The role of digital tools in developing physical education teachers' digital competence: a case study of a platform

El papel de las herramientas digitales en el desarrollo de la competencia digital de los profesores de educación física: un estudio de caso de una plataforma

Authors

Silvy Juditya [1]
Febriana Pratiwi [2]
Dhani Agusni Zakaria [3]

[1] STKIP PASUNDAN (Indonesia)
[2] Universitas Pasifik Morotay (Indonesia)
[3] STKIP PASUNDAN (Indonesia)

Corresponding author:
Sjuditya@gmail.com

How to cite in APA

Juditya, S., Pratiwi, F., & Zakaria, D. A. (2025). The Role of Digital Tools in Developing Physical Education Teachers' Digital Competence: A Case Study of a Platform. *Retos*, *67*, 876–887. https://doi.org/10.47197/retos.v67.110921

Abstract

Background: The current era of technology requires every teacher to be able to develop their digital competence through various uses of platforms, for example the birth of PMM in Indonesia where PMM is present with the aim of helping teachers prepare and develop digital competence which will later contribute to the development of teaching, especially Physical Education.
Aim: This study investigates the contribution of the Merdeka Mengajar (PMM) platform in developing digital readiness among physical education teachers.
Methods: Descriptive survey where this study involved 155 teachers in West Java Province, The data collection technique used was in the form of a questionnaire containing 18 questions regarding the contribution of the use of PMM to the development of digital readiness of Physical Education teachers while the data was analyzed using descriptive statistics and presented as percentages and frequencies.
Results: The research findings revealed that around 95% of teachers said they understood the PMM application effectively and this data shows that teachers' digital readiness and competence play a significant role in the high adoption of the PMM platform. This is evidenced by the high perception rating, ability to access and integrate technology, and positive attitudes and the significant relationship between the use of PMM in the development of digital competence of Physical Education teachers.
Conclution : That digital media, in this case the use of the PMM application, has a very large role in developing the digital competence of physical education, sports and health teachers (PJOK) especially in West Java.

Keywords

Platform; Digital Competences; Physical Education; TPACK.

Abstract

Antecedentes: La era tecnológica actual exige que todo docente desarrolle su competencia digital mediante el uso de diversas plataformas. Por ejemplo, el nacimiento de PMM en Indonesia, donde PMM está presente con el objetivo de ayudar al profesorado a prepararse y desarrollar competencias digitales que posteriormente contribuirán al desarrollo de la docencia, especialmente en Educación Física.
Objetivo: Este estudio investiga la contribución de la plataforma Merdeka Mengajar (PMM) al desarrollo de la preparación digital del profesorado de Educación Física.
Métodos: Encuesta descriptiva con 155 docentes de la provincia de Java Occidental. La técnica de recopilación de datos utilizada fue un cuestionario con 18 preguntas sobre la contribución del uso de PMM al desarrollo de la preparación digital del profesorado de Educación Física. Los datos se analizaron mediante estadística descriptiva y se presentaron como porcentajes y frecuencias.
Resultados: Los hallazgos de la investigación revelaron que alrededor del 95 % del profesorado afirmó comprender eficazmente la aplicación PMM. Estos datos demuestran que la preparación y la competencia digital del profesorado desempeñan un papel importante en la alta adopción de la plataforma PMM. Esto se evidencia en la alta percepción, la capacidad de acceder e integrar la tecnología, las actitudes positivas y la significativa relación entre el uso de PMM y el desarrollo de la competencia digital del profesorado de Educación Física.
Conclusión: Los medios digitales, en este caso el uso de la aplicación PMM, desempeñan un papel fundamental en el desarrollo de la competencia digital del profesorado de Educación Física, Deportes y Salud (PJOK), especialmente en Java Occidental.

Palabras clave

Plataforma; Competencias digitales; Educación física; TPACK.

Introduction

The use of technology in education is becoming more common, altering the traditional classroom setting and supporting new educational approaches, including physical education. One of the changes brought about by developments in technology in the education sector is the usage of learning media with greater digital touch (Darmawan, Rahmad & Putera, 2012; Putra et al., 2022). Although physical education has traditionally focused on physical activity and movement abilities, it can greatly benefit from the use of digital resources. This was increasingly realized when Indonesia became one of the nations impacted by the COVID-19 epidemic in 2020, consequently learning had to be carried out in two ways, namely online and offline utilizing various digital platforms (Heng, 2021); ((Almahasees, Z., Mohsen, K., & Amin, 2021)), these changes subtly indicate that there has been a change and that technology is now playing a significant role in the field of education (Usfinit & Kuswandi, 2024) particularly in the use of various digital-based media, which is no longer something foreign but has instead become ingrained in society as digital media become an integral part of the educational process (Juditya et al., 2020); (Yulianto et al., 2024). Through the *Merdeka* Curriculum with one of its interventions is school digitalization. The aim of this school digitalization program is to help prepare excellent students for the workforce in 2040 (Yamin, M., & Syahrir, 2020; (Helmina, H., Fussalam, Y., Silvia, R., 2022;Arnes et al., 2023) nd to enhance the quality of resources available to teachers at every stage (Direktorat Sekolah Dasar, 2020; Hasmawaty et al., 2023). In order to facilitate this school digitization program, the government has established a digital platform known as the *Merdeka Mengajar Platform* (PMM) (Sherly et al., 2021).

