



Research Article

## TVET student teachers' soft skill profile of Computer Aided Design (CAD) courses at Malaysian teacher education institute

Sarala Thulasi Palpanadan<sup>1\*</sup>, Ros Eliana Ahmad Zuki<sup>2</sup>, Azhari Mariani<sup>3</sup>

<sup>1</sup>Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Batu Pahat, Johor, Malaysia

<sup>2,3</sup>Institut Pendidikan Guru Kampus Temenggong Ibrahim, 80350 Johor Bahru, Johor, Malaysia

[sarala@uthm.edu.my](mailto:sarala@uthm.edu.my)

\*Corresponding Author email: [sarala@uthm.edu.my](mailto:sarala@uthm.edu.my)

Submission: 22 September 2020    Revised: 24 October 2020

Accepted: 30 November 2020

### ABSTRACT

Soft skills are very much needed and have to be mastered in improving the self-performance of all graduates. The imbalance between academic curriculum and soft skills can also affect the quality of student teachers. A pilot study was also conducted to identify the level of mastery of soft skills (critical thinking and problem solving skills) of Technical and Vocational Education and Training (TVET) student teachers through learning Computer Aided Design (CAD) course using a self-developed profile. Thus, the aim of this study was to validate the developed profile. A quantitative method was employed where questionnaires were distributed for data collection. 37 TVET student teachers were involved in this study. Descriptive statistics using statistical packages for the social science version 25.0 (SPSS version 25.0) were adopted for data analyses. The value of cronbach alpha obtained for the instrument used was 0.974 which was considered high. In addition, the Kappa value obtained was 0.972, indicating a very good agreement from the 3 experts. The findings revealed that participants' mean scores for critical thinking and problem solving skills were 3.439 and 3.437 respectively which revealed that the student teachers were having moderate levels of soft skills. Hence, this study is important and relevant in helping to validate the instrument developed that can be utilised by the lecturers to gain feedback on the mastery level of soft skills among TVET student teachers. Besides, the findings of this study can be implemented for TVET student teachers at other Teachers Training Institute or other institutions.

**Keywords:** *Soft Skills, Profile, Technical and Vocational Education and Training (TVET), Student Teachers, Computer Aided Design (CAD) Courses*

### 1. INTRODUCTION

The Malaysian National Education Philosophy (FPK), since introduced to the public in 1988, targeted the educational outcomes that are capable of producing a balanced human capital in terms of physical, emotional, spiritual and intellectual. Apparently, soft skills are emphasised to be embedded in all the institutions including the teacher education institutions for a better outcome of the courses taught. Various elements of soft skills can be included into the courses taught across the disciplines to help students become successful in academic and also workplaces (1, 2). The philosophy of education continues to be complemented by the existence of various missions, visions and strategic plans, either at the primary education level or at the higher education level. The Education Development

Plan 2013-2025 aims to improve the excellence and quality of teaching and learning at the primary and secondary levels that support the aspirations of FPK (3). The implementation of the Primary School Standard Curriculum (KSSR) and the Secondary School Standard Curriculum (KSSM) in 2013, has further strengthened efforts to achieve the goals of FPK. At the level of Malaysian Institute of Teacher Education (IPGM) this effort is continued with various new policies and programs towards producing the country's first class human capital. New policies, programs and modules such as the application of soft skills in the curriculum are implemented in line with the government's hope in producing graduates who are not only excellent in academics but also able to think critically and have leadership characteristics (4). Graduates of Technical and Vocational Education and Training (TVET) may face career challenges in teaching due to the current changes in various aspects of thinking, economics, technology, social and politics. Thus, it is pertinent that soft skills are inculcated within them in order to face the challenges at the workplace.

