs in the Learning Skills Questionnaire

Variable	Cronbach Alpha
Analogising	.781
Modeling	.832
Reasoning causally	.900
Argumentation	.784

4. RESULTS

The demographics of the 831 respondents are tabulated in Table 2. There were slightly more females (54.3%) than males (45.7%) which reflects the increase in access to education in the recent decades, particularly among girls. Majority of the respondents were of Malay ethnicity (98%). More than half or 56.8% of the respondents were *Sijil Pelajaran Malaysia* (SPM, Malaysian Certificate of Education) level school leavers who were below 20 years old and 30.9% of the respondents were in semester three of study. A large proportion of the respondents were from the Northern region (Kedah, Penang and Perak) (38.6%) while those from the East Coast region (Pahang) comprised 30.0% of the respondents.

Table 2: Respondents' demographics (*N* = 831)

Demographics	*N*	%
Gender		
Male	380	45.7
Female	451	54.3
Race		
Malay	768	92.4
Chinese	10	1.2
Indian	7	0.8
Others	46	5.5
Age		
Under 20	472	56.8
20-24	335	40.3
25-29	22	2.6
30-34	2	0.2
Semester		
One	201	24.3
Two	218	26.2
Three	257	30.9
Four	154	18.5
Region		
Northern (Kedah, Penang, Perak)	321	38.7
Central(Selangor)	68	8.2
Southern (Melaka and Johor)	124	14.9
East Coast (Pahang)	249	30.0
Sabah	52	6.3
Sarawak	17	2.0

To answer the first research question on the perception of respondents' level of problem-solving skills, the data was analysed through the descriptive statistics where the mean and standard deviation for each construct i.e. analogizing, modelling, reasoning causally and argumentation was identified based on SPSS version 21 (see Table 3).

Table 3: Computed means for statements perceptions in skills used in problem-solving

Item	*M*	*SD*
ANALOGISING		
Compare similar problems or cases that have been done in class	3.04	.971
Compare similar problems or cases to find the answer to the problem	3.19	.925
Organise the ideas presented when solving a problem	3.40	.874
Use ICT tools or software to organise the idea	3.30	1.025
Use ICT tools, such as graphics, graphic organisers, and mind maps	3.25	.878
MODELING		
Use ICT tools or software to show relationships between the concepts	3.24	1.025

Item	*M*	*SD*
Use ICT tools or software to construct a model	3.14	1.050
View interactive simulations or other ICT resources to show relationships between concepts	3.30	.920
CAUSAL REASONING		
Find relationships between the concepts	3.49	.872
Construct a model in your mind (mental model) to show relationships between concepts	3.21	.936
Change the relationship between concepts to see the results	3.25	.878
Make predictions to forecast the answer	3.38	.917
Discuss the implications when a variable is changed	3.31	.940
Find the effect of changing different variables	3.07	.886
Test predictions made	3.11	.939
Guess the answer	3.42	.841
Use a real situation to test the answer	3.34	.908
Experiment with the mental model of the case to solve the problem	3.16	.934
Focus only on important points in a complex question	3.51	.846
Answer a complex question by writing the answers, step by step	3.42	.863
ARGUMENTATION		
Ask questions to find important aspects to focus	3.56	.849
Answer a complex question and justifying each of the steps in the answer	3.22	.898
Consider several possible answers	3.40	.803
Consider other methods/approaches to find answers	3.43	.839
Consider that there may be criteria, other than method and final answer, for evaluating solutions to problems and complex questions	3.30	.861

As can be seen, all the students' average scores relative to the different dimensions ranged from 3.04 to 3.56 on a 5-point Likert-type rating scale. The results indicate that on average, the respondents exhibited only medium levels of problem-solving skills. In terms of analogizing, students highly agreed that they "organise the ideas presented when solving problems" with the highest mean score (mean= 3.40; S.D.= .874), followed by "use ICT tools to or software to organise the idea" (mean= 3.30; S.D.= 1.025), and "use ICT tools, such as graphics, graphic organisers, and mind maps" (mean= 3.25; S.D = 0.878).

In terms of modeling, students highly agreed that they "view interactive simulations or other ICT resources to show relationships between concepts" with the highest mean score (mean= 3.30; S.D.= .920), followed by "use ICT tools or software to show relationships between the concepts" (mean= 3.24; S.D.= 1.025), and "use ICT tools or software to construct a model" (mean= 3.14; S.D. = 1.050). In terms of reasoning causally, students highly agreed that they "focus only on important points in a complex question" with the highest mean score (mean= 3.51; S.D.= .846), followed by "find relationships between concepts (mean= 3.49; S.D. = 0.872)" and "guess the answer" (mean= 3.42; S.D.= .841). In terms of argumentation, students highly agreed that they "ask questions to find important aspects to focus" with the highest mean score (mean= 3.56; S.D.=

.849), followed by "consider other methods/approaches to find answers (mean = 3.43; S.D.= .839)" and "consider several possible answers" (mean = 3.40; S.D.= .803).