The *Merdeka Mengajar* Platform (PMM) is an online platform developed by the Indonesian Ministry of Education, Culture, Research, and Technology (Kemdikbudristek) to help teachers carry out the Merdeka Curriculum ((Juditya, 2020;Adnan, 2020)). PMM offers a variety of resources and tools to assist teachers in improving their teaching practices (Siska, J., Dewi, C., Selviani, D., & Fitria, 2022), including access to a large collection of curated learning resources such as lesson plans, video modules, and assessments aligned with the Merdeka Curriculum. PMM is also a teaching tool, consisting of a set of digital tools for lesson design, delivery, and assessment, including presentations, interactive exercises, and rubrics. The PMM platform allows teachers to interact, cooperate, and share best practices with colleagues from around Indonesia (Darnita, Y., Wibowo, S. H., & Toyib, 2022; (Surani et al., 2022). The Merdeka Mengajar Platform's key features include individualized learning, which allows teachers to build personalized learning experiences for students based on their specific requirements and learning styles. PMM supports a wide range of teaching methods, allowing teachers to adjust their instruction to varied learning situations and student preferences. Data-driven insights allow teachers to use student performance data to improve teaching decisions and monitor the progress of students. PMM is freely accessible to all Indonesian teachers, regardless of location or school type. Overall, the Merdeka Mengajar Platform is an invaluable resource for Indonesian teachers who are dedicated to implementing the Merdeka Curriculum and improving teaching practices.

Despite the potential benefits, some physical education teachers are still not digitally ready or competent enough to effectively employ these technologies. Considering that the trend of using technology in learning has developed rapidly, if physical education teachers do not have both competencies, it will have a poor impact on the trend of using various digital media in physical education. The following data was found by the researcher as part of their assignment from the Provincial Education Office to support physical education teachers in the West Java region in socializing their use of the PPM platform. Additionally, based on data collected by the researcher from the Education Quality Assurance Center of West Java (BBPMP), there is still 45.3% of teachers who do not understand the PMM platform well, and 66.8% of teachers who follow up on real actions require improvement. Only 13.9% of teachers use assessments well, and 49.4% of teachers use technology improperly (BBPMP JABAR, 2024). Digital competence refers to the knowledge, abilities, and attitudes required to effectively use technology for educational purposes (Chen et al., 2024 ; (Ladrón et al., 2019). To optimize the use of PMM by physical education teachers, the provincial government, through the education office of each city/district, implements a variety of programs aimed at increasing PMM use. Socialization activities involving teacher working groups (KKG) and/or Subject Teacher Deliberations (MGMP) for physical education and these socialization activities are quite helpful in increasing the use of PMM, as stated in research conducted by (Surani, D., Asnawati, A. N., & Kusuma, 2022); (Prabowo et al., 2021); (Hasmawaty et al., 2023).

The trend of using digital media in physical education has undergone many developments over the years, especially in the current digital era. It includes the use of AI technology in the form of Kinect motion capture to analyze student movements during 400m running activities (He et al., 2024). Other examples are the use of the movement analysis application "Coach's eye" to provide effective feedback on sports skills in tennis and badminton games (Zulkifli & Danis, 2022), and the use of audio-visual media developed and implemented to help children aged 5-6 in developing physical motor skills (Supriyani Siregar & Sari, 2023). (Made et al., 2023) successfully developed and implemented ICT-based media related to floor exercise learning oriented to the TPACK principle. In the Covid era, many physical education teachers used Google Classroom through hybrid learning as the most effective learning method at that time (Banat, 2020). The use of various video tutorials in various motion learning materials in physical education classes is considered the most effective in impacting student activeness in learning (Febrianto et al., 2023). Other example of digital media usage for physical education are the use of volleyball learning videos implemented for high school students (Muhammad Yusran Yusuf Mubar et al., 2024), the use of video games in soccer training aimed at improving students' cognitive aspects (Swamynathan Sanjaykumar et al., 2025), the use of technology trends in the form of VR, AR and wearable devices in sports to help analyze performance, improve training and even help in analyzing injuries (Johan et al., 2024), the use of AR in the physical education that is considered to have a positive impact on the learning environment, especially in athletics (Liu et al., 2022), and the use of mobile technology supported by the ICRA flipped learning model in training physical skills in various racket sports such as badminton, tennis and table tennis (Lin et al., 2022). (Lindín et al., 2023) found that the learning management system (LMS) is the technology most often used, followed by hybrid learning systems. Furthermore, research discussing trends in the use of existing technologies does not only focus on the use of technological media, but there is also research related to technology that is more focused on transforming the management of traditional physical education into digital learning by transforming it into virtual classroom management. (Işıkgöz, 2024) and (Song & Cheong, 2024), in their research, also explains that, in in China, teachers have high efficacy in teaching, but this is inversely proportional to the level of efficacy in the use of technology in learning, which still needs to be improved.

Based on the above study, the trend of using digital media has been implemented in physical and sports education with various motion content. This technology is mostly used by students as a learning media, by athletes and/or coaches as a measuring tool/aid to detect movement abilities/injuries and by teachers as a media to provide learning stimulation. Moreover, the above study also focuses more on the positive impact of media use for media users, while this study focuses more on the use of a digital platform called the Merdeka Mengajar Platform (PMM). This study focuses on one single case study related to a digital platform called the Merdeka Mengajar Platform (PMM). This PMM provides various features to assist extensive resources specifically geared to optimize the implementation of the Merdeka Curriculum, including in physical education learning. This case study will look at how PMM features and capabilities can provide physical education teachers with the digital skills and knowledge they need to successfully integrate technology into lesson plans, assessments, and teaching methods regularly. Maka The purpose of this study is to investigate the role of digital devices in improving physical education teacher readiness and digital competence. This research is necessary to become one of the specialized studies in the current technological era where the trend of using technological media in the world of sports is still experiencing significant development. This research is expected to be used as evaluation material and input for the Indonesian government, especially in developing special applications for physical education teachers, and in making policies to improve the digital competence and readiness of teachers. It can also be used as a reference for the appropriate use of technology for teachers in improving their digital competence and readiness.

Method

This quantitative study employs a case study methodology. Data will be collected using a Google form from January 1, 2024, to February 29, 2024. In this study, the dependent variable is digital competence, while the independent factors are teacher level and teaching area. The questionnaire is assessed using a percentage for each question item. The questionnaire is open-ended, so participants are free to respond to questions in any order or at random, but they must respond to every question. The responses

indicate the understanding or impression of physical education teachers regarding the Merdeka Mengajar platform, as well as their level of skills and attitudes.

