

Technological pedagogical and content knowledge among vocational special education teachers

Conocimientos pedagógicos y de contenido tecnológico entre los docentes de educación especial vocacional

Rubashini Ramakrishnan¹

Universiti Kebangsaan Malaysia - MALAYSIA

rrruba_83@yahoo.com

Norshidah Mohamad Salleh²

Universiti Kebangsaan Malaysia - MALAYSIA

nshidah@ukm.edu.my

Aliza Alias³

Universiti Kebangsaan Malaysia - MALAYSIA

eliza@ukm.edu.my

ABSTRACT

Teachers play an essential function in implementing the ultimate goal of education by producing insightful human capital in line with the goals of the Pelan Pembangunan Pendidikan Malaysia (PPPM) 2013-2025. This effort is also the main responsibility of special education teachers in improving a learning process that satisfies the specific necessities of special needs students. Special education teachers require to furnish themselves with a wide assortment of knowledge and skills so that quality education can be applied to students with special needs. Therefore, this study investigates the level of technological pedagogical and content knowledge, teaching style, self-efficacy and competence of vocational special education teachers. This research employs a quantitative approach applying the survey method. In this research, 36 teachers from vocational special education school from the state of Selangor involved as a sample. The collected data were analysed, adopting the SPSS application to get the mean and standard deviation.

Keywords: Technological Pedagogical and Content Knowledge, Teaching Style, Self-Efficacy, Competence, Special Education Teacher.

RESUMEN

Los maestros desempeñan una función esencial en la implementación del objetivo final de la educación al producir un capital humano perspicaz en línea con los objetivos del Pelan Pembangunan Pendidikan Malasia (PPPM) 2013-2025. Este esfuerzo es también la responsabilidad principal de los maestros de educación especial para mejorar un proceso de aprendizaje que satisfaga las necesidades específicas de los estudiantes con necesidades especiales. Los maestros de educación especial deben proporcionarse una amplia variedad de conocimientos y habilidades para que la educación de calidad se pueda aplicar a los estudiantes con necesidades especiales. Por lo tanto, este estudio investiga el nivel de conocimiento tecnológico pedagógico y de contenido, estilo de enseñanza, autoeficacia y competencia de los docentes de educación especial vocacional. Esta investigación emplea un enfoque cuantitativo aplicando el método de encuesta. En esta investigación, 36 profesores de la escuela de educación especial vocacional del estado de Selangor participaron como muestra. Los datos recopilados fueron analizados, adoptando la aplicación SPSS para obtener la media y la desviación estándar.

Palabras clave: Pedagogía tecnológica y conocimiento del contenido, estilo de enseñanza, autoeficacia, competencia, docente de educación especial.

1 Faculty of Education, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

2 Corresponding author. Faculty of Education, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia.

3 Faculty of Education, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

Recibido: 22/07/2019 Aceptado:05/10/2019

1. INTRODUCTION

Education is an important element in the development of countries and nations. The country's education system is intended to produce quality citizens and to fulfil the country's goals. Advances in the educational system are continually growing and necessary as there are differences and demands at the national level and swift growth globally (Zainal, Talib, Idris, Noor & Salleh, 2014). Influence of changes that will discursively impact student accomplishment, especially at school level and this involves special needs students. Consequently, the government has presented education in a manner to provide the needs of the students in line with the expansion of education at the national level. The curriculum is designed not only to produce knowledgeable citizens but also skilful in various fields. Malaysia Education Ministry provides the vocational education curriculum for special needs students as they have the physical capacity to be trained in order to practice the skills acquired after graduation (KPM, 2012). Trained teachers are required to actualize government goals. Besides, teachers must also have the confidence to keep up with the developments in the national education system. Teachers who teach special needs students in schools, especially in vocational education schools have to furnish themselves with a broad array of knowledge and skills. They should be informed of the technological pedagogical and content knowledge, teaching style, self-efficacy and competence as planned in the Standard Kualiti Pendidikan Malaysia Gelombang 2 (SKPMg2)(KPM, 2017).

