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Deep Learning among TVET Trainees at the Teacher Education Institute

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Abstract

Deep learning is effective learning that enhances the engagement of trainee teachers through self-directed efforts, relationships with learning partners, skill-building, knowledge, self-confidence, and a sense of curiosity via inquiry-based discovery methods. The benefits of this deep learning focus on teachers, especially trainee teachers at Teacher Education Institutes (IPG), as they will lead the education sector in the future. Therefore, this quantitative survey study was conducted to identify the level of deep learning among TVET trainee teachers in IPG. The respondents of this study comprised 125 Design and Technology (RBT) trainee teachers from Temenggong Ibrahim Teacher Education Institute. A five-point Likert scale questionnaire was used as the instrument for data collection. The researcher employed IBM SPSS version 22 for descriptive statistical analysis, specifically mean and standard deviation, to identify the level of deep learning among trainee teachers at Temenggong Ibrahim Teacher Education Institute. The findings indicate that deep learning is at a high level, with a mean score of 4.13 (SD=0.806). Based on the findings, TVET trainee teachers are believed to be capable of fully practicing deep learning, and this situation aligns with the Ministry of Education's goal to produce quality teachers with high levels of digital competency.

Keywords: Deep Learning, Teacher Education Institute, TVET, Teacher Trainees

Introduction

Education, teaching, and learning are experiencing a major shift from conventional methods to more in-depth learning strategies. Meanwhile, the need to investigate changes and improve products, processes, or services can drive organizational innovation (Mendoza, 2015). In line with the need for change, a new pedagogy centered on the principles of deep learning has been introduced (Mykhailo Petrenko, 2024). This new deep learning pedagogy represents a shift from memorization and passive learning. Instead, it emphasizes active engagement and inquiry-based exploration learning styles. This approach aims to empower students to build their understanding of concepts, foster deep connections between ideas, and develop the essential skills needed to succeed in the 21st century (Fullan & Langworthy,

2014). In today's rapidly evolving technological landscape, deep learning has emerged as a critical component of education, particularly within Technical and Vocational Education and Training (TVET) programs at teacher education institutes. The importance of deep learning among TVET trainees cannot be overstated, as it equips them with the necessary skills to adapt to complex, real-world problems and fosters a deeper understanding of their respective fields.

Advances in technology and a growing understanding of cognitive science have influenced educators to adopt innovative methods for fostering critical thinking, collaboration, and creativity in students. According to Shakirah and Hairulliza (2020), the digital utilization of technological advances has the potential to stimulate students to interact with learning materials and learning environments to improve their understanding of concepts and inspire the application of concepts in real life. It is also in line with the Digital Education Policy strategy which aims to empower educators as the jewels of digital education (KPM, 2023). Thus, educators play an important role in changing the entire education system by using pedagogy and technology in a new and integrated way (Mykhailo Petrenko, 2024) to realize deep learning among students at school. Deep learning is widely implemented in higher education institutions because it supports the task of teaching staff to provide students with the skills required by the industry (Ashfahani et al., 2017). Deep learning environments encourage personalized and differentiated learning, which is especially beneficial in TVET education where learners often come from diverse backgrounds. By addressing the individual needs of trainees, teacher education institutes can better prepare future instructors to manage diverse classrooms, catering to different learning styles, abilities, and experiences. Furthermore, Ellyza Karim (2019), also thinks that the New Pedagogy for Deep Learning (NPDL) should be expanded in teaching and learning to create more competent IPG students. Understanding how deep learning can be effectively integrated into TVET curricula allows for creating programs that are relevant but also engaging, and impactful. However, research on the implementation of deep learning at the Teacher Education Institute (IPG) is still lacking (Orna Levin, 2024). Prioritizing deep learning in TVET programs is crucial for preparing trainees to meet the challenges of modern industries. By emphasizing this area of study, teacher education institutes can enhance the quality of education, ensure relevance in the workforce, and contribute to the development of skilled professionals capable of driving innovation and progress. Therefore, this study was carried out to identify the level of deep learning application among trainee teachers at IPG.

Problem Statement

Malaysia focuses mainly on transforming TVET to develop quality human capital by strengthening governance and increasing the effectiveness of education programs (RMK-12, 2021). IPG as a pillar in producing future teachers plays an important role in fostering deep learning so that teachers can apply it in school and be extended to all the young generations who will lead the world economy. This is because the 2021 digital competency survey among 297 018 teachers in Malaysia showed that 57.9% of them were at the basic level. As such, one of the initiatives taken by the government is providing allocations for teacher training and increasing innovative practices to enable deep learning through digital utilization (KPM, 2023). To realize this aspiration, the transformation of IPG is done to achieve excellence in teacher education by developing deep learning that has a high impact. However, there is still a lack of guidance as well.

The study's results can also channel information to IPGM administrators in formulating the essence of courses and programs that can raise lecturers' and teacher trainees' awareness about the importance of deep learning in producing quality teaching and learning activities at IPG, thus realizing the Transformation of IPG.