Participants

This survey included 155 physical education teachers from around West Java province. The characteristics of respondents involved as data sources in this study were physical education teachers from various levels of educational units (elementary schools, junior high schools, and senior high schools). Other criteria included teachers who had active status in the database (Dapodik), teachers who worked in schools that had implemented the independent curriculum for at least one year, and teachers who already had a belajar.id account and had installed and utilized the Merdeka Mengajar Platform. As a research code of ethics, the researcher guaranteed the confidentiality of all responder personal information and ensured that it was utilized solely for study. Table 1 shows the distribution of data based on the level of education where the teacher teaches and the category of the teacher's teaching area.

Table 1 Data Description of Participation

		N	Marginal Percentage
Participant		155	100%
Level of School	Elementary School	71	45.7%
	Junior High School	55	35.2%
	Senior High School	29	19.10
Area of residence	City area	117	75.3%
	District area	38	24.7%
Gender	Men	125	80.6%
	Woman	25	16.12%

Table 1 shows the characteristics of the data sources in this study. Out of the 150 physical education teachers sampled in this study, 45.7% of the teachers teach in elementary schools, 35.2% teach in junior high schools, and 19.10% teach in senior high schools. 75.3% of the teachers teach in urban areas and 24.7% in rural areas. The proportion of physical education teachers is 80.6% male and 16.12% female, with an average age of 36 years, an average work experience of 11 years, and teaching in educational institutions from Elementary, to high-school level.

Procedure

The process of collecting data was executed using a Google form link, which was sent to participants who fulfilled the requirements. The West Java province's sports teacher organization and physical education subject teacher meeting distributed the link. It is required of respondents to independently complete the questionnaire and to give truthful and precise answers. After the data collecting time was over, the data was collected and evaluated to determine the perception of digitalization acceptability in physical education learning and the elements that influence it. The questionnaire contained 18 questions that referred to (Händel et al., 2020)(Chen et al., 2024); (Fernández-Batanero et al., 2022). This open-ended questionnaire seeks to elicit respondents' impressions about digital platforms, which is teachers' readiness and competency in using digital platforms. These questions address teachers' comprehension of digital platforms that might be employed as "partners" in developing learning programs, as well as the potential benefits for teachers and schools. Each question is intended to elicit respondents' perspectives on the feasibility, readiness, competency, and benefits of employing technology in the context of physical education curriculum in schools across all educational units. Prior to implementation, this instrument underwent validity and reliability assessments to ensure the instrument's ability to reliably measure the variables under study. Thus, this questionnaire is expected to provide a comprehensive picture of how this PMM is able to provide an impact on the formation of competency and digital readiness of physical education teachers, especially in the West Java region, this issue was raised in a study to respond to developments in the use of digital in physical education learning and its possible influence on improving student academic achievement and the competence and performance of physical education teachers. This research was conducted only in the West Java Province, considering that the researcher is domiciled in one of the cities in the West Java Province and is currently involved in a school program in the province. The indicators are presented in Table 2.

Table 2 Questionnaire Item Indicators

Aspect	Indicator
Understanding/Perception	1. Knowledge of PMM Application 2. Installation of PMM application 3. An Understanding of the use PMM application
Practice/Skills	1. PMM application utilization duration 2. Application of utilization Frequency 3. Can use application features 4. Implementation of every PMM application feature 5. Frequently use feature 6. Sub feature that are often used in the "Self-development" feature 7. Sub feature that have not been used in the "Self-development" 8. Sub feature that are often used in the "Teaching" 9. Sub feature that have not been used in the "Teaching" 10. Sub feature that are often used in the "Teaching" 11. Sub feature that have not been used in the "Inspiratio"
Attitude	1. Reasons to use PMM 2. Teacher feedback on the PMM application

Table 3 shows a Cronbach's Alpha reliability rating of 0.956 for 18 items, indicating a very high level of consistency in the measurement instruments or questionnaires analyzed.

Table 3. Cronchbach' Alpha Value

Cronbach's Alpha	N of Items
.956	18

The value of 0.956 is categorized as "very high", which means that the questionnaire instrument used in this study has an excellent level of internal consistency. It means that each item in the questionnaire is relevant and consistent in measuring the same aspect, namely the digital competence of physical education teachers in the context of using the PMM.

Table 4 Validity and Realibulity Test

No	Question	Corrected Item Total Correlation	Note	Cronbach's Alpha	Note
1.	Your school of origin is in…	.754	Valid	.953	Reliable
2.	Your Teaching Education Unit...	.727	Valid	.954	Reliable
3.	Do you know or have experience with the PMM application?	.767	Valid	.953	Reliable
4.	Have you installed and used PMM??	.756	Valid	.953	Reliable
5.	Do you understand how to use PMM digital media?	.771	Valid	.952	Reliable
6.	How long have you known about and used PMM?	.743	Valid	.953	Reliable
7.	During the course of a semester, how many times do you typically use PMM?	.738	Valid	.954	Reliable
8.	What do you usually do with the PMM application?	.747	Valid	.954	Reliable
9.	How much do you understand, learn, and use of each PMM feature?	.740	Valid	.953	Reliable
10.	What features do you often use?	.762	Valid	.952	Reliable
11.	Which features of the Self-Development Feature do you use the most?	.767	Valid	.952	Reliable
12.	What features of the Self-Development Feature do you never use?	.772	Valid	.953	Reliable
13.	Which features in the Teaching Feature do you use the most?	.780	Valid	.954	Reliable
14.	What features of the Teaching Feature do you never use?	.672	Valid	.955	Reliable
15.	Which features of the Inspiration Feature do you use the most?	.568	Valid	.956	Reliable
16.	Which Inspiration Features have you never used?	.654	Valid	.954	Reliable
17.	What is your reason using PMM?	.672	Valid	.955	Reliable
18.	How do you feel when you use PMM?	.770	Valid	.951	Reliable

Data analysis

Quantitative data is processed for descriptive statistical analysis, which is reported in percentages and frequencies. Furthermore, this study conducted validity and reliability tests to ensure the instrument and data validity. The test's validity is determined by the corrected total item correlation, with $r < 0.3$ suggesting fewer valid components. The reliability test examines the questionnaire's consistency when it is repeated. Cronbach's Alpha was employed as the technique in this research. If the Cronbach Alpha coefficient is 0,9 it is considered "very good", 0,9>0,8 "good", 0,8>0,7 is "acceptable", 0,7>0,6 is considered "questionable", 0,6 >0,5 is considered "poor", dan 0,5 > unacceptable or rejected. All data in this study was analyzed using IBM SPSS software version 21.