Additionally, they need to possess the knowledge and skills in the subjects taught, even the teachers need to know about the special needs students themselves and the necessary learning support (Salleh, Hassan & Zainal, 2018). Teachers' mastery in integrating technological pedagogical and content knowledge is necessary because teachers are accountable for the learning activities of special needs students in schools. Previous studies reveal that special education teachers are less skilled in the adoption of technology in teaching which becoming less attractive and boring (Giles & Kent, 2016; Tondeur, Paraje, van Braak, Voogt & Prestridge, 2017). Knowledge in technology, pedagogy and content is important to integrate into special education so that the potential of special needs students can be improved and facilitate them to become independent (Liu, Wu & Chen, 2013). Teachers need to equip themselves with technology-related knowledge so that these components can be combined with pedagogy and content when teaching. Rather than that, teaching style also becomes one of the important elements to be included in teachers' daily teaching. Teachers are found to be less aware of the teaching objectives provided because they do not take into account the special needs students' ability (Sweigart, Landrum & Pennington, 2015). Teachers must change their teaching styles if they notice special needs students are starting to lose focus and become stultify (Gunarhadi, Sunard, Andayani & Supratiwi, 2018) during the teaching and learning process. Teachers need to diversify their teaching styles according to the needs and abilities of the special needs students so that the teaching environment is more enjoyable and active learning can be created.

Self-efficacy also plays a vital role because teachers' personal beliefs can positively impact students' achievement, especially special needs students. Teachers with low self-efficacy are incapable of presenting quality education in special education (Dunst & Brother, 2014). Conversely, if teachers have positive self-efficacy, teachers can offer better teaching strategies (Katz, 2015; Ramakrishnan & Salleh, 2018) and engaged special needs students in learning with more effective (Narkon & Wells, 2013). High self-efficacy of teachers can promote special needs students' eagerness to learn more. The same observation applies to competence that is being the principal pillar of the teaching profession. Teachers with less competence will negatively impact the social, emotional and behavioral of special needs students (Verschueren & Kooman, 2012). If teachers are profoundly competence, an excellent social relationship between teachers and students can be built (Breeman et al., 2015). Teachers need great levels of academic and professional skills so that special needs students can master new knowledge and practice it after school.

Ergo, research on the level of technological pedagogical and content knowledge, teaching style, self-efficacy and competence among special education teachers are explored. Four research questions were developed:

1. What is the level of technological pedagogical and content knowledge of teachers in vocational special education?
2. What is the level of the teaching style of teachers in vocational special education?
3. What is the level of self-efficacy of teachers in vocational special education?
4. What is the level of competency of teachers in vocational special education?

2. METHODOLOGY

The survey was done at a vocational special education secondary school in the state of Selangor. The study sample (N = 36) was selected as the sample for this pilot study. The sample selection was based on criteria that only teachers who teach in vocational special education schools are involved.

There were four research instruments applied and adapted in this study. The instruments are Technological Pedagogical and Content Knowledge (Hani, 2017), Grasha Teaching Style (Grasha, 1996), Teacher Sense of Efficacy Scale (TSES) (Nik Aida, 2016) and SKPMg2 Competence (KPM, 2017). This survey includes five parts. Part A is Respondent's Personal Profile Information with eight items. Part B is Technological Pedagogical and Content Knowledge with four constructs. The answer choices for each item were based on a five-point Likert scale, which strongly disagrees to strongly agree. Part C is a Teaching Style with five constructs. The answer choices for each item were based on a seven-point Likert scale, which strongly disagrees to strongly agree. Part D is Self-Efficacy with three constructs. The answer options for each item were based on a nine-point Likert scale, which is not very confident to very confident. Part E is Competence with five constructs. The answer choices for each item were based on a five-point Likert scale, which is not very confident to very confident.

3. DATA ANALYSIS

The pilot study ascertained that the Cronbach's Alpha for the instrument reliability level of technological pedagogical and content knowledge was .882, teaching style was .956, self-efficacy was .958 and competence was .945. Questionnaire responses were analysed using the Statistical Packages for the Social Sciences (SPSS) version 23.0. Descriptive statistics of mean and standard deviation were applied to analyse the results of this study. To define the level of each variable, mean values were categorized according to varying mean scores per section, as shown in tables 1 to 3.

