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6C Competency Level in TnL at IPGKPT

Kamaruddin, Mahamsiatus[1]* & Mohd Shah, Manisah

[1,2]Institut Pendidikan Guru Kampus Pendidikan Teknik, Nilai, Negeri Sembilan, Malaysia

*Corresponding author: mahamsiatus.ipgkpt@gmail.com

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Abstract: This research is based upon a pilot study on the evaluation of the 6C competency development dimensions on the Pedagogical Capacity of Meaningful Learning *(KPPB).* This approach was applied in the teaching and learning (TnL) on student teachers (majoring in Design and Technology (RBT), Mathematics (MT) and Science (SN) who took xxxx3152-'Digital Innovation in Teaching and Learning' course at the Teacher Education Institute of the Technical Education Campus (IPGKPT). Competency 6C is a set of skills that every student teacher needs to master to lecturers know the impact of TnL at the end of the subject, regarding the dimension of character, citizenship, collaboration, communication, creativity, and critical thinking. critical thinking dimension in study. Since the Institute of Teacher Education Malaysia (IPGM) implements the *KPPB* in the academic program, therefore student teachers at the Institute of Teacher Education Campus (IPGK) not only have to achieve the learning outcomes of the subject, but they also must be able to master the 6C competencies. This study carried out using the quantitative approach based on the adaptation of the 6C rubric by the Malaysian Teacher Education Institute (IPGM) involving student teachers based on the alignment of the subject course outlines. The findings of the study show the reliability of the items used based on the Cronbach-alpha diagnostic test is 0.966, including the percentage value of each 6C competency level obtained based on the five levels of the progression dimension, 1. 'Limited Evidence', 2. 'Emerging', 3. 'Developing', 4. 'Accelerating' or 5. 'Proficient'. In overall, the findings indicate, there are two sub-dimensions of 6C that need to focus on, "Character - Learning how to learn" and "Creativity - Asking questions using accurate inquiry questions". The finding shows that the lecturers must focus more on the future to improve student to master their learning with applying the effective pedagogical strategies meaningful and continuously.

Keywords: *KPPB, 6C competency, digital innovation*

1. Introduction

In line with VUCAH (volatility, uncertainty, complexity, ambiguity, and hyper-connected) today, if we want to produce preservice teachers who can thrive, can think in new situations, and can change the world, we must look at learning in terms of the important things they learned/highlighted, how learning fostered, where learning occurs, and how we measure their learning success. The implementation of the TnL strategy needs to create an environment that challenges, provokes, stimulates, and celebrates the learning of the preservice teachers.

Concerning the various TnL strategies recommended by academicians, one of the strategies of the new learning pedagogy processes, is the New Pedagogy of Deep Learning (NPDL), introduced by Michael Fullan with his fellow researchers (Fullan et. al., 2018). The efforts of research started several years ago, focusing on how students can achieve meaningful learning in their studies. The research formulates, practices, and dimensions to change the learning process so that students can develop important skills and global competency respectively. The conclusion of the study disclosed the importance of the TnL strategy, through which students can achieve the six global 6C competencies: 'Character', 'Citizenship', 'Collaboration', 'Communication', 'Creativity' and 'Critical thinking'.

Based on the research efforts, the NPDL approach was applied as one of the TnL strategies in the academic program by the Malaysian Teacher Education Institute (IPGM), as one of the new capacities in the TnL implementation strategy (Karim et al., 2021; Mohd Shah & Kamarudin, 2022) on campus. This idea integrated the application of NPDL with other models and was known as the *Kapasiti Pedagogi Pembelajaran Bermakna*

**Corresponding author: author@organisation.edu.co*
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(KPPB) model, focusing on the holistic and comprehensive TnL approach to improve preservice teachers' learning strategies. Therefore, three Teacher Education Institute campuses, which is a campus under IPGM, implemented *KPBB* in 2018 as a pilot. Then in 2020, the implementation of *KPBB* expanded to all 27 campuses throughout Malaysia (Karim et al., (2021). The implementation of the TnL process on campus is intended to strengthen the quality of preservice teachers in today's contemporary era. The *KPPB* approach is aligned to encourage preservice teachers to create new knowledge and connect with the real world using digital technology to achieve the 6C global competency. IPGM also adapted the 6C competency rubric as at https://mynpdl.ipg.edu.my/kompetensi-6c/.