In addition, the regression test is measured for

Results

Table above (table 5) shows that the phenomenon of utilizing a PMM digital platform has an impact on the formation of an understanding aspect of 84.33%, where 95.5% of PJOK teachers know about PMM, 74.2% have installed PMM on their respective devices/gadgets and 83.8% can use/operate PMM; skills of 48.77% where 33.1% of PJOK teachers stated that they have a certain duration in using PMM, 37% of teachers said they often use PMM, 41.2% of them can already use all the features in PMM even 40.5% of teachers have started to implement some of the information in PMM into their teaching activities, 82.9% of them answered that they have a fairly frequent frequency in utilizing each feature and of all the features in PMM, PJOK teachers more often utilize the first feature related to self-development features (80%), the second teaching feature (74%) and the third inspiration feature (59.3%); even the phenomenon of the use of PMM has an impact on the formation of attitude aspects of 55.8% where PJOK teachers have a positive response to the use of PMM of 55.5% and good feedback of 56.1% even if looking at the previous explanation (table 5) it can be drawn a picture that the phenomenon of PMM utilization can have an impact of 62.96% on the formation of digital competencies possessed by PJOK teachers, especially in the West Java region.

Table 5 The digital competence of physical education teachers, specifically in the phenomenon of using PMM applications

Aspect	Indicator	Percentage Per Indikator	Percentage Per Aspek
Understanding/Perception	Knowledge of PMM Application	95.5	84.33
	Installation of PMM application	74.2	
	An Understanding of the use of PMM application	83.8	
Practice/Skill	PMM application utilization duration	33.1	48.77
	Application of utilization Frequency	37	
	Can use application features	41.2	
	Implementation of every PMM application feature	40.5	
	Frequently use feature	82.9	
	Sub feature that are often used in the “Self-development” feature	80	
	Sub feature that has not been used in the “Self-development”	66	
	Sub feature that are often used in the “Teaching”	74	
	Sub feature that has not been used in the “Teaching”	48	
	Sub feature that are often used in the “Teaching”	58.1	
	Sub feature that has not been used in the “Inspiratio”	59.3	
Attitude	Reasons to use PMM	55.5	55.8
	Teacher feedback on the PMM application	56.1	

Figure below (figure 1) shows the digital competence of physical education teachers on one PMM application which has been used by physical education teachers for approximately 3 years starting from 2020. Based on table 5 and figure 1, it can be seen that the digital competence of physical education teachers in terms of understanding/perception of the PMM application is 33.5% for the indicator of knowledge of the PMM application, 72.4% of physical education teachers have installed the PMM application and 83.8% of teachers have understood how to use the PMM application.

Figure 1. Digital Competence of Physical Education Teachers: Understanding/Perception of PMM

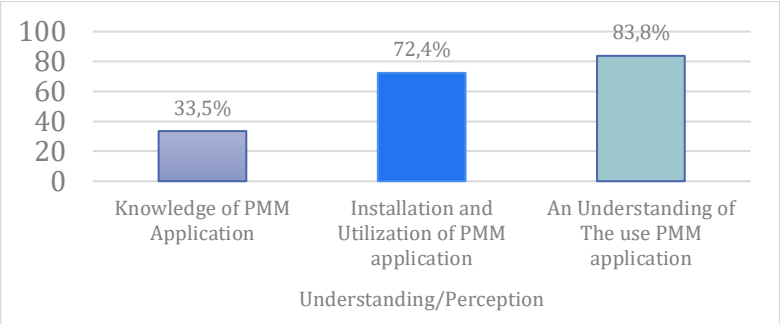

Figure below (Figure 2) shows the digital competence of physical education teachers in terms of the use/skills in using the PMM application. The figure above shows that 33.1% of teachers have used the PMM application with different ranges of utilization ranging from 1 month to more than 2 years. 37% of physical education teachers answered that they used this application 1 to 3 times in a semester. 41. 2% of physical education teachers are accustomed to using the PMM application. 40.5% of physical education teachers explained that they have used PMM with various activities, including only opening PMM, opening and studying PMM, and opening, studying, and utilizing PMM. 82. 9% of physical education teachers said that they had utilized all the features in the PMM application with various activities using each feature, ranging from studying each feature without utilizing it to studying and utilizing each feature in the PMM application. 80% of physical education teachers have utilized the self-training and community features, and 66% of physical education teachers have never utilized the school principal selection, community and independent training in self-development features. 74% of physical education teachers make extensive use of the learning outcomes/learning objectives flow and teaching tools features and 48% of physical education teachers have never used these features. 58.1% of teachers have used the inspiration video and work evidence features and 59.3% of teachers have not used these features.