Table 1 Interpretations of mean scores for the technological pedagogical and content knowledge and competence level of vocational special education teachers

Mean scores	Interpretations
1.00 – 1.89	Very low
1.90 – 2.69	Low
2.70 – 3.49	Moderate
3.50 – 4.29	High
4.30 – 5.00	Very High

Source: Adaptation from *Bahagian Perancangan dan Penyelidikan Dasar Pendidikan* (BPPDP) (KPM, 2006)

Table 2 Interpretations of mean scores for the teaching style level of vocational special education teachers

Mean scores	Interpretations
1.00 – 3.00	Low
3.01 – 5.00	Moderate
5.01 – 7.00	High

Source: Adaptation from Nik Yusof (2004)

Table 3 Interpretations of mean scores for the self-efficacy level of vocational special education school teachers

Mean scores	Interpretations
1.00 – 1.80	Very low
1.81 – 3.60	Low
3.61 – 5.40	Moderate
5.41 – 7.20	High
7.21 – 9.00	Very High

Source: Adaptation from Nik Aida (2016)

4. RESULT AND DISCUSSION

The results of this study are based on the research questions to study at the level of technological pedagogical and content knowledge, teaching style, self-efficacy and competence of vocational special education teachers.

a. Level of Technological Pedagogical and Content Knowledge

Table 4 Level of Technological Pedagogical and Content Knowledge

Constructs	Mean	Standard Deviation	Interpretations Level
Technological Pedagogical Knowledge	4.03	.777	High
Technological Content Knowledge	4.06	.611	High
Pedagogical Content Knowledge	4.27	.450	High
Technological Pedagogical Content Knowledge	4.06	.532	High

Table 4 shows the mean scores for the level of the technological pedagogical and content knowledge of vocational special education teachers. Generally, it was discovered that the level of technological pedagogical and content knowledge was high (mean=4.13, sd=.435). The technological pedagogical knowledge construct had a mean of 4.03 with a standard deviation of .777 while the construct of technological content knowledge had a mean of 4.06 with a standard deviation of .611. The pedagogical content knowledge construct had a mean of 4.27 with a standard deviation of .450 while the construct of technological pedagogical content knowledge has a mean of 4.06 with a standard deviation of .532. From the findings, teachers' level of knowledge was found to be higher in pedagogical content knowledge comparison to other constructs. This outcome signifies that teachers in vocational special education have good knowledge of technology, pedagogy and content.

b. Level of Teaching Style

Table 5 Level of teaching style

Constructs	Mean	Standard Deviation	Interpretation Level
Expert	5.58	.735	High
Formal Authority	5.57	.754	High
Personal Model	5.63	.770	High
Facilitator	5.34	.827	High
Delegator	5.46	.845	High

Table 5 presents the mean scores for the teaching style of teachers in vocational special education. Overall it was found that the level of teaching style was high for all teaching styles (mean=5.52, sd=.703). The construct of expert had a mean of 5.58 with a standard deviation of .735 while an authority formal construct had a mean of 5.57 with a standard deviation of .754. The construct of personal model had a mean of 5.63 with a standard deviation of .770 while the facilitator construct had a mean of 5.34 with a standard deviation of .827. The construct of delegator had a mean of 5.46 with a standard deviation of .845. Based on the results, the level of personal model teaching style is found to be higher than other teaching styles. It points out that teachers in vocational special education specialize in teaching using variety of teaching styles.

c. Level of Self-Efficacy

Table 6 Level of self-efficacy

Constructs	Mean	Standard Deviation	Interpretations Level
Student Engagement	7.22	1.082	Very High
Instructional Strategies	7.32	1.320	Very High
Classroom Management	7.44	1.103	Very High

Table 6 displays the mean scores for the self-efficacy level of teachers in special vocational education. Overall, teachers' self-efficacy was found to be very high (mean=7.33, sd=1.104). The student engagement construct had a mean of 7.22 with a standard deviation of 1.082 while the construct of instructional strategies had a mean of 7.32 with a standard deviation of 1.320. The classroom management construct had a mean of 7.44 with a standard deviation of 1.103. From the data obtained, the effectiveness of teachers in vocational special education is higher in the classroom management aspect.

d. Level of Competence

Table 7 Level of competence

Constructs	Mean	Standard Deviation	Interpretations Level
Teacher as Planner	4.50	.561	Very High
Teacher as Controller	4.45	.470	Very High
Teacher as Adviser	4.56	.452	Very High
Teacher as Assessor	4.54	.445	Very High
Teacher as Motivator	4.56	.418	Very High

Table 7 exposes the mean scores for competence levels of teachers in vocational special education. Generally, teacher competence was found to be very high (mean=4.52, sd=.401). The construct as a planner had a mean of 4.50 with a standard deviation of .561 while the construct as a controller had a mean of 4.45 with a standard deviation of .470. The construct as an adviser had a mean of 4.56 with a standard deviation of .452 while the construct as an assessor had a mean of 4.54 with a standard deviation of .445. The construct as a motivator had a mean of 4.56 with a standard deviation of .418. From the findings, the level of competence of teachers in vocational special education is higher in terms of teachers as adviser and motivator in comparison to other constructs.