Soft skills are something that is invisible, more on interpersonal characteristics of a person and not just technical. It focuses more on personality skills that can help determine a person's strengths in leadership, facilitation, mediation, and consultation. Soft skills are also referred as individual competency skills that are humanistic and have relationships with other human beings (5). Soft skills are very much needed and have to be mastered in improving the self-performance of graduates. The imbalance between academic curriculum and soft skills can affect the quality of student teachers who need to teach and prepare their students for future endeavours. Soft skills were introduced in the module prepared by the Higher Education Department, Ministry of Education Malaysia (4) which have actually been practiced holistically by Teacher Education Institute (TEI) for generations. Nowadays, soft skills are more systematic, directed, practical and aided by more thorough logistics planning (6). The IPGM soft skills handbook has been developed based on several learning theories, namely cognitive theory, constructivism, behaviorism and social which are the basis for the construction of soft skills framework adopted by 27 campuses of TEIs throughout Malaysia. According to the theory of constructivism, learning occurs when past experiences affect new experiences and learning. In other words, learning will only occur when the existing knowledge of the learner can be integrated with the knowledge that has just been received to produce a new and useful concept or information. These concepts, knowledge and experience are the transferable skills. In addition, constructivism which was pioneered by Carl Rogers (1902- 1987) is also known as information processing theory where the individual receives various types of stimuli from the environment consciously or unconsciously.

Most studies related to Computer Aided Design (CAD) courses involved teaching and module development processes. Thus far, there were very limited studies related to the soft skills profile related to TVET student teachers with regard to CAD courses. IPGM recommended that the curriculum should apply soft skills. Thus, the educators seemed to apply soft skills in teaching CAD courses but there was no information on the level of students' mastery level of the soft skills taught or practised. Therefore, this study was important and it was a necessity to validate the profile that can be used as an instrument

to measure the student teachers' mastery of the related soft skills, and at the same time identifying the level of mastery of soft skills of TVET students through CAD courses.

## 2. LITERATURE REVIEW

The CAD course was offered to Year 1 Semester 2 students who opted for the Technology Design course. Through this course, it was hoped that student teachers could design project drawings that would be presented practically and applied in the development of project design using CAD software. The total learning hours for this course is 75 hours, of which 6 hours were lectures and the rest were practical, while the credit value for this course was 3. There were two soft skills attributed to the CAD course as outlined in the Course Information Summary which included critical thinking and problem solving skills.

Critical thinking is one of the elements of soft skills that involves high-level thinking skills (7). Creative thinking is also a form of evaluation process, where evidence is needed in drawing conclusions and considering alternative explanations (8). Some researchers argue that critical thinking aims to produce interpretation, analysis, evaluation and inference, as well as explanations of evidence, conceptual, methodological, criterion, or contextual considerations on which the evaluation is based (9).

Critical thinking should be the core of learning, because it makes a person creative and innovative to be able to solve various problems of daily life in a more complex way. Therefore, the application of critical thinking skills to student teachers is very important, especially the preparation for a very challenging world of education. Some scholars argues that pre-teacher education is the right place for intervention activities that enhance their critical thinking skills (10). Therefore, educational institutions should improve the ability to think critically to student teachers (11). This explains that the critical thinking skills of student teachers need to be improved in line with the challenges of globalization. Therefore, it is an obligation for teacher educators to educate prospective teachers of critical thinking skills so that they can apply it to their students in school later.

Several previous studies suggest learning critical thinking skills in promoting 21st century needs (12, 13). In addition, teacher educators should be able to identify whether student teachers are capable of mastering critical thinking skills in the courses they attend. This is in line with some studies related to critical thinking which states it is important to identify clues to explain the mastery of one's critical thinking (14, 15). Computer Aided Design is one of the courses that is seen to be able to develop the critical thinking potential of teachers holistically, especially from the cognitive aspect. Therefore, the development of a soft skill profile that includes critical thinking is seen as very relevant and important to identify the mastery level of critical thinking of the student teachers.

The debate over the topic of quality education at public institutions has gained a lot of attention these days. The importance of embedding soft skills into the teaching and learning activities is highly emphasized by the scholars and education departments. Among many, problem solving skill is a very important skill not only in educational settings but also throughout life. Problem solving becomes a crucial skill for students to master

when they begin a new section of life upon graduation (16). Problem solving skills also need to be cultivated from a very early stage of schooling years among the learners (17).