Figure 2. Digital Competence of Physical Education Teachers: Skills in Utilizing PMM

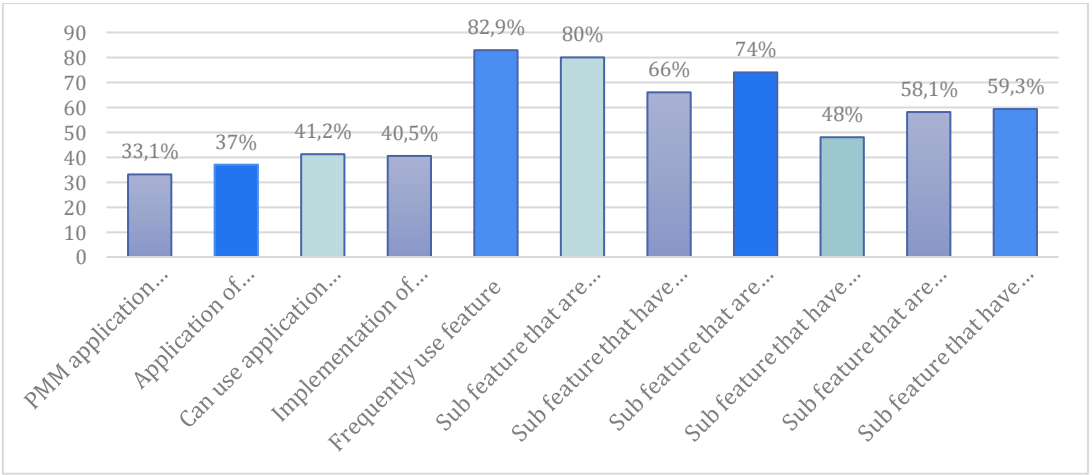

Figure below (Figure 3) shows the digital competence of teachers in terms of the attitude of physical education teachers towards PMM. 55.6% of physical education teachers have a positive reason for utilizing PMM, which they believe is very necessary, and 56.1% of teachers give positive feedback (very helpful) on the use of PMM, especially in improving competence, both in terms of teaching and digital competence in the current era of digitalization. Based on the data, the 'Student Assessment' feature in PMM was used by 74% of PJOK teachers to evaluate students' movement skills such as dribbling, passing, and shooting. In addition, 80% of teachers took advantage of 'Independent Training' to improve their understanding of physical skills learning methods.

Figure 3. Digital Competency of Physical Education Teachers: Attitude of Physical Education Teachers towards PMM

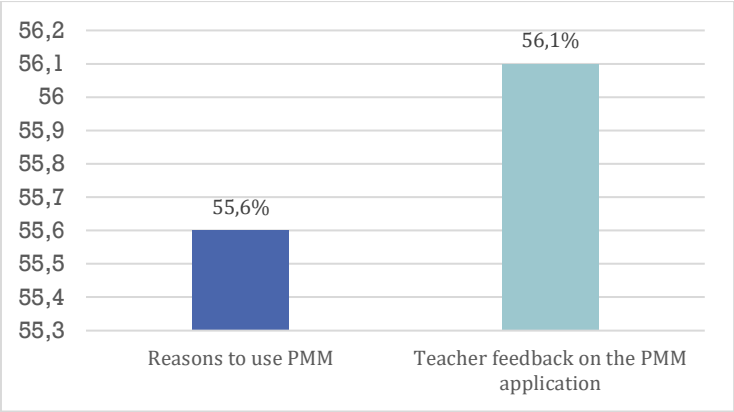

Table below shows that all independent variables in this study, which consist of Perception, Skills, and Attitude, have a significant influence on the Digital Competence of Physical Education Teachers with an R Square value of 1,000, which explains 100% of the variation in Digital Competence, with p-values = 0.000, indicating that it is very significant. The regression test results show that the variables of perception, skills, and attitudes have a significant effect on the digital competence of physical education teachers in utilizing the teaching and learning media ($p < 0.001$). The R^2 value of 1,000 indicates that the three variables are able to explain 100% of the variation in the digital competence of physical education teachers. These results confirm that the use of digital media plays a very important role in shaping the digital competence of physical education teachers in terms of positive perceptions, skills, and attitudes.

Table 6. Multiple Linear Regression Test

Variable	Coefficient (β)	Sig (p-value)	Remarks
Perception	0.333	0.000	Significant
Competence	0.333	0.000	Significant
Attitude	0.333	0.000	Significant
R^2 (R-Square)	1.000		Very strong model

Discussion

Based on the data analysis on table 5 and figures 1, 2 and 3, this study will explain two major discoveries. The first finding is that the majority of physical education teacher respondents are optimistic about digital technology, particularly the PMM platform in physical education learning. The second finding is that there are three indicators of digital competence that influence physical education teachers' perceptions. These indications include comprehension/knowledge, skills, and attitudes. In the 4.0 age and the 5.0 era, the use of digital technology in education is becoming unavoidable, including in Indonesia. The development of digital-based school learning has been a leading trend in the international world since 2016; current digital technology is an important part that can be collaborated in supporting learning, but the presence of technology in the world of education is not a good thing if it is not accompanied by the mastery of pedagogy from teachers in schools (Resing, 2020). Therefore, in order to support pedagogical competence, the Ministry of Education in Mr. Nadiem era launched a management system called the *Merdeka Mengajar* Platform (PMM), where PMM is one of the digital partners that teachers can use to carry out learning transformation (Silvi Lisvian Sari et al., 2022) and this is in line with what was conveyed by (Aprianto et al., 2020) that changes in the learning and teaching environment are unavoidable as a result of information technology advancements that are currently starting to affect the world of education. The PMM, in particular, offers numerous benefits to teachers, particularly Physical Education teachers in schools. Given that PMM has many features that teachers can use as a guide, including teaching features like CP/ATP features, Teaching Tools, Student Assessments; self-development features like Independent training, Community, Principal Selection, and Performance Management; and finally, an Inspiration feature with features like inspirational videos, evidence of work, and assessment practice ideas, PMM can influence positive teacher behavior in the

classroom and increase motivation to improve the quality of physical education learning (Puspita Sari et al., 2023; Wasi & Siregar, n.d.).