However, naming the 6C competencies is a step towards clarity on how the TnL process focuses, but it does not help lecturers, preservice teachers, or learning partners have the same understanding of what is meant. Since then, researchers have conducted a pilot study on the application of *KPPB* for the subject xxxx3152 `Digital Innovation in Teaching and Learning' (Mohd Shah & Kamaruddin, 2022) at the IPG Kampus Pendidikan Teknik (IPGKPT), which is one of the campuses under IPGM. This study intends to discuss further the findings on items in the 6C competency dimension that are at a slightly show low level progression, which are the ‘character' and 'creativity' dimensions, although the overall finding of the mean value of items for both dimensions at the accelerating level (level 4) compared to other dimensions indicates a higher value. Therefore, the purpose of this study is to further discuss two out of the 6C competency development dimension levels among preservice teachers at IPGKPT who took xxxx3152 subjects.

2. Background

KPPB outlines six dimensions of global competency, that explain the skills and attributes required by every preservice teacher, that is character, citizenship, collaboration, communication, creativity, and critical thinking, based on Fullan et. al. (2018). *KPPB* emphasizes the creation and use of new knowledge in real life, establishing new learning partnerships between and among preservice teachers and lecturers, expanding the learning environment by moving beyond the traditional classroom without counting time, or space, and including people either inside or outside the classroom as a catalyst to build a learning approach with the advantage of digital technology at anywhere, anytime to accelerate and deepen learning. This study used the IPGM adapted 6Cs rubric to assess the level of learning development ability of preservice teachers taking xxx3152- ‘Digital Innovation in Teaching and Learning' subjects. Each Learning Development Competency is identified in terms of development aspects of preservice teacher learning to provide a complete picture of the competencies, skills, and attitudes, the achievement of the 6C competencies. For each competency is described based on the Fullan et al. (2018) progression dimension level.

Innovation, on the other hand, refers to updating or is to improve by using creative and critical thinking skills to generate a solution to a problem. While digital innovation is one of the studies, that focuses on the using technology and computers to reduce operating costs, improve the delivery of quality products, simplify product design and development, and speed up the service management processes (Mohamad Yusoff & Hanif, 2019). Implementing innovation in TnL using digital tools with creative ideas through various learning strategies is to facilitate more effective and engaging learning and diversify teaching resources. In this study, through the subject xxxx3152-‘Digital Innovation in Teaching and Learning’, they not only have to explain the concept and innovation process, but they also have to generate ideas to develop the TnL innovation resources, starting from preparation, development, and implementation of innovation TnL resources. This includes conducting the innovation TnL resources showcases and evaluating products applicable using in TnL according to their objectives. This is because the preservice teachers are expected in this subject to generate ideas and be highly creative to improve the quality of teaching, thereby contributing to the advancement of the development of economical and innovative TnL resources.

3. Methodology

The researchers identified the preservice teachers' population as 108 students from three major intakes in 2019, who taking xxxx3152 subjects. Researchers then selected a total of 81 preservice teachers as respondents based on Krejcie and Morgan's sample size (Krejcie & Morgan, 1970). This research instrument consisted of an item set of 30 questions divided into the six components of the 6C competencies, as described in the background of this study. Respondents should respond to correspond to the dimensions of 6C competency progression items, 1. ‘Limited evidence’, 2. ‘Emerging', 3. ‘Developing’, 4. ‘Accelerating’, or 5. Proficient. The item Cronbach alpha value obtained was 0.966, which indicates the reliability of the item, according to Lim (2007), is very good. Table 1. Show the numbers of 6C Competency items using an IPGM adapted rubric (https://mynpdl.ipg.edu.my/kompetensi-6c/).

Table 1. The number of items according to the 6C competency construct

Construct	Item list
Character (4 items)	A1, A2, A3, A4
Citizenship (5 items)	B1, B2, B3, B4, B5
Collaboration (5 items)	C1, C2, C3, C4, C5
Communication (5 items)	D1, D2, D3, D4, D5
Creativity (5 items)	E1, E2, E3, E4, E5
Critical Thinking (6 items)	F1, F2, F3, F4, F5, F6

The methodology of this study focuses on assessing the level of preservice teacher 6C competency in creating digital innovation products for xxxx3152 subjects as TnL resources. The data were further analyzed using MS Excel software to determine the frequency, percentage, and mean value of the developmental dimension level for each 6C competency dimension. The interpretation of the mean score for this study was based on the five levels of the 6C competency progression.