The findings of this study can also provide awareness to TVET trainee teachers to create a positive culture and environment to support deep learning to develop teaching and learning innovation. The findings of this study can also be used as a guide to produce special strategies in promoting the production of teaching and learning innovations in IPG, Malaysia. The Malaysian Ministry of Education can also design deep learning activity modules by integrating deep learning elements as well as significant activity recommendations.

Methodology

This study is a survey using quantitative methods. The population of this study is teacher trainees majoring in TVET at the Institute of Teacher Education. The purposive sampling method was employed to identify the number of samples for this study. This sampling method was chosen because it saves cost and time. A total of 125 trainee teachers majoring in Technical and Vocational Education from IPGK Temenggong Ibrahim Johor were identified as the respondents of this study.

The instrument used in this study is a questionnaire that consists of two parts. Part A contains four items on the respondent's background. Part B includes 25 items related to Deep learning. All items in section B are adapted from the Teacher-Student Role Framework for Deep Learning (Fullan & Langworthy, 2014). A 5-point Likert scale (never, rarely, sometimes, often, and very often) was used to measure the items in the questionnaire. A pilot study was conducted on 30 TVET trainee teachers. The findings of the pilot study with Cronbach's Alpha value of 0.97 show the high-reliability value of the research instrument. This finding is in line with Merten (2014) who stated that a Cronbach's Alpha value exceeding 0.70 indicates high reliability of the instrument. Based on the findings, comments, and feedback obtained through the pilot study, improvements to the items in the instrument have been made. Mean score analysis was used to identify the level of deep learning among TVET trainee teachers at IPG. The interpretation of mean scores in Table 1 shows the range and level of deep learning implementation.

Table 1
Interpretation of Mean Score

No	Range	level
1	1.0 – 2.4	Low
2	2.5 – 3.4	Medium
3	3.5 – 5.0	High

Source: Oxford and Burry-Stock (1995)

The mean score interpretation reference in Table 1 is used to determine the level of the implementation of deep learning among TVET trainee teachers at IPG.

Research Findings and Discussion

The samples consisted of 125 respondents selected from 168 returned questionnaires. The respondents are trainee teachers majoring in Technical and Vocational Education from IPGK Temenggong Ibrahim Johor. Respondents were selected by purposive sampling in this study. Background information (demographics) of students is taken to facilitate the research. The descriptive analysis that has been carried out shows that the number of male trainees is 25 people which is 20% while the number of female trainees is 100 people which is 80%. In addition, the majority of the samples are Bachelor of Teaching (PISMP) trainees which is 80 people equal to 64% compared to 45 which is 36% of foundation trainees (PPISMP). Deep learning is measured using 25 items in the instrument. Table 2 shows the overall mean score for all the items.

Table 2
Mean scores for Deep Learning Items

Bil	Item / Element	Mean Score	Standard deviation	Level Interpretation
1	I developed a trusting relationship with the lecturer.	4.09	0.910	High
2	I build trusting relationships with peers.	4.27	0.817	High
3	I have got a good mentor.	4.52	0.731	High
4	I explore my interests in learning goals.	4.27	0.758	High
5	I develop self-capacity to explain learning goals.	4.14	0.702	High
6	I develop self-capacity to explain learning tasks.	4.14	0.734	High
7	I developed my capacity to define success criteria.	4.16	0.745	High
8	I show my cooperation in the learning process.	4.23	0.711	High
9	I implement two-way teaching and learning with peers.	4.30	0.734	High
10	I implement two-way teaching and learning with the lecturer.	4.27	0.788	High
11	I developed the capacity to do reflection.	4.14	0.702	High
12	I persevere in the face of challenges.	4.18	0.691	High
13	I provide high-quality feedback.	4.14	0.734	High
14	I encourage others.	4.23	0.774	High
15	I give feedback to the lecturer regarding the success of self-study.	4.07	0.728	High
16	I give feedback to my peers regarding the success of self-study.	4.05	0.834	High
17	I produced a learning process guide.	3.95	0.963	High
18	I produced a self-study development guide.	3.98	0.902	High
19	I develop an intellectual capacity to produce new knowledge.	4.09	0.802	High
20	I developed an attitude inclined towards generating new knowledge.	4.07	0.846	High
21	I am constantly creating digital learning resources to explore new knowledge.	4.07	0.818	High

22	I am constantly creating digital learning tools to explore new knowledge.	4.07	0.873	High
23	I use the digital learning tools produced to create new knowledge.	4.11	0.813	High
24	I use the digital learning tools produced to connect with friends around the world.	4.00	0.940	High
25	I use digital learning tools to connect with experts around the world.	3.75	1.102	High
	Average Mean Score	**4.13**	**0.806**	**High**

Overall, the findings of the study show that the average mean score for all 25 deep-learning items is 4.13 (Table 2). Based on the mean score interpretation table (Table 1), the mean score of 4.13 (SD=0.806) is at a high level. Therefore, the level of deep learning among TVET trainee teachers is at a high level. This shows that IPG trainee teachers are active in implementing deep learning. Teaching and learning that combines learning partners, the latest pedagogical practices, the support of learning partners, and the local community can help in realizing deep learning (Ellyza Karim, 2019).

