International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
www.ijmoe.com

GLOBAL ACADEMIC EXCELLENCE

CONTEXTUAL KNOWLEDGE IN ELECTRICAL TECHNOLOGY EDUCATION: A STUDY OF TVET EDUCATORS' PERSPECTIVES AND PRACTICES IN TEACHING AND LEARNING

Mohd Fahmi Adnan[1*], Mohd Zolkifli Abd Hamid[2], Mohd Hizwan Mohd Hisham[3], Mohd Fadzil Daud[4]

[1] Department of Technical and Engineering Education, School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Malaysia
Email: mohdfahmi.adnan@utm.my
[2] Department of Technical and Engineering Education, School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Malaysia
Email: mohdzol@utm.my
[3] Department of Technical and Engineering Education, School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Malaysia
Email: hizwan@utm.my
[4] Department of Applied Mechanics & Design, Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, Johor, Malaysia
Email: fadzil@utm.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 10.12.2023
Revised date: 15.01.2024
Accepted date: 19.02.2024
Published date: 12.03.2024

To cite this document:

Adnan, M. F., Abd Hamid, M. Z., Hisham, M. H. M., & Daus, M. F. (2024). A Contextual Knowledge In Electrical Technology Education: A Study Of Tvet Educators' Perspectives And Practices In Teaching And

Abstract:

In ensuring TVET graduates have been equipped with a good level of competency and are ready for industrial revolution 4.0 needs, a lot of initiatives have been introduced by the National TVET Council (MTVET), universities and TVET institutions providers. But there is still a phenomenon where the industry questions the quality of TVET graduates, particularly in the aspects of knowledge and skills. In making the TVET students able to capture and realize the real working environments and practices during the process of teaching and learning, TVET educators need to instill the elements of contextual knowledge into their curriculum design. Having a contextual teaching and learning approach in the education system has been proved by many scholars that it has had a good impact on making the students involved in meaningful learning processes by connecting them to real-life situations and linking them on how to apply it in the workplace and everyday life. Thus, this present study has investigated the utilization of contextual knowledge in teaching and learning electrical technology courses among TVET educators. An explanatory

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

Learning. *International Journal of Modern Education, 6* (20), 151-160.

DOI: 10.35631/IJMOE.620012

sequential mixed method research design has been followed to conduct this investigation study. Two phases of data collection have been involved and the priority has been given to quantitative data and followed by qualitative research data. The population for this study is electrical technology program lecturers from the Vocational Colleges in Malaysia. Findings from this study are expected to give a current visual of contextual knowledge levels among TVET educators that have been instilled in the teaching and learning process. In future research, all the significant findings from this study can be utilized for conducting follow-up research on developing a framework of contextual knowledge in teaching and learning for TVET educators.

Keywords:

Contextual Knowledge; TVET Educators; Engineering Education; Electrical Technology

Introduction

In the era of Industrial Revolution 4.0, TVET educators should be equipped with and enhance their teaching competencies to conduct technical and vocational training that promotes future human capital and the adaptation of new technologies in teaching and learning to face global challenges. Hence, it is challenging and highly necessary to have TVET educators with the appropriate set of modern, advanced skills, knowledge, and attitudes that align with changes brought on by globalization and current issues faced. TVET educators need the ability to adjust, adapt, and become more flexible during the process of designing and implementing the curriculum and learning environments (Ismail et al., 2018).