With the various features in PMM that are utilized by Physical Education teachers, it will indirectly have an impact on improving the quality of movement learning in schools considering that this PMM has a vision, namely to create a collaborative ecosystem that can increase effectiveness in learning and provide a positive climate for teachers in improving learning (Dewa et al., n.d.). According to the responses of physical education teachers, many believe that using features in a digital platform, specifically PMM, can have many positive impacts on improving their quality in creating meaningful learning. The impacts they can feel include skill development, collaboration and communication, access to learning resources, problem-solving skills, the ability to adapt to new tools, digital literacy, and creativity and innovation. Referring to this, factors as important as technology itself include teachers' understanding, skills, and attitudes toward using technology, with digital competence being one of the factors that can influence improving the quality of learning (Kallas & Pedaste, 2022) particularly in the context of physical education learning. Supporting this, technology presently plays an essential role in improving the quality of learning; nevertheless, the presence of technology will not be maximized unless teachers are trained with pedagogical abilities for using technology (Voogt et al., 2013).

The perspective of technological pedagogical content knowledge (TPACK) holds that a teacher in the modern classroom needs to comprehend the ways in which pedagogy, content, and technology might interact (Rosenberg & Koehler, 2015), where TPACK itself discusses a number of topics under the umbrella term "TPACK framework," including technological pedagogical knowledge (TPK), which is concerned with the relationship between technology and pedagogical practices; pedagogical content knowledge (PCK), which is concerned with pedagogical practices and learning objectives; and technological content knowledge, which is concerned with technology and learning objectives (TCK). These topics are all combined from aspects of technological knowledge (TP), which includes TP's discussion of teachers' knowledge of tools, software, and hardware; Pedagogical Knowledge (PK) discusses how to manage, instruct, and guide students; and Cognitive Knowledge (CK) discusses a teacher's scientific discipline (Koehler et al., 2014). Aside from all the previously mentioned factors, the most crucial one for enhancing digital competency through the use of digital platforms is to talk about an open-minded attitude toward technology use, which can result in enough experience and raise teacher awareness to improve teaching, particularly in the current digital era. Long-term experience using features in digital platforms, in this case PMM, also fosters positive communication between teachers and students. The use of the 'Assessment' and 'Teaching Tools' features directly supports the learning process of movement skills in physical education classes.

Teachers can measure students' technical performance in a measurable and standardized method. This study recommends a mentoring model in the form of workshops and coaching clinics that focus on the direct practice of utilizing the PMM features in learning physical skills.

Conclusions

Based on the results of the analysis conducted by the researchers, it can be concluded that digital media, in this case the use of the PMM application, has a very large role in developing the digital competence of physical education, sports and health teachers (PJOK) especially in West Java. The significant role of digital media in the development of digital competence cannot be separated from the utilization of each feature found in the Merdeka Mengajar Platform (PMM). In fact, the researchers found that there are several features that are often used by teachers, such as the self-training and community features, the learning outcomes/learning objectives flow features, and the teaching tools. Eventually, the utilization of each feature has an impact on the development of their digital competence. This study is limited to the West Java region and uses descriptive analysis. Further research is recommended to expand the geographical reach, identify other factors that can influence the development of digital competence, and analyze the impact of other types of platforms on the formation of digital competence, especially for PJOK teachers.

Acknowledgements

The completion of this research is inseparable from supporting parties who helped facilitate the entire series of research. Therefore, the authors would like to express their deepest gratitude for the support and assistance in facilitating communication and data collection to the West Java Teacher Empowerment Center (BBGP), the Physical Education Teachers' Working Group (MGMP) in West Java Province, West Java National Sports Teachers Association (IGONAS), Physical Education, Health and Recreation (PJKR) Study Program of STKIP PASUNDAN, and STKIP PASUNDAN.

References

Adnan, M. (2020). Online learning amid the COVID-19 pandemic: Students perspectives. *Journal of Pedagogical Sociology and Psychology*, *1*(2), 45–51. https://doi.org/10.33902/jpsp.2020261309

Almahasees, Z., Mohsen, K., & Amin, M. O. (2021). Faculty's and Students' Perceptions of Online Learning During COVID-19. *Frontiers in Education*.

Aprianto, E., Purwati, O., & Anam, S. (2020). Multimedia-Assisted Learning in a Flipped Classroom: A Case Study of Autonomous Learning on EFL University Students. *International Journal of Emerging Technologies in Learning*, *15*(24), 114–127. https://doi.org/10.3991/ijet.v15i24.14017

Arnes, A., Muspardi, M., & Yusmanila, Y. (2023). Analisis Pemanfaatan Platform Merdeka Mengajar Oleh Guru PPKn untuk Akselerasi Implementasi Kurikulum Merdeka. *Edukatif : Jurnal Ilmu Pendidikan*, *5*(1), 60–70. https://doi.org/10.31004/edukatif.v5i1.4647

Banat, A. (2020). KEMANDIRIAN BELAJAR MAHASISWA PENJAS MENGGUNAKAN MEDIA GOOGLE CLASSROOM MELALUI HYBRID LEARNING PADA PEMBELAJARAN PROFESI PENDIDIKAN DI MASA PANDEMI COVID-19. In *Jurnal Teknologi Pendidikan* (Vol. 13, Issue 2).

BBPMP JABAR. (2024). *Dasboard Pengunaan Platform Merdeka Mengajar (PMM) Jabar*.

Chen, X., Chang-Richards, A., Ling, F. Y. Y., Yiu, K. T. W., Pelosi, A., & Yang, N. (2024). Effects of digital readiness on digital competence of AEC companies: a dual-stage PLS-SEM-ANN analysis. *Building Research & Information*, 1–18. https://doi.org/10.1080/09613218.2024.2343825

Darmawan, Rahmad & Putera, G. (2012). *Jadi Juara dengan Sepakbola Possesion.Jakarta: KickOff Media*. Kick Off Media.

Darnita, Y., Wibowo, S. H., & Toyib, R. (2022). Sosialisasi Platform Teknologi Informasi Sekolah Menengah Kejuruan Pusat Keunggulan di SMK Negeri 10 Bengkulu Utara. *Prima Abdika*, *2*(1), 96–106.