4. Findings

The survey was conducted with preservice teachers who had taken the xxxx3152 "Digital Innovation in Teaching and Learning" course. Table 2a shows the number of respondents, a total of 81 preservice teachers, consisting of 33 male (40.74%) and 48 female (59.26%). Table 2b, on the other hand, shows a breakdown of the respondents' course options which 34 (41.98%) majoring in Mathematics, 26 (32.10%) in Science, and 21 (25.93%) in Design and Technology (RBT).

Table 2a. Profile of Respondents based on Gender

Gender	Frequency, f	Percentage (%)
Male	33	40.74
Female	48	59.26
Total	81	100.00

Table 2b. Profile of Respondents based on Course Options

Course Options	Frequency, f	Percentage (%)
Mathematics	34	41.97
Science	26	32.10
Design & Technology	21	25.93
Total	81	100.00

The data of this study was analyzed descriptively based on frequency, f, mean score, and percentage, % using MS-Excel. To determine the dimension of deep learning progression based on 6C competencies, Table 3 shows the mean score interpretation based on a five-point Likert scale compared to the results of the questionnaire.

Table 3. Mean Scores Interpretation for a five-point scale

Mean Score	0.00 - 1.50	1.51 - 2.50	2.51 - 3.50	3.51 - 4.50	4.51 - 5.00
Dimension	Limited	Emerging	Developing	Accelerating	Proficient

Source: Mohd Najib (2003) and NPDL 6Cs rubric (2018)

The findings of this study refer to the continuation of our previous study in Mohd Shah & Kamaruddin (2022) which examines the level of deep learning progression based on the mean of 6Cs competencies in the implementation of the "Digital Innovation in TnL" course. This study found that all six competencies are in the dimension of accelerating. However, for the competency of Character and Creativity, it shows that there are two items, namely items A1 and E2, which are in the "Developing" dimension as shown in Table 4.

Table 4. Mean Item of 6Cs Competencies and Deep Learning Dimension Interpretation

Competencies Construct	Item	Mean	Average	Dimension of Deep Learning Progression
Character	**A1**	**3.22**	3.62	Accelerating
	A2	3.74		
	A3	3.67		
	A4	3.86		

Citizenship	B1	3.51	3.75	Accelerating
	B2	3.75		
	B3	3.69		
	B4	3.65		
	B5	3.90		
Collaboration	C1	4.00	3.85	Accelerating
	C2	3.94		
	C3	3.81		
	C4	3.79		
	C5	3.86		
Communication	D1	3.72	3.73	Accelerating
	D2	3.74		
	D3	3.73		
	D4	3.69		
	D5	3.77		
Creativity	E1	3.60	3.60	Accelerating
	E2	**3.48**		
	E3	3.74		
	E4	3.65		
	E5	3.53		
Critical Thinking	F1	3.75	3.60	Accelerating
	F2	3.65		
	F3	3.53		
	F4	3.59		
	F5	3.54		
	F6	3.74		
		Average Mean	**3.69**	**Accelerating**

Analysis of the data obtained in Table 4 with reference to the 6Cs competency based on deep learning progression dimension, 1. 'Limited', 2. 'Emerging', 3. 'Developing', 4. 'Accelerating', or 5. 'Proficient', indicates that the preservice teacher has achieved all the 6C competencies at the fourth level, which is "Accelerating" with an overall mean value of 3.69. The average mean of 3.69 means that the progression of deep learning for preservice teachers, especially those who take the digital innovation in TnL subject, has reached the "Accelerating" dimension.

The competency with the highest mean value is collaborative (3.85), followed by citizenship (3.75), communication (3.73), character (3.62) and creativity (3.60) and critical thinking (3.60) both with the same mean values. This shows that preservice teachers can achieve all the 6C competencies during the course learning by developing TnL digital innovation resources quite well. As an example of collaborative competency, they can collaborate with each other in a group, can improve interpersonal and group skills, have social, emotional, and cross-cultural skills, and can manage dynamics and challenges while utilizing digital tools collaboratively. This is followed by the competence of citizenship, communication, character including the competency of creativity and critical thinking. Through the competencies achieved, it is hoped to increase the strength and excellence of preservice teachers and lecturers in changing strategies to implement TnL in the future.