Problem solving skill is an important part of soft skills in the domain of Cognitive (7). It is very important for teachers and student teachers to master this skill in order to be able to apply them effectively in their teaching practices. They definitely need to be good teachers who can develop the abilities of students in TVET subjects including CAD. Educators have to be capable enough to manage the abilities of their students in order to provide suitable tasks to be solved while conducting their lessons (18, 19). Since, problem solving skills are normally associated with high proficient students, educators also should ensure that students are able to use the knowledge obtained in the previous lessons in the new tasks or assignments. Apparently, the new tasks which are not the routine exercises can be the challenging problems that would guide the students to develop their thinking skills. This is because problem solving skills are the core areas in teaching critical thinking (20). Thus, choosing the appropriate activities for students becomes an important assignment for educators in order to provide the platform for students to think and work hard in addressing the problems of the tasks given to them.

Problem-solving is known for its complexity which involves various skills that need to be practised and addressed (17). Researchers have highlighted two types of problems which are the routine (ordinary) problems and non-routine problems (21). Routine requires a formula, equation or method to be solved (22). Meanwhile, the non-routine problems refer to the situations where the results could not be guessed earlier, and could not be settled with the help of a known formula and method. In this case, the use of analysis, synthesis, trial-error and creative enterprise could be useful in solving the problems (23). Researchers also highlighted that apart from teaching students to solve problems using the routine problem method, the use of nonroutine problems also should be taught to students which would trigger students' critical thinking skills (22). Furthermore, the practice of the non-routine problems as problem-solving strategies can be beneficial to students in many aspects including inculcating the creative thinking skills (24).

In today's day and age, all students would have to be involved in some kind of problem solving matters where they would have to find solutions using the skills and efforts that they possess. Thus, students will be in a position to find a better solution using the strategy or strategies that they have learnt or familiar with which would define the consequences of the choices made. This is because all problems need careful evaluation and skills to be dealt with. Researchers argue that students need to be given sufficient time to work with the problems assigned to them where they need to write the outcome with justification (25). However, he also stated that if students are not able to solve the problem, they should be given simpler problems where they can take their own pace to solve the problem. Since the outcomes of assessments highlight the level of problem solving ability among students, educators favour employing problem solving techniques in various assessments. Thus, it is vital to teach problem solving skills in schools and tertiary education as a way to prepare students for academic and real-life situations. It is also important for the TVET students' future work area that would be mostly associated with people in public. In this case, their mastery level of soft skills would play an important role for them to be successful

at the workplace. Therefore, this study is conducted with the purpose to identify the student teachers' perception of the mastery of soft skills and validating the profile which is used to measure the level of mastery of the soft skills.

### **3. OBJECTIVE OF THE STUDY**

Thus, the objective of this study was to determine the reliability of the developed profile. This study also aimed at identifying the level of mastery of soft skills (critical thinking and problem solving skills) of TVET student teachers through the learning of CAD course.

### **4. METHODOLOGY**

This study is a descriptive study that employed a quantitative approach using a survey technique. This study involved 37 TVET student teachers who had taken the CAD course (involving the whole population). A perfect instrument will measure a variable accurately (26). Thus, a self-developed questionnaire was used as a research instrument in this study. The questionnaire was divided into two main parts, namely part A that contained questions about the background of students and part B contained questions about soft skills. In section B, a five-level ranking question was used. Strongly agree level (SS) rated 5, agree (S) rated 4, neutral (KS) rated 3, disagree (TS) rated 2 and finally, strongly disagree (STS) rated 1. The instrument called profile was developed based on IPGM Soft Skills Handbook with 30 items (13 items for critical thinking constructs and 17 items for problem solving constructs). The instrument was developed according to the instrument development procedure based on a scale model (27), which emphasised on the following steps: (1) identify constructs and items; (2) examine content validity of constructs and items based on agreement by expert (28); and (3) refine the items obtained from a pilot study for actual study. The questionnaire was validated by 3 experts related to the field. Subsequently, based on the data obtained, analysis was conducted. The quantitative data were analyzed descriptively using SPSS 25.0 software to obtain mean values. The mean interpretation based on Levin and Rubin (2002) was used in this study to determine the knowledge level of soft skills. The mean interpretation of the scores obtained from each construct were 1.00-2.33 (low), 2.34-3.66 (moderate) and 3.78-5.0 (high). Based on the analysis, interpretations were made for the impact of the study related to the need of the profile in TVET education.