The teaching profession is a significant concern that every teacher should take into account. Teachers need to have knowledge from varying facets so that the quality education process can be conducted to the special needs students. Technological pedagogical and content knowledge is one of the components that should be incorporated into the daily teaching of all teachers. The outcomes of this study are parallel with previous research decisions such as Gómez-Ariza, Conejeras-Solar and Martín (2016) and Demirok and Bağlama (2018) which present that teachers' technological pedagogical and content knowledge is at a high level.

For the teaching style, the findings are similar to the study by Blândul and Bradea (2017) and Gunarhadi et al. (2018) who found that the teaching style of teachers who teach special needs students is at a high level. While Gunarhadi, Anwar, Andayani and Shaari (2016) proposed that the level of the teaching style of teachers was negative as teachers would regularly separate the special needs students with the typical students, in learning. Various teaching styles influence the presentation of these students in learning, both academically and psychologically (Gunarhadi et al., 2016). Teachers can motivate students by diversifying their teaching style to appropriate the level of special needs students.

Breeman et al. (2015) and Lowrey, Hollingshead, Howery and Bishop (2017) found that high levels of teacher self-efficacy actually had a strong impact on special needs students' stance. The findings of this study are parallel with their findings where the level of teacher self-efficacy is at a very high level. Teachers' high self-efficacy is required to diminish the weaknesses when teaching special needs students (Narkon & Wells, 2013; Yin, Loreman, Majid & Alias, 2019). Self-efficacy represents a vital position in every teacher because their confidence can grant an engaging learning atmosphere.

Blândul and Bradea (2017) emphasize the importance of the element of competence among teachers. According to their research, competence does not only needs attention in regards to the development of professionalism but also on ways in which a teacher should emphasize and asses the skills. This aspect is similar to this study where the level of teacher competence is very high as teachers can implement and evaluate teaching in the capacity special needs students.

5. CONCLUSION

Altogether, the research carried out among vocational special education school teachers is at a great level. Teachers are perceived to be aware of their respective responsibilities in reaching the significant aims of their teaching profession. Teachers need to keep striving for knowledge in all phases of academics and skills. Therefore, teachers need to be more conscious of the types and specifications of courses needed to keep up with the current momentum.

This study can be referred by disparate parties, especially policy practitioners, informing the implementation of vocational education for special needs students and the teachers. The elements of technological pedagogical and content knowledge, teaching style, self-efficacy and competence need to be highlighted in outlining a guide that will serve as reference material for teachers. Also, the findings present powerful implications for teachers who teach special needs students so that a quality education system can be provided to them. Implementation of quality vocational education needs to be practiced in daily teaching so that skillful and knowledgeable special needs students can be produced. The findings also highlight how the teaching profession can be enhanced in a better way. Teachers need to be more responsible towards their duties as an ideal teacher so that their services are optimized by everyone, including special needs students, parents, schools, community and the country.

As a suggestion for further research, studies related to technological pedagogical and content knowledge, teaching style, self-efficacy and competence of vocational special education school teachers could be expanded by looking at perspectives of educational options, gender and teaching experience. The dominant factors and the influence on the teaching profession can also be analyzed.

ACKNOWLEDGMENT

This research was supported by the grant from the Faculty of Education, Universiti Kebangsaan Malaysia: GG-2019-062