Based on Table 2, all of the 25 items of deep learning recorded a mean score at a high level. Among all, the third item which is "I have got a good mentor" got the highest mean score of 4.52 (SD=0.731). The 25th item (I use digital learning tools produced to connect with experts around the world) recorded the lowest mean score of 3.75 (SD=1.102). However, the mean score remains at a high level. ReSDondents agreed that they implement two-way teaching and learning with peers (mean=4.30, SD= 0.734) and lecturers (mean=4.27, SD= 0.788). The implementation of two-way teaching and learning activities is also achieved because trainees can build a reliable relationship with the lecturer (mean=4.09, SD=0.910) and peers (mean=4.27, SD=0.817). The findings of this study also show that deep learning occurs when TVET trainee teachers have good communication and interpersonal skills because they can use the skills and knowledge learned to build networks with peers, lecturers, and experts across borders. The findings of this study are in line with Gatz and Akira (2024) who prove that the educational network created plays an important role in stimulating deep learning.

In addition, deep learning was also achieved because respondents also expressed high agreement in exploring their interest in learning goals (mean=4.27, SD=0.758) and being able to develop their capacity to explain learning goals (mean=4.14, SD= 0.702), explaining learning tasks (mean=4.14, SD= 0.734), explaining success criteria (mean=4.16, SD= 0.745) and doing reflection (mean=4.14, SD= 0.702) in addition to being diligent in facing challenges (mean=4.18, SD= 0.691). They also create cooperation in the learning process (mean=4.23, SD= 0.711). The analysis of items 4, 5, 6, 7, and 8 prove that interest and self-effort in understanding the goals and implementing the Teaching and learning process can produce deep learning among TVET IPG trainee teachers. Mykhailo Petrenko (2024) also states that excellence in teacher education begins with a deep understanding of principles and practices that support innovative pedagogy and a commitment to continuous improvement.

Based on the analysis of items 13,14,15 and 16, trainees were able to encourage others (mean=4.23, SD= 0.774) as well as high-quality feedback (mean=4.14, SD= 0.734) to the lecturer (mean=4.07, SD = 0.728) and peers (mean=4.05, SD= 0.834) related to self-learning.

Furthermore, the trainees were able to produce a guide to the learning process (mean=3.95, SD= 0.963) and develop trainees' ment of self-learning (mean=3.98, SD= 0.902). When TVET trainee teachers have understood the learning goals and know the success criteria, they will have high confidence in carrying out more meaningful Teaching and learning activities. In fact, can give encouragement and support to other friends. Orna Levin (2024), also found that student experience in real-world situations can create deep learning.

To realize deep learning, trainees always produce digital equipment (mean=4.07, SD= 0.873) as well as digital learning resources (mean=4.07, SD= 0.818) to explore new knowledge. Items 19 and 20 show that trainees develop intellectual ability (mean=4.09, SD= 0.802) and a tendency (mean=4.07, SD= 0.846) towards producing new knowledge. They also use digital learning tools to create new knowledge (mean=4.11, SD= 0.813), and connect with friends (mean=4.00, SD= 0.940) and experts (mean=3.75, SD= 1.102) around the world. The findings of the study proved that IPG trainee teachers are active in producing digital tools and resources to create new knowledge and create a network with the outside world. It is in line with the government's wishes and supports of the digital talent cluster initiative, which is to develop efficient and competent Digital Talent (KPM, 2023). Furthermore, this finding is also in line with the study of Mykhailo Petrenko (2024) who states that digital utilization can equip educators with deep learning experiences.

Implications and Recommendations

The findings of this study can contribute to new knowledge in the field of deep learning in particular. It reveals the characteristics of deep learning in IPG, Malaysia. Therefore, the findings of this study are believed to have implications for the framework of deep learning, and for the practice of teaching professionalism as well as teacher education policy. The new pedagogy and understanding of learning means that it can be extended to nearby schools.

The study of the level of implementation of deep learning in the education sector is still lacking in Malaysia. Although this study has contributed to the field of deep learning in a specific way, it is still insufficient and requires further research. In this section, some further studies are proposed to produce a large impact. First of all, this study only focuses on the field of TVET IPG. So the researcher suggests that this study be extended to Matriculation Colleges, Vocational & Technical Colleges, polytechnics, Private HEIs, and Public HEIs throughout Malaysia in the future. Next, further research that examines the differences in Matriculation Colleges, Vocational & Technical Colleges, polytechnics, Private HEIs, and Public HEIs throughout Malaysia can also be studied to see the significance of this study.

Conclusion

This study is an initial initiative to gain an overview of the implementation of deep learning among TVET trainee teachers at IPG. Deep learning is the main focus of this study in the context of IPG as it is a crucial element for enhancing the quality of teacher education to produce competent future teachers and digital natives. Overall, this study has produced new findings in the field of deep learning at IPG, Malaysia. The level of deep learning among TVET trainee teachers at IPG is high. The integration of relationships with the learning environment and the utilization of digital tools in realizing deep learning can contribute to the creation of new knowledge and skills. In line with this, stakeholders need to continuously collaborate

with the learning environment community and industry partners to ensure that deep learning is effectively implemented at all levels of educational institutions.

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