As mentioned by Wagiran et al. (2019) in their studies on future TVET educators' competencies, it is emphasized that TVET educators need to incorporate contextual learning elements into their curriculum. According to Wagiran et al. (2019) and Grollmann (2008), this contextual learning can aid students during the transition from school to the workplace. In the regional TVET teacher standard for ASEAN, Becker and Spöttl (2019) have underscored the importance of TVET educators instilling contextualization elements in their students to help them link their knowledge and skills with real-world applications and environments. Mishra (2019) stated that contextual knowledge has become a fundamental necessity to include in the teaching and learning process; lacking it can limit the effectiveness and success of creating meaningful learning experiences. Advancing contextual knowledge levels can also enhance individuals' innovation in their daily work (Muhammed et al., 2011). Based on previous study findings, a lack of instilling contextual knowledge during the teaching and learning process has had a negative impact on the competencies of graduate students (Mitana and Kitawi, 2021; Phan, 2020; Anderson, 2020; Adnan et al., 2019; Buchanan et al., 2019; Mishra, 2019; Abebe, 2009).

Therefore, it is crucial for TVET educators to possess a good level of contextual knowledge in order to guide students in achieving learning goals, relevant content, and concepts that hold meaning in their daily lives. Since no comprehensive academic study has investigated the utilization of contextual knowledge among TVET educators in the electrical technology course, the researcher feels a responsibility to conduct an explanatory study to determine the extent of contextual knowledge utilization among TVET educators in teaching and learning electrical technology courses. Consequently, this conducted research study seeks answers to the following research objectives:

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

1. To examine the extent of TVET educators' contextual knowledge utilization in teaching and learning electrical technology courses based on the elements of realization, design intention and normalization.
2. To identify the level of contextual knowledge elements utilization among TVET educators in teaching and learning electrical technology courses.
3. To explore the essential contextual knowledge elements instill by TVET educators in teaching and learning electrical technology courses.

This conducted research study has explored the cognitive domain based on the cognitive constructivism theory, drawing on Piaget's work. According to Amineh and Asl (2015), the cognitive constructivism theory emphasizes the cognitive processes that individuals use to make sense of their surroundings. Al Mulhem (2014) added that in Piaget's theory, the focus was more on how students construct meaning and understand it by actively exploring and discovering the world around them.

Conceptual Framework

As illustrated in Figure 1, three main frameworks have been referenced in the conceptual framework of this study. These frameworks include the framework of contextual knowledge in 3D CAD modeling for Mechanical Engineering Undergraduates program (Adnan, 2021), the REACT Strategies for contextual teaching and learning framework (Crawford, 2001), and the framework of core competencies for an ideal future vocational teacher proposed by Wagiran et al. (2019). In this study, the framework of contextual knowledge by Adnan (2021) was served as the primary framework. Three elements of contextual knowledge; realization, design intention, and normalization has been utilized as the independent constructs of this study. The elements in this framework were developed based on an exploratory study conducted with practicing engineers in the manufacturing industry. All the emerged elements and sub-elements of contextual knowledge emerged in this framework are based on the experiences of practicing engineers in the application of 3D CAD modeling software in their daily product design work. The three main elements and appropriate sub-elements from this framework has been referenced in this study to guide the researcher in investigating TVET educators' contextual knowledge use during the teaching and learning of electrical technology courses. The representation of Adnan (2021)'s contextual knowledge framework is shown in Figure 2.