Next, to calculate each student's mean score for every construct, the sum of the answers to each item in that construct was divided by the number of that construct's items. Table 4 presents the mean scores and standard deviation of the four subscales of problem-solving strategies in the First Principles of Learning (Jonassen, 2013).

Table 4. Results of Students' Problem-solving Strategies

Constructs	*M*	*SD*	Skill level
Analogizing	3.21	.661	Medium
Modelling	3.27	.711	Medium
Reasoning Causally	3.30	.619	Medium
Argumentation	3.38	.630	Medium

As can be seen, all the students' average scores relative to the different constructs of the First Principles of Learning ranged from 3.21 to 3.38 on a 5-point Likert-type rating scale. The results indicate that on average, the respondents exhibited only medium levels of problem-solving skills. Results suggests that analogising was used the least frequently by students (mean = 3.21, S.D. = 0.661) whereas argumentation was used more frequently by students (mean = 3.38, S.D. = 0.630).

Next, as the respondents of this study were those in the Culinary Arts programme whose learning exposure ranged from semester one to semester four, it is necessary to identify whether their length of semesters in the programme made any difference in their use of problem-solving strategies. Identifying this can also help to determine at which semester of their education would be more appropriate to introduce problem-solving instruction. Table 5 shows that students in the first semester have the lowest level of problem-solving skills (mean = 3.21; S.D. = .661).

Table 5. Descriptive for Students' Levels of Problem-Solving Strategies According to Semester of Study

Group	*n*	*M*	*SD*
Semester			
One	202	3.21	.661
Two	218	3.27	.711
Three	257	3.30	.619
Four	154	3.38	.629

Next, to determine the level of problem-solving skills of students according to the different regions, the data was analysed through descriptive statistics according to the various regions (see Table 6).

Table 6. Level of problem-solving skills according to regions

Regions	*n*	*M*	*SD*	Skill level
Northern	321	3.25	0.54	Medium
Central	68	3.24	0.40	Medium
Southern	124	3.19	0.51	Medium
East Coast	249	3.41	0.06	Medium
Sabah	52	3.30	0.58	Medium
Sarawak	17	3.08	0.56	Medium

As can be seen, all the region's average scores relative to the different dimensions ranged from 3.1 to 3.4 on a 5-point Likert-type rating scale. This indicates that on average, the respondents exhibited only medium use of their problem-solving strategies according to different regions. The region with the lowest level of problem-solving skills is the Sarawak region, and the region with the highest level of problem-solving skills is the East Coast region.

5. DISCUSSION

This study explores the levels of problem-solving skills perceived by the respondents. The results from the current study seems to tie with Malaysia being ranked in the bottom third out of 74 and 65 countries that participated in the PISA 2009 edition and PISA 2012 respectively, and below the Organisation for Economic Co-operation and Development (OECD) average in the mathematics, science and reading literacies (Thien, 2016). The PISA results of Malaysia are below the international and OECD average. These results have suggested the poor levels of problem-solving skills among 15-year olds which has been the subject of intense debate within the education fraternity. A 2014 World Bank Report by Gil Sander et al. (2014) notes that the 'under-performance' also appears to worsen over the years. This may be because PISA is an assessment of students' ability to solve problems focused on real-life applications, which tends to be more difficult for students to master (Clarke, 2016). The results support the work of other studies for example, the one linking the lack of problem-solving skills to TVET graduates (Bakar & Hanafi, 2007; Department of Community College Education, 2011; Mimi Mohaffyza Mohamad, Yee Mei Heong, Nurfirdawati Muhammad Hanafi, & Tee Tze Kiong, 2014; Rahman, Mokhtar, Hamzah, & Yasin, 2011; Sander, 2012; Zaliza Hanapi, Mohd Safarin Nordin, & Khamis, 2015). In accordance with the present findings, previous studies, as noted above, have also demonstrated that these are valid concerns because employees with strong communicative skills, ability to perform tasks and who were highly critical and able to solve problems were more sought after and not just those who possessed technical skills (Deutsch et al., 2009; Lin & Cherng, 2006; Müller et al., 2009; Young & Chapman, 2010).