### **5. FINDINGS AND DISCUSSION**

#### **5.1. LEVEL OF RELIABILITY OF THE DEVELOPED SOFT SKILL PROFILE**

According to the analysis data via SPSS 25, the cronbach alpha for the instrument (questionnaire) used was 0.974 which was considered high and thus, the instrument could be accepted to be used for this research. In this study, the instrument (questionnaire) was checked and confirmed by three experts. The experts were senior lecturers in this area. The validity checked by the experts confirmed that this study has implemented a check based on the value of Fleiss Kappa index multiplier (29, 28). This step served to ascertain the reliability of the items as agreed by the experts. For each category, every observer's

probability was randomly calculated. The value of the agreement multiplier items for each item was obtained using the following *Fleiss Kappa (Kf)* formula:

$$Kf = (Pa - Pr) / 1 - Pr$$

*Pa* - the agreement level by rating expert.

*Pr* - probability of hypothesis agreement

based on observation data.

Many researchers have agreed that a Kappa value > 0.75 indicates an excellent agreement. A weak agreement is indicated by a Kappa value < 0.40. Another interpretation was gave different interpretations of *k* value as shown in Table 1 (30).

**Table 1. Kappa Agreement Scale**

| Kappa Value | Agreement Level |
|-------------|-----------------|
| Below 0.00  | very weak       |
| 0.01 – 0.20 | weak            |
| 0.21 – 0.40 | moderately weak |
| 0.41 – 0.60 | moderate        |
| 0.61 – 0.80 | good            |
| 0.81 – 1.00 | very good       |

As shown in Table 2 below, the Fleiss Kappa analysis showed that the Kappa value obtained for “soft skills” was 0.972, indicating a very good agreement because the value exceeded 0.80.

**Table 2. Fleiss Kappa Analysis of Soft Skills**

| Item | %Ag  | Item | %Ag  | Item | %Ag  |
|------|------|------|------|------|------|
| CT1  | 1.00 | CT11 | 1.00 | PS21 | 1.00 |
| CT2  | 1.00 | CT12 | 1.00 | PS22 | 1.00 |
| CT3  | 0.67 | CT13 | 1.00 | PS23 | 1.00 |
| CT4  | 0.67 | PS14 | 1.00 | PS24 | 1.00 |
| CT5  | 0.67 | PS15 | 1.00 | PS25 | 1.00 |
| CT6  | 1.00 | PS16 | 1.00 | PS26 | 1.00 |
| CT7  | 1.00 | PS17 | 1.00 | PS27 | 1.00 |
| CT8  | 1.00 | PS18 | 1.00 | PS28 | 1.00 |
| CT9  | 1.00 | PS19 | 1.00 | PS29 | 1.00 |
| CT10 | 1.00 | PS20 | 1.00 | PS30 | 1.00 |

## 5.2. THE PERCEPTIONS OF TVET STUDENTS TOWARDS THE LEVEL OF MASTERY OF SOFT SKILLS

Table 3 shows the summary of the students' responses based on the 2 constructs in soft skills, critical thinking and creative and innovative ways of solving problems.

**Table 3. Summary of responses**

| Skills            | No of Items | No of respondents | Overall Mean |
|-------------------|-------------|-------------------|--------------|
| Critical Thinking | 13          | 37                | 3.439        |
| Problem solving   | 17          | 37                | 3.437        |



According to Table 1, the means of all 30 items were between 3.2432 - 3.5405 (moderate). The findings revealed that participants' mean scores for critical thinking was 3.439 and problem solving was 3.437. Based on the mean interpretation (31), both of these means show that students' skills of critical thinking and problem solving were considered moderate.