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

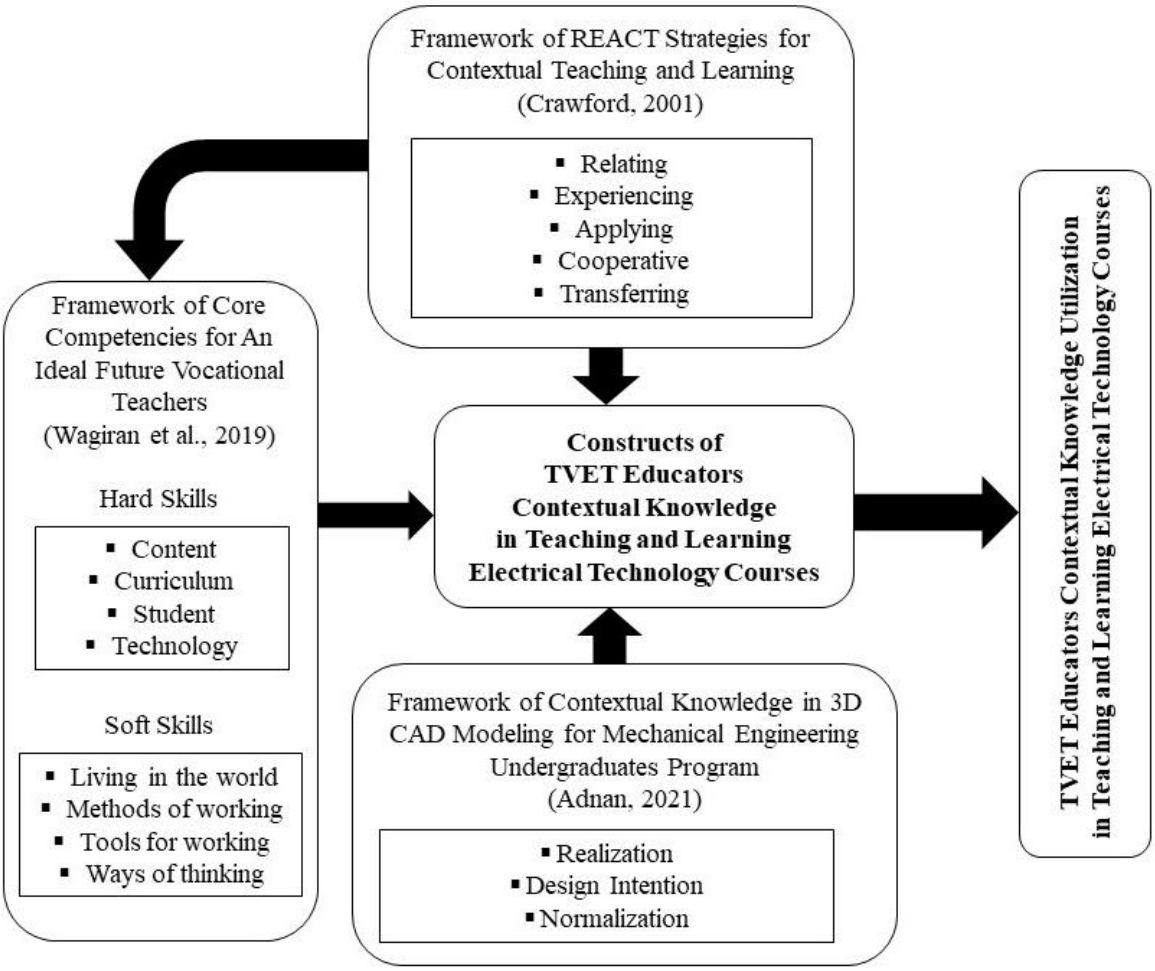

Figure 1: Research Conceptual Framework

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

Figure 2: Framework of Contextual Knowledge in 3D CAD Modeling for Mechanical Engineering Undergraduates Program

Source: Adnan, 2021

In the process of investigating TVET educators' contextual knowledge instillation in the teaching and learning process, the framework of REACT Strategies for contextual teaching and learning, proposed by Crawford (2001), has been selected for reference in this study. In these REACT strategies, Crawford (2001) has listed five strategies to engage students in the contextual teaching and learning process. These five strategies are known as:

i. Relating
Learning with a curriculum that attempts to place learning in the context of life experiences must, first, call the student's attention to everyday sights, events and conditions. It must then relate those everyday situations to new information to be absorbed or a problem to be solved.

ii. Experiencing
The exploration, discovery and invention context are the important elements in contextual learning. Considering the fact that various teaching strategies like video, story, or text-based activities can lead students to become more engaged or motivated,

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

these nevertheless constitute rather passive types of learning. Additionally, when students have the opportunity to manipulate tools and materials and engage in other active research activities, learning seems to "take" much more quickly.