Dewa, O., Made, A., Priantini[1], M. O., Suarni[2], N. K., Ketut, I., & Adnyana[3], S. (n.d.). *ANALISIS KURIKULUM MERDEKA DAN PLATFORM MERDEKA BELAJAR UNTUK MEWUJUDKAN PENDIDIKAN YANG BERKUALITAS*. http://ojs.uhnsugriwa.ac.id/index.php/JPM

Direktorat Sekolah Dasar. (2020). *Platform Merdeka Mengajar*. Kementerian Pendidikan Kebudayaan Riset Dan Teknologi Republik Indonesia.

Febrianto, G., Astuti, I., & Enawat, E. (2023). STUDI DESKRIPTIF KEAKTIFAN BELAJAR SISWA MENGGUNAKAN MEDIA PEMBELAJARAN VIDEO TUTORIAL DALAM PENDIDIKAN JASMANI DI SMA. In *Jurnal Teknologi Pendidikan* (Vol. 16, Issue 2).

Fernández-Batanero, J. M., Montenegro-Rueda, M., Fernández-Cerero, J., & García-Martínez, I. (2022). Digital competences for teacher professional development. Systematic review. *European Journal of Teacher Education*, *45*(4), 513–531. https://doi.org/10.1080/02619768.2020.1827389

Händel, M., Stephan, M., Gläser-Zikuda, M., Kopp, B., Bedenlier, S., & Ziegler, A. (2020). Digital readiness and its effects on higher education students' socio-emotional perceptions in the context of the COVID-19 pandemic. *Journal of Research on Technology in Education*, *54*(2), 267–280. https://doi.org/10.1080/15391523.2020.1846147

Hasmawaty, Muliati, & Bachtiar, M. Y. (2023). Optimalisasi Aplikasi Platform Merdeka Mengajar (MM) Melalui Komunitas Belajar Gugus PAUD. *Madaniya*, *4*(2), 574–581.

He, Q., Chen, H., & Mo, X. (2024). Practical application of interactive AI technology based on visual analysis in professional system of physical education in universities. *Heliyon*, *10*(3). https://doi.org/10.1016/j.heliyon.2024.e24627

Helmina, H., Fussalam, Y., Silvia, R., & . . . (2022). Analisis Kesiapan Dan Keberlanjutan Program Merdeka Belajar Kampus Merdeka (Studi Kasus Universitas Muhammadiyah Jambi). *Jurnal Muara*.

Heng, K. (2021). Online learning during COVID-19: Key challenges and suggestions to enhance effectiveness. *Cambodian Education Research Journal*, *1*(1), 1–20.

Işıkgöz, M. E. (2024). Traditional Classroom Management to Virtual Classroom Management: A Study on Physical Education Teachers' Competencies. *Sage Open*, *14*(4). https://doi.org/10.1177/21582440241305211

Johan, T., Yuswanto, A., Ernawati, N., & Solikhah, F. K. (2024). Cómo influye la digitalización en el aprendizaje transformador en el deporte y la enfermería? : Revisión sistemática. *Retos*, *63*, 326–337. https://doi.org/10.47197/retos.v63.107

Juditya, S. (2020). *Pembelajaran Penjas di Era Covid-19*.

Juditya, S., Suherman, A., Rusdiana, A., Nur, L., Agustan, B., & Zakaria, D. A. (2020). Digital teaching material "pojok": One of the technology based media in physical education learning. *International Journal of Psychosocial Rehabilitation*, *24*(10), 1774–1784. https://doi.org/10.37200/IJPR/V24I10/PR300204

Kallas, K., & Pedaste, M. (2022). How to Improve the Digital Competence for E-Learning? *Applied Sciences (Switzerland)*, *12*(13). https://doi.org/10.3390/app12136582

Koehler, M. J., Mishra, P., Kereluik, K., Shin, T. S., & Graham, C. R. (2014). The technological pedagogical content knowledge framework. In *Handbook of Research on Educational Communications and Technology: Fourth Edition* (pp. 101–111). Springer New York. https://doi.org/10.1007/978-1-4614-3185-5_9

Ladrón-de-Guevara Moreno, L., Cabero-Almenara, J., & Almagro Torres, B. (2019). El conocimiento tecnológico, pedagógico y disciplinar del profesorado universitario de Educación Física (Technological, pedagogical and content knowledge in faculty professors of Physical Education). *Retos*, *36*, 362–369. https://doi.org/10.47197/retos.v36i36.68898

Lin, Y.-N., Hsia, L.-H., & Hwang, G.-J. (2022). Fostering motor skills in physical education: A mobile technology-supported ICRA flipped learning model. *Computers & Education*, *177*, 104380. https://doi.org/10.1016/j.compedu.2021.104380

Lindín, C., Engel, A., Gràcia, M., Rivera-Vargas, P., & Rubio, M. J. (2023). Literature Review on Emerging Educational Practices Mediated by Digital Technologies in Higher Education, Based on Academic Papers. In *SAGE Open* (Vol. 13, Issue 4). SAGE Publications Inc. https://doi.org/10.1177/21582440231204677

Liu, Y., Sathishkumar, V., & Manickam, A. (2022). Augmented reality technology based on school physical education training. *Computers and Electrical Engineering*, *99*, 107807. https://doi.org/10.1016/j.compeleceng.2022.107807

Made, M. A. W., Suwiwa, I. G., Bayu, W. I., & Estrella, E. O. (2023). ICT TPACK-Oriented of Floor Gymnastics Learning Media for Elementary School Students. *Journal of Education Technology*, *7*(1), 34–44. https://doi.org/10.23887/jet.v7i1.57076

Muhammad Yusran Yusuf Mubar, Arnidah, Nurhikmah Hasyim, & Abdul Hakim. (2024). Feasibility of volleyball technics video in physical education for senior high school. *Jurnal Inovasi Teknologi Pendidikan*, *11*(1), 1–11.