## 6. CONCLUSION

The development of the soft skills profile was conducted to determine the mastery of the soft skill levels among TVET student teachers in the CAD courses. The developed profile could be a quality instrument for assessing the student teachers' soft skills including critical thinking and problem solving skills, which are applicable for TVET student teachers and educators in general. The findings of the study revealed that the participants' mean scores for critical thinking and problem solving skills were relatively moderate. Therefore, this study proved that a lot of effort needs to be taken by all parties involved in TVET education at teacher education institutions to improve this situation. Soft skills are very much needed and they need to be mastered to improve the self-performance of student teachers and graduates at the workplace. This is because the imbalance between academic curriculum and soft skills can affect the quality of the students' teachers in handling the teaching and learning processes effectively in the classrooms.

In addition, this study is also important and relevant in helping the TVET educators and lecturers to gain feedback on the mastery level of soft skills among TVET student teachers. Thus, it is proposed that this study be implemented for TVET student teachers in other Teachers Training Institute or other institutions to obtain their levels of soft skill mastery in order to bring this issue to the attention of the policy makers and stakeholders. In this way, it is hoped that the implementation of embedding soft skills in all the subjects, particularly TVET education at IPGM could be conducted more rigorously. This will also be in line with the hope of the Ministry of Education in producing more effective and empathetic student teachers who could conduct the teaching and learning activities more meaningfully to help create a better nation. Therefore, this profile could be used as a yardstick to investigate the level of soft skill mastery in other settings and actions could be taken to improvise the mastery of the skills among the student teachers and graduates in other fields.

## Reference:

1. Majid, S., Liming, Z., Tong, S., & Raihana, S. Importance of soft skills for education and career success. *International Journal for Cross-Disciplinary Subjects in Education*. 2012, 2(2), 1037-1042.
2. Greenberg, A.d., & Nilssen, A.H. The role of education in building soft skills. Putting into perspective the priorities and opportunities for teaching collaboration and other soft skills in education. 2015, Wainhouse Research. (online) <https://www.google.ca/url>
3. Ministry of Education Malaysia. *Malaysian Education Blueprint 2013-2025*. Putrajaya: Ministry of Education, Malaysia. 2013