iii. Applying
Applying concepts and information in a useful context often projects students into an imagined future (a possible career) or into an unfamiliar location (a workplace). This happens most commonly through text, video, labs, and activities, and these contextual learning experiences are often followed up with firsthand experiences such as plant tours, mentoring arrangements and internships.

iv. Cooperating
Learning in the context of sharing, responding, and communicating with other learners is a primary instructional strategy in contextual teaching. The experience of cooperating not only helps the majority of students learn the material, it also is consistent with the real-world focus of contextual teaching. Employers espouse that employees who can communicate effectively, who share information freely and who can work comfortably in a team setting are highly valued in the workplace. Therefore, to encourage students to develop these cooperative skills while they are still in the classroom.

v. Transferring
Learning in the context of existing knowledge or transferring, uses and builds upon what the student has already learned. Such an approach is similar to relating, in that it calls upon the familiar. Students develop confidence in their problem-solving abilities if we make a point of building new learning experiences on what they already know.

The third framework considered in this study aims to understand the core competencies required for an ideal future vocational teacher. TVET educators' competencies within this framework are categorized into two groups: hard skills and soft skills. According to Wagiran et al. (2019), hard skills competency includes aspects such as content, curriculum, student, and technology. Each of these aspects consists of sub-elements that TVET educators need to be competent in, as outlined in Figure 3. The soft skills category encompasses four aspects: living in the world, methods of working, tools for working, and ways of thinking, with detailed sub-elements provided in Figure 3. This framework was crucial for the researcher during the development of the quantitative survey instrument in this study. All relevant elements have been utilized to investigate the level of contextual knowledge instilled by TVET educators in the teaching and learning process of electrical technology courses.

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

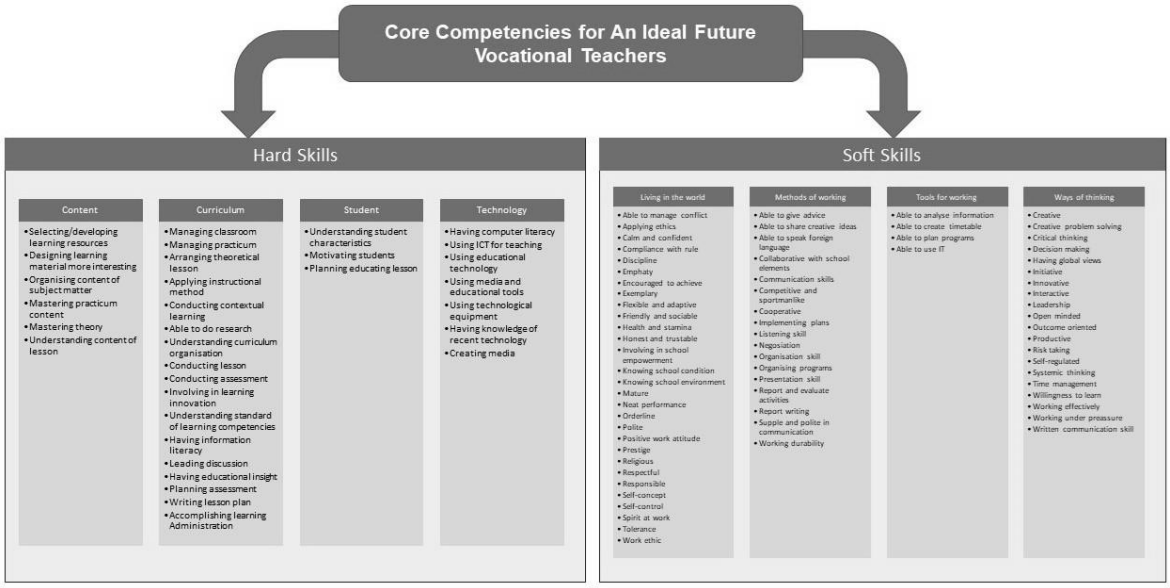

Figure 3: Framework of Core Competencies for An Ideal Future Teachers
Source: Wagiran et al., 2019

Research Methodology

A mixed-methods research design has been used to conduct this research study. According to Creswell and Clark (2017), research problems can be understood by combining quantitative and qualitative research data. The framework of explanatory sequential mixed method research has been followed to investigate TVET educators' contextual knowledge of the subject matter. In an explanatory mixed method design, the data has been collected sequentially to understand the research problems of the conducted study (Creswell and Creswell, 2017).