Prabowo, D. A., Fathoni, M. Y., Toyib, R., & Sunardi, D. (2021). Sosialisasi Aplikasi Merdeka Mengajar dan Pengisian Konten Pembelajaran pada SMKN 3 Seluma Untuk Mendukung Program SMK-PK Tahun 2021. *JPMTT (Jurnal Pengabdian Masyarakat Teknologi Terbarukan)*, *1*(2), 55–60. https://jurnal.ikhafi.or.id/index.php/jpmtt/article/view/410

Puspita Sari, K., Mujahidin, M., Al Muhammad Cepu, I., & Al Muhammad Cepu, S. (2023). *ANALISIS PEMANFAATAN PLATFORM MERDEKA MENGAJAR UNTUK PENINGKATAN KOMPETENSI GURU DI SEKOLAH MENENGAH ATAS AL MUHAMMAD CEPU*. https://www.ejournal.smaamc.sch.id/index.php/belajar

Putra, B. S., Soepriyanto, Y., & Susilaningsih. (2022). NOVEL CHAT SEBAGAI INOVASI MEDIA PEMBELAJARAN SOSIOLOGI MATERI BENTUK INTERAKSI SOSIAL. *JKTP: Jurnal Kajian Teknologi Pendidikan*, *5*(1), 42–51. https://doi.org/10.17977/um038v5i12022p042

Resing, W. C. M. , V. B. , & E. J. G. (2020). Children's solving of 'Tower of Hanoi' tasks: Dynamic testing with the help of a robot. *Educational Psychology*, *40*(9), 1136–1163.

Rosenberg, J. M., & Koehler, M. J. (2015). Context and technological pedagogical content knowledge (TPACK): A systematic review. *Journal of Research on Technology in Education*, *47*(3), 186–210. https://doi.org/10.1080/15391523.2015.1052663

Sherly, Dharma, E., & Sihombing, H. B. (2021). Merdeka Belajar: Kajian Literatur. *Konferensi Nasional Pendidikan I*.

Silvi Lisvian Sari, A., Pramesti, C., Suliana, R. R., & kunci, K. (2022). *SOSIALISASI PLATFORM MERDEKA MENGAJAR SEBAGAI WADAH BELAJAR DAN BERKREASI GURU Informasi Artikel Abstrak* (Vol. 6, Issue 01). http://jurnal.unipasby.ac.id/index.php/penamas

Siska, J., Dewi, C., Selviani, D., & Fitria, Y. (2022). Pemguatan Implementasi Kurikulum Merdeka Bagi Sekolah di Bengkulu Utara. *Jurnal Pengabdian Kepada Masyarakat*, *1*(4), 497–501.

Song, X. L., & Cheong, J. P. G. (2024). An Examination of Chinese Physical Education Teachers' Teaching Efficacy and Technology Self-Efficacy at the Time of the COVID-19 Pandemic. *SAGE Open*, *14*(2). https://doi.org/10.1177/21582440241241933

Supriyani Siregar, E., & Sari, I. P. (2023). Development of Audio-Visual Media on the Physical Motor Development of Students in Big Kindergarten. *JTP-Jurnal Teknologi Pendidikan*, *25*(3), 363–370. https://doi.org/10.21009/JTP2001.6

Surani, D., Asnawati, A. N., & Kusuma, A. W. (2022). Sosialisasi Aplikasi Merdeka Mengajar dan Pengenalan Platform SIMBA dalam Meningkatkan Pemahaman Media Pembelajaran Kepada Tenaga Pendidik di SMPN 10 Cilegon. *Jurnal Pengabdian Dan Edukasi Sekolah*, *2*(2), 164–171.

Surani, D., Asnawati, A. N., & Kusuma, A. W. (2022). Sosialisasi Aplikasi Merdeka Mengajar Dan Pengenalan Platform Simba Dalam Meningkatkan Pemahaman Media Pembelajaran Kepada Tenaga Pendidik Di Smpn 10 Cilegon. *Jubaedah : Jurnal Pengabdian Dan Edukasi Sekolah (Indonesian Journal of Community Services and School Education)*, *2*(2), 164–171. https://doi.org/10.46306/jub.v2i2.77

Swamynathan, S. ., Salini, B. ., Udaichi, K. ., Yoga Lakshmi , P. ., Kalmykova, Y., Lobo, J. ., & Setiawan, E. . (2025). The role of football video games in boosting cognitive abilities critical to football performance. *Retos*, *62*, 802–806. https://doi.org/10.47197/retos.v62.109761

Usfinit, I. F., & Kuswandi, D. (2024). *Development of augmented reality feature modules on the introduction of historical monuments in Timor Leste*. *11*(1), 11–22.

Voogt, J., Fisser, P., Pareja Roblin, N., Tondeur, J., & van Braak, J. (2013). Technological pedagogical content knowledge – a review of the literature. *Journal of Computer Assisted Learning*, *29*(2), 109–121. https://doi.org/10.1111/j.1365-2729.2012.00487.x

Wasi, Z., & Siregar, N. M. (n.d.). *PENGARUH PERMAINAN HADANG DAN PERMAINAN TAP JONGKOK TERHADAP KETERAMPILAN GERAK*. 101–106.

Yamin, M., & Syahrir, S. (2020). Pembangunan pendidikan merdeka belajar (telaah metode pembelajaran). *Jurnal Ilmiah Mandala Education*.

Yulianto, M. F., Degeng, I. N. S., Duananda, M., & Degeng, K. (2024). *Web-based teaching media innovation to improve understanding of science learning*. *11*(1), 33–43.

Zulkifli, A. F., & Danis, A. (2022). Technology in physical education: Using movement analysis application to improve feedback on sports skills among undergraduate physical education students. *Social Sciences and Humanities Open*, *6*(1). https://doi.org/10.1016/j.ssaho.2022.100350

Authors' and translators' details:

Silvy Juditya	sjuditya@gmail.com	Author
Febriana Pratiwi	febrianapratiwi@upi.edu	Author
Dhani Agusni Zakaria	Daniewoxxx82@gmail.com	Author