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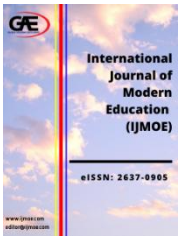

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EXPLORING THE NEXUS OF TEACHER COMPETENCY AND CLASSROOM-BASED ASSESSMENT READINESS: A MULTIVARIATE ANALYSIS AMONG PHYSICAL AND HEALTH EDUCATION TEACHERS

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Abstract:

The implementation of Classroom-based assessment (CBA), locally known as *Pentaksiran Bilik Darjah* (PBD), remains a significant challenge within the Physical and Health Education (PHE) domain. This study examines the influence of demographic factors (gender, teaching experience, specialization and training attendance) on teacher competency and PBD readiness among primary school teachers in Selangor, Malaysia. Utilizing a predictive correlational design, data were collected from 430 PHE teachers through a proportionate stratified random sampling technique. Multivariate Analysis of Variance (MANOVA) initially revealed significant differences in competency and readiness based on specialization, teaching experience and training attendance ($p < 0.05$). However, when teacher competency dimensions (knowledge, skills and attitudes) were statistically controlled as covariates using Multivariate Analysis of Covariance (MANCOVA), the effects of specialization and teaching experience became non-significant. Only training attendance remained a significant multivariate predictor of PBD readiness (V= 0.030, p = 0.007, n_p^2= 0.030). Interestingly, the analysis of adjusted means revealed a 'Training Paradox", where non-trained teachers perceived higher readiness during implementation, suggesting that formal training may heighten "impact concerns" and professional reflexivity. Professional attitude emerged as the most consistent covariate across all PBD readiness phases. These findings suggest that professional competency is a more potent

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determinant of PBD readiness than demographic profiles. The study concludes that educational policy should shift from one-off administrative briefings toward sustained, competency-based professional development to ensure the quality of PHE assessment.

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Keyword:

Classroom-Based Assessment, Formative Assessment, Physical and Health Education, Teacher Competency, Teacher Readiness

Introduction

The Malaysian education landscape is undergoing a significant structural transformation driven by the Malaysian Education Blueprint (MEB) 2013-2025. Central to this transformation is the holistic development of students, aligning with the National Education Philosophy which emphasizes the balance of intellectual, physical, emotional and spiritual domains (Ministry of Education, 2024a). Within this policy context, Classroom-based assessment (CBA), locally known as *Pentaksiran Bilik Darjah* (PBD), serves as a strategic mechanism to foster meaningful learning and authentic student development (Dhanapalan, 2025; Razak et al., 2023).

Unlike traditional high-stakes testing, PBD is a continuous formative approach that requires teachers to integrate assessment within the teaching and learning (T&L) process. This integration demands a high level of teacher readiness across three critical stages: pre-T&L(planning), during-T&L (implementation) and post-T&L (reporting and follow-up) (Shahudin & Jamaludin, 2024; Yuh & Husaina, 2020). In the context of Physical and Health Education (PHE), teacher readiness is even more paramount. PHE assessment is uniquely challenging as it involves the observation of physical performance, motor skills and health literacy which are often qualitative and require high professional integrity (Kong & Koh, 2024; Li, 2024).

Extensive literature identifies teacher competency comprising knowledge, skills and attitudes as the cornerstone of effective assessment (Nasim et al., 2024; Permana et al., 2024). While knowledge enables the design of appropriate instruments, skills allow for the reflection and adjustment of instructional strategies and a positive attitude ensures sustained professional commitment (Bezeau et al., 2023; Carillo-López, 2023). Despite the Ministry's report indicating that 87.3% of teacher reached a "good" level in competency courses (Ministry of

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Education, 2024a), empirical evidence suggests that grassroots implementation remains inconsistent, with many teachers operating at a moderate level of assessment literacy (Ashma et al., 2022; Nurul Huda & Anuar, 2022).

A critical gap exists in current research regarding the multivariate nature of these variables. Most previous studies in Malaysia have examined demographic factors (such as gender, teaching experience, specialization and professional training) and teacher readiness in isolation (Xin & Nasri, 2024; Yusoff et al., 2024). Consequently, it remains unclear whether observed differences in PBD readiness are truly a function of demographic characteristics or if they are inherently confounded by the teachers' underlying competency levels. For instance, while specialized (option) teachers may appear more ready, is this readiness a result of their specialization per se, or is it because their specialization has equipped them with higher competency dimensions?