Therefore, this study has involved two phases of data collection, with priority given to quantitative data followed by qualitative research data. All collected data then be integrated during the interpretation phase of the study. Questionnaires has been developed based on the contextual knowledge framework established by Adnan (2021). These questionnaires explored all elements and sub-elements in the framework, investigating the level of contextual knowledge among TVET educators during the teaching and learning of the electrical engineering course. In the qualitative data collection phase, a set of interview protocols has been developed for conducting semi-structured interviews with TVET educators.

The target population for this research comprises electrical technology program lecturers from Vocational Colleges in Malaysia. A purposive sampling strategy has been employed to ensure representation of all TVET educators, irrespective of gender, level of achievement, and cultural background (Teddlie and Yu, 2007). This sampling approach aims to provide an in-depth and representative understanding of the contextual knowledge of TVET educators in teaching and learning the electrical technology course. All quantitative data has been analyzed using SPSS version 28. In the data analysis process, descriptive statistics has been utilized to summarize overall trends or tendencies, offering insights into the variation in scores and comparisons among them (Creswell and Guetterman, 2019). NVIVO version 12 has been employed to analyze all interview transcriptions, identifying emerging themes that can support the quantitative data results.

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

Implications to TVET Education

The findings of this research have several important implications for TVET education. First, the research found that TVET educators' contextual knowledge utilization is a critical factor in their ability to effectively teach and learn electrical technology courses. This suggests that TVET programs should focus on developing the contextual knowledge utilization skills of their educators and making them aware of the key elements of realization, design intention, and normalization of electrical technology teaching and learning process. This can be done through a variety of means, such as providing professional development opportunities, mentorship programs, and internships, as well as incorporating contextual knowledge utilization into their teaching performance assessment.

Second, the research found that TVET educators' contextual knowledge utilization is influenced by various factors, including their prior experience, training, and the specific context in which they are teaching. This suggests that TVET programs should take into account these factors when developing professional development opportunities for their educators. For instance, educators with less experience may need more guidance and support in developing their contextual knowledge utilization skills, while educators with more experience may need opportunities to share their best practices with their colleagues. Additionally, TVET programs should provide training and support to educators in adapting their contextual knowledge utilization strategies to the specific needs of their students and the context in which they are teaching.

Third, the research found that effective TVET educators instill essential contextual knowledge elements in their teaching and learning strategies. These elements include:

Realization: The ability to connect electrical technology concepts to real-world applications and make them relevant to students' lives. This can be achieved through the use of case studies, simulations, and hands-on learning activities.

Design Intention: The ability to help students understand the design intentions of electrical technology systems and the rationale behind their design. This can be done by providing students with insights into the engineering process, the constraints and considerations that influence design decisions, and the trade-offs involved in different design choices.

Normalization: The ability to normalize electrical technology concepts and terminology for students, breaking down complex concepts into manageable chunks and using language that is accessible to students at their level of understanding. This can be achieved through the use of clear and concise explanations, analogies, and visual aids.

By incorporating these essential contextual knowledge elements into their teaching, TVET educators can foster a deeper understanding of electrical technology concepts among students and prepare them for success in the workforce. The findings of this research suggest that TVET educators' utilization of contextual knowledge is a valuable asset that can enhance the quality of TVET education. By developing their educators' contextual knowledge utilization skills and encouraging them to incorporate essential contextual knowledge elements into their teaching, TVET programs can ensure that their students receive the best possible education and are well-equipped to meet the challenges and opportunities of the workplace.