BIBLIOGRAPHIC REFERENCES

- Blândul, V. S., & Bradea, A. (2017). Developing psychopedagogical and methodical competences in special / inclusive education teacher. *Problems of Education in the 21st Century*, 75(4), 335-344.
- Breeman, L. D., Wubbels, T., van Lier, P. A. C., Verhulst, F. C., van der Ende, J., Maras, A., ... Tick, N. T. (2015). Teacher characteristics, social classroom relationships, and children's social, emotional, and behavioral classroom adjustment in special education. *Journal of School Psychology*, 53(1), 87-103
- Demirok, M. S., & Baglama, B. (2018). Examining technological and pedagogical content knowledge of special education teachers based on various variables. *TEM Journal*, 7(3), 507-512.
- Dunst, C. J., & Bruder, M. B. (2014). Preservice professional preparation and teachers' self-efficacy appraisals of natural environment and inclusion practices. *Teacher Education and Special Education*, 37(2), 121-132.
- Giles, R. M., & Kent, A. M. (2016). An investigation of preservice teachers' self-efficacy for teaching with technology. *Asian Education Studies*, 1(1), 32-40.
- Gómez-Ariza, M. P., Conejeros-Solar, M. L., & Marti, A. (2016). How good is good enough? A community-based assessment of teacher competencies for gifted students. *SAGE Open*, 6(4), 1-14.
- Grasha, A. F. (1996). *Teaching with style*. CA, United States of America: Alliance Publishers.
- Gunarhadi, Anwar S. M., Andayani, T. R., & Shaari A. S. (2016). The effect of cluster-based instruction on mathematic achievement in inclusive schools. *International Journal of Special Education*, 31(1), 78-87.
- Gunarhadi, Sunard, Andayani. T. R., & Supratiwi. M. (2018). Breaking academic inclusion through cluster-based instruction (An approach to differentiated instruction for students with disabilities in inclusive schools). *Journal of Engineering and Applied Science*, 13(8), 2221-2225.
- Hani, M. A. M. (2017). *Hubungan amalan pengintegrasian teknologi maklumat dan komunikasi (TMK) dengan pengetahuan teknologi pedagogi kandungan (PTPK), gaya pengajaran dan kepercayaan guru kemahiran hidup bersepadu*. (PhD's Thesis). Bangi, Universiti Kebangsaan Malaysia.
- Katz, J. (2015). Implementing the three block model of universal design for learning: Effects on teachers' self-efficacy, stress, and job satisfaction in inclusive classrooms K-12. *International Journal of Inclusive Education*, 19(1), 1-20.
- KPM (2012). *Transformasi Pendidikan Vokasional. Pelan Pembangunan Pendidikan Malaysia (PPPM) 2013-2020*. Putrajaya, Kementerian Pelajaran Malaysia.

- KPM. (2006). *Bahagian Perancangan dan Penyelidikan Dasar Pendidikan. Pelan Induk Pembangunan Pendidikan 2006-2010*. Putrajaya, Kementerian Pelajaran Malaysia.
- KPM. (2017). *Standard Kualiti Pendidikan Malaysia Gelombang 2*. Jemaah Nazir dan Jaminan Kualiti. Putrajaya, Kementerian Pelajaran Malaysia.
- Lowrey, K. A., Hollingshead, A., Howery, K., & Bishop, J. B. (2017). More than one way: Stories of UDL and inclusive classrooms. *Research and Practice for Persons with Severe Disabilities*, 42(4), 225-242.
- Narkon, D. E., & Wells, J. C. (2013). Improving reading comprehension for elementary students with learning disabilities: UDL enhanced story mapping. *Preventing School Failure: Alternative Education for Children and Youth*, 57(4), 231-239.
- Nik Aida. S. N. Z. A. (2016). *Hubungan sokongan guru besar, efikasi sendiri, efikasi kolektif dengan komitmen kerja guru pendidikan khas*. (PhD's Thesis). Bangi, Universiti Kebangsaan Malaysia.
- Nik Yusoff. N. M. R. (2004). *Kemahiran mendengar bahasa Arab: Satu kajian di Sekolah Menengah Kerajaan Negeri*. (PhD's Thesis). Bangi, Universiti Kebangsaan Malaysia.
- Ramakrishnan, R., & Salleh, N. M. (2018). Teacher's self-efficacy: A systematic review. *International Journal of Academic Research in Business and Social Sciences*, 8(12), 2379-2402.
- Salleh, N. M., Hassan, N. J., & Zainal, K. (2018). The needs of modification teaching and learning Mathematics for students with visual impairment in primary school. *Journal of Advanced Research in Dynamical and Control Systems*, 10(2), 1662-1668.
- Sweigart, C. A., Landrum, T. J., & Pennington, R. C. (2015). The effect of real-time visual performance feedback on teacher feedback: A preliminary investigation. *Education and Treatment of Children*, 38(4), 429-450.
- Tondeur, J., Pareja Roblin, N., van Braak, J., Voogt, J., & Prestridge, S. (2017). Preparing beginning teachers for technology integration in education: Ready for take-off?. *Technology, Pedagogy and Education*, 26(2), 157-177.
- Verschuere, K., & Kooman, H. M. Y. (2012). Teacher-child relationships from an attachment perspective. *Attachment and Human Development*, 14(3), 205-211.
- Yin, L. C., Loreman, T., Majid, R. A., & Alias, A. (2019). The Dispositions towards loving pedagogy (DTLP) scale: Instrument development and demographic analysis. *Teaching and Teacher Education*, 86(2019), 1-9.