This study addresses this empirical void by employing multivariate approach to examine differences in PHE teacher competency and PBD readiness based on demographic factors in Selangor. Crucially, this study further investigated whether demographic differences in readiness persist after statistically controlling for the confounding influence of competency dimensions. By isolating the unique contribution of demographic factors from underlying competency levels, this research provides a more nuanced understanding of the unique contributions of demographics versus professional competency. The findings are expected to offer evidence-based insight for the Ministry of Education to design more targeted professional development programs for PHE teachers.

Literature Review

Teacher Readiness in PBD

Teacher readiness is conceptualized as a dynamic construct that evolves across pre-, during- and post-teaching phases (Yuh & Husaina, 2020). Pre-T&L readiness (planning) involves the systematic alignment of learning objectives with Curriculum and Assessment Standard Documents (DSKP), ensuring that assessment instruments are constructively aligned with physical performance outcomes (Marnizam & Ali, 2021; Shahudin & Jamaludin, 2024). During-T&L readiness demands high "assessment literacy" where teachers must perform real-time, authentic observations and provide immediate formative feedback to enhance student mastery in cognitive, affective and psychomotor domains (Bores-Garcia et al., 2023; Carrillo-López, 2023). Post-T&L readiness, widely regarded as the most technically demanding phase, requires teachers to systematically analyse data and determine Mastery Levels (TP) with professional integrity to ensure the validity of student progress reports (Thoomeran et al., 2024; Zakaria et al., 2024b).

From a theoretical perspective, this progression of readiness aligns with Fuller's Theory of Concerns (1969), where a teacher's focus evolves from "Self-concerns" (personal adequacy) to 'Impact-concerns" (student learning outcomes). High levels of readiness in the planning stage do not necessarily guarantee equivalent readiness in implementation or reporting (Nagaretnam & Mahmud, 2022). In the context of PHE, the requirement for readiness is even more acute due to the dynamic nature of outdoor learning environments and the reliance on qualitative performance evidence (Kong & Koh, 2024; Zakaria et al., 2024a). Therefore, operationalizing readiness as a multidimensional construct allows for a more granular analysis

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of teacher preparedness across diverse assessment functions. However, literature suggests that readiness is not uniform; it is often fragmented, where teachers may demonstrate high readiness in planning but falter during actual implementation or reporting due to a lack of interpretive skills (Atan et al., 2020; Thoomeran et al., 2024).

Teacher Competency

Teacher competency is defined as a holistic integration of individual attributes including knowledge, skills, values and motivations, that collectively shape professional performance outcomes (Spencer & Spencer, 1993; Nasim et al., 2024). In the Malaysian context, this definition is institutionally anchored within the Malaysian Teacher Standard 2.0 (SGM 2.0), which mandates that teachers possess a comprehensive suite of competencies to ensure high-quality, relevant and high-impact educational delivery (Said et al., 2022).

Literature consistently categorizes teacher competency into three primary dimensions comprising knowledge, skills and attitudes (Mat Said et al., 2023). In the context of assessment, knowledge refers to teacher's conceptual understanding of curriculum standards (DSKP), formative assessment principles and the designs of valid and authentic instruments (Hollenstein & Brühwiler, 2024; McMillan, 2022). Skills represent the practical manifestation of this knowledge, encompassing the ability to conduct systematic observations, interpret student learning evidence and deliver constructive feedback within dynamic classroom environments (Granada & Oco,2024; Hanapi et al., 2020). Attitude constitutes the dispositional foundation of competency, comprising professional values, commitment and the self-efficacy necessary to sustain assessment integrity across instructional phases (Alonzo et al., 2020; Berhanu, 2024).

The structural relationship among these three dimensions is most clearly articulated through the Iceberg Competency Model (Hay McBer, 1996), wherein knowledge and skills constitute the observable surface of professional practice, while attitudes, values and motivational dispositions function as the deeper, less visible yet more powerful drivers of sustained performance. In PHE, this triad carries heightened significance, as teacher must simultaneously manage the complexities of assessing psychomotor performance, physical fitness and health literacy within authentic, activity-based settings (Hartono et al., 2024; Monacis et al., 2023).