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

Acknowledgement

This research was funded by a grant from Universiti Teknologi Malaysia Encouragement Research (UTMER Grant Q.J130000.3853.31J19).

References

Abebe, A. (2009). Influences of individual and contextual factors on improving the professional development of TVET teachers in Ethiopia (Doctoral dissertation, Technische Universität Kaiserslautern).

Adnan, M. F. (2021). A Framework of Contextual Knowledge in Three Dimensional Computer Aided Design For Mechanical Engineering Undergraduates (Doctoral dissertation, Universiti Teknologi Malaysia).

Adnan, M. F., Daud, M. F., Saud, M. S., & Hussin, W. N. W. (2019). Utilization of contextual knowledge elements in 3D CAD model visualization from the perspectives of practicing engineers. International Journal of Emerging Technologies in Learning (iJET), 14(24), 106-120.

Anderson, T. D. (2020). Perceived role of institutional supports for African American community college transfer students' engineering success (Doctoral dissertation, University of Oklahoma).

Becker, M., & Spöttl, G. (2019). Regional TVET teacher standard for ASEAN: Essential competences for TVET teachers in ASEAN. Bangkok: GIZ.

Buchanan, R., Byard, T., Ferguson, G., Billings, K., Dana, M., & Champagne, J. (2019, July). Navigating standardized spaces in student teaching. In The Educational Forum (Vol. 83, No. 3, pp. 237-250). Routledge.

Crawford, M. L. (2001). Teaching contextually. Research, rationale, and techniques for improving student motivation and achievement in mathematics and science. Texas: Cord.

Creswell, J. W., & Clark, V. L. P. (2017). Designing and conducting mixed methods research. (3rd Edition). Thousand Oaks, CA, Sage.

Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches (5th Edition). Thousand Oaks, CA: Sage.

Creswell, J. W., & Guetterman, T. C. (2019). Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research. (6th Edition). Pearson Education International.

Grollmann, P. (2008). The quality of vocational teachers: Teacher education, institutional roles and professional reality. European Educational Research Journal, 7(4), 535-547.

Ismail, A., Hassan, R., Bakar, A. A., Hussin, H., Hanafiah, M. A. M., & Asary, L. H. (2018). The development of TVET educator competencies for quality educator. Journal of Technical Education and Training, 10(2).

Mishra, P. (2019). Considering contextual knowledge: The TPACK diagram gets an upgrade. Journal of Digital Learning in Teacher Education, 35(2), 76-78.

Mitana, J. M. V., & Kitawi, A. (2021). Using action research to develop educational managers' responsibility for whole school development. Educational Action Research, 1-19.

Ministry of Education Malaysia (2012) "Malaysia Education Blueprint 2013-2025," http://www.moe.gov.my/v/pelan-pembangunan-pendidikan-malaysia-2013-2025, accessed 5 May 2015.

Muhammed, S., Doll, W. J., & Deng, X. (2011). Developing Individual Level Outcome Measures in the Context of Knowledge Management Success. In Strategies for

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 6 Issue 20 (March 2024) PP. 151-160
DOI: 10.35631/IJMOE.620012

Knowledge Management Success: Exploring Organizational Efficacy (pp. 106-127). IGI Global. DOI: 10.4018/978-1-60566-709-6.ch007.

Phan, T. C. M. (2020). Professional learning in a Vietnamese university language teaching context: An inquiry-driven approach (Doctoral dissertation, The University of Waikato).

Teddlie, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. Journal of mixed methods research, 1(1), 77-100.

Wagiran, W., Pardjono, P., Suyanto, W., Sofyan, H., Soenarto, S., & Yudantoko, A. (2019). Competencies of future vocational teachers: Perspective of in-service teachers and educational experts. Jurnal Cakrawala Pendidikan, 38(2), 387-397.