Next, the results suggest students had average levels of problem-solving skills, with analogizing skills least frequently used and argumentation most frequently used. Analogizing was crucial for students when they encountered problems which they had experienced previously. However, students may not have enough prior experience to be able to apply analogies more efficiently. For example, when learning new contents, students need to have a familiar frame of reference which can be used as an analogy to facilitate the learning process (Kauchak & Eggen, 1998). It is deduced that the lack of analogizing being used as a strategy by the students can be

attributed to their lack of exposure to real-world problems during instruction. Besides, to create more opportunities for causal reasoning, modelling or argumentation in the classroom, instructors must provide meaningful tasks using real-world problem so that students can provide their reasoning and produce coherent arguments when justifying solutions(Dewitt, Alias, Palraj, & Siraj, 2018). The results derived from this study also support the idea recommended by Thompson, Poulston, and Neill (2017) who stated that today's institutions must take the necessary measures to ensure that the simultaneous goals of developing subject matter knowledge and problem-solving skills are achieved, to ensure the success of hospitality students. Thus, real-world problems should be used as part of instruction to develop students' problem-solving skills. Argumentation on the other hand may be used more frequently as instructors.

In the era of intense development, low levels of problem solving skills still exists in various regions of Malaysia. The results from this study has also given the bigger picture to enhance the understanding of the profile of Culinary Arts students representing the different regions in Malaysia. If the study only focused in the only Community College that offers Culinary Arts in the Central region, less would be known about the results of problem solving skills among the other 10 Community Colleges that are offering Culinary Arts in Malaysia. This research may help in planning of educational intervention in the regions and Malaysia in general. Since students in the state of Sarawak had the lowest level of problem-solving skills, in future, the problem-solving instruction intervention could be designed for students there. Moreover, the research has also found that students in the first semester, who were generally those who had just finished Form Five or *SPM* had the lowest level of problem-solving skills. As fresh school leavers, they were relatively new to the courses in the Culinary Arts. However, with more problem-solving practices relevant to Culinary Arts, the students will learn to internalize the process as early as possible (Brown, 2006) thus making them more employable. The finding of this study is significant because one of the Program Learning Outcomes of the Culinary Arts programme at Community Colleges is for students to be able to solve problems creatively and innovatively. Hence, emphasis on inculcating problem-solving skills should be addressed when students begin the first semester itself. In this manner, the classroom instruction should emphasise students' thinking and reasoning using real-world problems in the Culinary Arts. As a result, the results from this paper can be utilized by instructional designers of problem-solving learning environments to learn about the concepts of problem-solving strategies that can be incorporated into their teaching and learning to develop students' problem-solving skills more effectively.

5.1 Implications of the findings

The results derived from this study are essential to all the stakeholders involved in teaching and learning such as the instructors and students, the Ministry of Higher Education, the Department of Community College Education, the Culinary Arts schools' instructors and the students. In the Malaysian Education Blueprint (Higher Education) 2015-2025 which was launched to transform the Malaysian education system, there was an emphasis made on the development of thinking skills among students. In particular, the aspiration contained in the Higher Education Blueprint is for students to possess those thinking skills that can enable them to appreciate the different views of others, the ability to think critically and the desire to be innovative thereby, taking the first move to deal with the problem-solving initiative; they were also expected to develop an entrepreneurial mindset to fulfil the requirements of the job market (Ministry of Education Malaysia, 2015). Thus,

an instructional model could be designed to inculcate problem-solving to transform TVET education into a vehicle for developing a thinking workforce, rather than as training in the application of specific procedures. The focus should be on the application of knowledge or 'know-how' or 'know-why', rather than focusing on 'know-what' or just procedures (Masek & Yamin, 2012). Considering the novelty of introducing problem-solving skills within Community Colleges, it appears that much needs to be done. For instance, instructors could benefit from the access to a teaching model template which supports the design and delivery of problem-solving instruction using selected instructional design theories such as the FPOI (First Principles of Instruction)(Merrill, 2012). Studies done by other researchers (Frick, Chadha, Watson, & Zlatkovska, 2010; Lo & Hew, 2017) have also suggested that the use of the First Principles of Instruction can improve students' motivation and learning when compared with other forms of instruction.

6. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The findings of this study should be interpreted in light of its limitations. First, only the perceptions of the students were reported in this study. Since the present study focused on students' perceptions, it is likely that self-reports are the most appropriate measure for data collection (Ensher et al., 2002). The perspective of the instructors in terms of students' problem-solving skills will be reported in another paper. Nevertheless, to eliminate any potential bias in the study, nationwide Culinary Arts students in the March 2016 cohort were studied. It would be helpful if future researchers could examine perspectives of instructors, policymakers and employers as well to compare if there are any discrepancies in the problem-solving abilities. Secondly, the findings are limited by the perception tests used in this study. The study would probably yield different results if the study used achievement tests. Future research should utilize multiple sources of data whenever possible. Nevertheless, the findings will be useful to Culinary Arts instructors, employers and policymakers interested in assessing the level of problem-solving skills of students. In future, should problem-solving skills be taught across Community Colleges, it would be interesting to examine whether students' evaluation of the problem-solving abilities have improved over time (i.e. pre-test and post-test and repetitive measures).

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