4. The Higher Education Department, Ministry of Education Malaysia. *Modul Pembangunan Modul Pembangunan Kemahiran Insaniah (Soft Skills) untuk Institusi Pengajian Tinggi Malaysia*. Universiti Putra Malaysia. 2006
5. Ahmad Esa, Suhaili Padil and Asri Selamat (). Application of Soft Skills In Architectural Programme In Polytechnics To Meet Industrial Requirements. Proceeding Malaysia International Technical HRD & 9th AASVET Conference 2013. *Asian Academic Society for Vocational Education and Training*. 2013, 633-640.
6. Rahimin Affandi Abd. Rahim, Lazim Omar, Nor Adina Abd Kadir and Nor Hayati Dahlal. Kemahiran Insaniah Di Institusi Pengajian Tinggi Awam Islam Malaysia Dan Indonesia: Satu Analisis Perbandingan (Soft Skills in Islamic higher Learning Institutions in Malaysia and Indonesia: A Comparative Analysis). *JATI-Journal of Southeast Asian Studies*. 2009, V. 14, p. 53-61, Dec. 2009. ISSN 2600-8653.
7. Bailin, S. Critical thinking and science education. *Science & Education*. 2002, 11(4), 361-375. DOI10.1023/A:1016042608621
8. Fani, T. *Overcoming Barriers to Teaching Critical Thinking*. Paper presented at the 1st international conference on the Future of Education, Florence, Italy, 2011 June.
9. Zhou, Q., Huang, Q., and Tian, H. Developing Students' Critical Thinking Skills by Task-Based Learning in Chemistry Experiment Teaching. *Creative Education*. 2013, 4(12), 40. DOI: <http://dx.doi.org/10.4236/ce.2013.412A1006>
10. Warburton, E. C. Changes in Dance Teachers' Beliefs About Critical-Thinking Activities. *Journal of Education and Human Development*. 2008, 2(1), 1-16.
11. Innabi, H., and ElSheikh, O. The Change in Mathematics Teachers' Perceptions of Critical Thinking after 15 Years of Educational Reform in Jordan. *Educational Studies in Mathematics*. 2007, 64(1), 45-68.
12. Fine, M. & Desmond, L. Inquiry-Based Learning: Preparing Young Learners for the Demands of the 21st Century. *Educator's Voice*. 2015, VIII, 2-11.
13. Hamlin, M., and Wisneski, D. Supporting the Scientific Thinking and Inquiry of Toddlers and Preschoolers Through Play. *Young Children*. 2012, 67(3), 82-88.
14. Facione, P. *Critical Thinking. What It Is and Why Its Counts*. Measured Reason and The California Academic Press. 2011
15. Paul, R. and Elder, L. *Critical Thinking (Concepts and Tools)*. The Foundation for Critical Thinking. 2006
16. Krulik, S. and Rudnick. J. A. *The New source book for teaching reasoning and problem solving in junior and senior high schools*. Boston, MA: Allyn and Bacon. 1996
17. Saygili, S. Examining the Problem Solving Skills and The Strategies Used by High School Students in Solving Non-routine Problems, *E-International Journal of Educational Research*. 2017, Vol: 8(2), 91-114.
18. Soifer. A. *What "Problem Solving" ought to mean and how Combinatorial Geometry answers this Question*, *Mathematics Competitions*. 2013, 26. 1. 8-22
19. Taylor. P. Classifying Methods of Problem Solving - and my Favorites, *Mathematics Competitions*. 2015, 28(1), 7-27.
20. Kem, G.N. Developing Problem-solving Skills. *Mathematics Competitions*. 2016, 29, 26-40.



21. Altun, M., Bintas, J., Yazgan, Y., Arslan, C. *Examination of problem solving development of elementary school students* (Project No. AFP 2001/37). Bursa, Turkey: Uludağ University, Academic Research Projects Department. 2007
22. Polya, G. *How to solve it: A New aspect of mathematical method*. 2nd ed. New York: Double Day and Co. 1957
23. Woodward, J., Beckmann, S., Driscoll, M., Franke, M., Herzig, P., Jitendra, A., Koedinger, K. R. and Ogbuehi, P. *Improving Mathematical Problem Solving in Grades 4 Through 8. Educator's Practice Guide*. U.S. Department of Education. 2012
24. Mabilangan, R. A., Limjap, A. A. and Belecina, R. R. Problem Solving Strategies of High School Students on Non-Routine Problems. *Alipato: A Journal of Basic Education*. 2011, Vol (5), 23-47.
25. London, R. A Curriculum of Non-Routine Problems. *American Educational Research Association: Atalanta*. 1993
26. Mohd Majid Konting. *Kaedah Penyelidikan Pendidikan*. Kuala Lumpur: Dewan Bahasa dan Pustaka. 2005
27. Cohen, R. J. and Swerdlik, M. E. *Psychological testing and assessment*. (5th ed.). Boston, MA: McGraw-Hill. 2002
28. Fleiss J., L. Measuring Nominal Scale Agreement Among Many Raters. *Psychological Bulletin*. 1981, 76(5), 378-382.
29. Cohen, J. A Coefficient for Agreement For Nominal Scales. *Educational and Psychological Measurement*. 1960, 37-46.
30. Landis, J. R. dan Koch, G. G. The Measurement of Observer Agreement for Categorical Data. *Biometrics*. 1977, 33 (1), 159-174.
31. Levin, R.I. and Rubin, D.S. *Statistik Untuk Pengurusan* (Ed. Ke.7). Edisi Bahasa Melayu, Terjemahan oleh Susila Munisamy dan Halimah Awang. Prentice Hall, Pearson Education Malaysia. 2000