Although the average overall mean value of each 6C competency shows that preservice teachers are on the dimension of Accelerating (between 3.51 - 4.50), based on the analysis of the mean value of each item, there are two items that are still on the Developing dimension, namely item **A1 Character** (3.22) and item **E2 Creativity** (3.48). Tables 5a and 5b show the construction of the answer choices and the mean scores obtained for items A1 and E2 in more detail.

In Table 5a, by referring to the mean score of **Character** ***A1: Learning how to learn***, is 3.22 which is only in *Developing* dimension. This is because the data shows that 15 respondents (18.52%) mostly chose dimension 1 "*I still need tutoring from the lecturer to learn* " and a few chose dimension 2 "*I started designing my TnL in collaboration with my lecturer* ". This data has an impact on the overall findings of the study. While 30 respondents (37.04%) chose "*I can recognize what and why I need to learn* " and 36 respondents (44.45%) mostly chose "*I am good at creating new learning experiences* " and only a few chose "*I am good at solving problems and generating new knowledge that impacts my life*". This shows that quite many preservice teachers still need guidance from lecturers to learn starting from guidance to collaborate in designing the innovation TnL resources, guidance to identify what and why is necessary, guidance to design new learning experiences to guidance to solve problems and generate new knowledge that has an impact on learning.

While in Table 5b, for item **E2: Creativity - *Questioning using the right inquiry questions***, shows 11 respondents (13.58%) chose dimensions 1 and 2 i.e. "*I am able to formulate an inquiry process if explained by the lecturer but am not able to explore issues*" and "*I still need guidance and support to explore the real issue*",

while 30 respondents (37.04%) chose dimension 3 and another 36 respondents (44.45%) chose dimension 4 and 5. This finding indicates that there are preservice teachers who still need to be guided to spark curiosity in designing their TnL digital innovation resources, starting from guidance to identify innovation issues, guidance and support exploring real issues in TnL, guidance in identifying problems and procurement and see from various perspectives until they are good at understanding 'big ideas', formulating problems, and building provocative questions including exploring real issues.

Both findings show that a few preservice teachers still feel that they have not yet mastered in 6Cs global competencies which are "Learning how to learn" and "Questioning using the right inquiry questions" according to their self-autonomy. Hence, lecturers need to recheck this element so that the intention of meaningful learning can be achieved, which is to accelerate the lecturer's ability to put a preservice teacher in control of the learning process in which the student as learner centre.

Table 5a. Mean score for item A1

A1: Character: Learning How to Learn	Frequency, f	%
1. I still need tutoring from the lecturer to learn	11	13.58
2. started designing my TnL in collaboration with my lecturer	4	4.94
3. I can recognize what and why I need to learn	30	37.04
4. I am good at creating new learning experiences	28	34.57
5. I am good at solving problems and generating new knowledge that impacts my life	8	9.88
Total	81	100
Mean score (Interpretation)	3.22 (Developing)	

Table 5b. Mean score for item E2

E2: Creativity: Questioning using the Right Inquiry Questions	Frequency, f	%
1. I am able to formulate an inquiry process if explained by the lecturer but am not able to explore issues	3	3.70
2. I still need guidance and support to explore the real issue	8	9.88
3. I am good at identifying problems and designing inquiries	28	34.57
4. I have strong and provocative inquiry skills in identifying issues and looking from multiple perspectives	31	38.27
5. I am very good at understanding "big ideas", formulating problems, building provocative questions, and exploring real issues	11	13.58
Total	81	100
Mean score (Interpretation)	3.48 (Developing)	

5. Conclusion

The quality of instructional delivery is influenced by lecturers' ability to design TnL in meaningful ways, including by coordinating curriculum, knowledge, teaching strategies, tools, and assessment methods. This study discusses how a preservice teacher taking the xxxx3152-'Digital Innovation in Teaching and Learning' subject developed 6C competencies in creating digital TnL innovation products as TnL resources. Assessing a preservice teacher's proficiency in meaningful tasks indicates that the preservice teacher is achieving the progress dimension. However, providing preservice teachers and lecturers with the same understanding of designing and measuring meaningful learning outcomes requires a holistic and sustained effort to achieve excellent grades in the future. Overall, there is still room for further improvement for all competencies up to the highest development dimension, the 'excellent' level. It represents a holistic and ongoing commitment to all aspects required in the early stages of planning, implementing, and evaluating TnL.

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Conflict of Interest
The authors declare no conflicts of interest.

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