Critically, however, empirical evidence indicates that the relationship among these three dimensions is neither linear nor uniformly additive, and that each dimension carries limitations when examined in isolation. With respect to knowledge, research consistently demonstrates that conceptual understanding does not automatically translate into effective classroom practice. Thoomeran et al. (2024) and Zakaria et al. (2024a) found that PHE teachers who had undergone formal PBD training still exhibited uncertainty in applying rubrics and authentic assessment instruments, revealing a persistent gap between declarative knowledge and practical execution. This pattern extends beyond the Malaysian context: Almahal et al. (2023); Onyango et al. (2024) and Supriyadi (2023) reported that teachers across multiple educational systems were unable to differentiate between the functions of formative and summative assessment, reducing assessment to marking exercise and effectively nullifying its role as a learning tool.

Regarding skills the evidence is equally nuanced. While teachers who demonstrate proficiency in constructing rubrics and implementing interactive assessment have been shown to conduct formative assessment more reflectively and systematically (Bezeau et al., 2023; Carillo-López,

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2023). Slingerland et al. (2024) caution that practical assessment skills do not develop automatically through formal training alone. This non-automatic developmental pathway suggests that skill acquisition requires deliberate, contextualised practise rather than mere exposure to training content – a distinction with direct implications for professional development programme design.

At the attitudinal level, a parallel limitation is evident. Positive professional attitude and high self-efficacy are necessary but not sufficient conditions for effective PBD implementation. Rothinam (2023) and Yeh (2021) found that teachers with strong dispositional commitment still encountered substantial difficulties in interpreting assessment data and delivering timely, targeted formative feedback. Furthermore, Asamoah et al. (2024) demonstrated that even when teacher possess both positive attitudes and adequate knowledge, examination-oriented school cultures can structurally suppress the expression of formative assessment practices – underscoring that individual competency operates within and is constrained by broader systemic and institutional conditions. Taken together, these findings reveal more complex picture than the Iceberg Model alone conveys. While the model implies that deeper attitudinal resource may compensate for surface-level knowledge or skill deficits – particularly among experienced teachers whose tacit professional wisdom guides practice – this compensatory assumption remains empirically underexplored in the Malaysian PHE context. The mixed and inconsistent findings across studies indicate that the relative contribution of each competency dimension to PBD readiness cannot be assumed, it must be empirically determined.

This study therefore operationalises teacher competency as a dynamic, synergistic construct and investigates the independent and joint effects of knowledge, skills and attitude on PBD readiness through a multivariate analytical framework – a design specifically chosen to reflect the multidimensional and independent nature of professional competency.

Demographic Determinants between Teacher Competency and PBD Readiness

The variation in teacher competency and PBD readiness is frequently attributed to demographic characteristics, which serve as indicators of teacher's professional life cycle and development trajectory. Literature suggests that these factors namely gender, teaching experience, subject specialization and professional training do not operate in isolation but interact with contextual conditions to shape a teacher's pedagogical identity and assessment capacity (Bezeau et al., 2023; Trotter, 1986). Critically, however, the direction and magnitude of these demographic effects are neither uniform nor independent or underlying competency levels, a complexity levels, a competency levels, a complexity that prior studies examining demographic factors in isolation have been unable to adequately address.

Subject specialization is widely recognized as a primary determinant of assessment self-efficacy in PHE. Specialized teachers typically possess deeper pedagogical content knowledge (PCK) enabling them to design authentic assessment instruments and conduct systematic performance observations more effectively than non-specialist counterparts (Radionova & Logvinova, 2023; Yılmaz et al., 2020). In the Malaysian PHE context specifically, non-option teachers have been shown to face constraints in assessment literacy, consistency in implementation and confidence in conducting performance-based observation (Gengatharan et al., 2023; Yahya et al., 2024). This specialization gap is theoretically coherent: formal subject training provides structured exposure to domain-specific PCK that cannot easily be replicated through general pedagogical experience alone. Nevertheless, this advantage is not absolute.

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Studies by Angelina et al. (2024) and Mohamed Faizul Mat Som et al. (2021) demonstrates that non-option teachers who receive targeted professional support can achieve comparable levels of competency and readiness, suggesting that specialization confers an initial advantage rather that a permanent ceiling. This moderating role of professional intervention implies that specialization effects on readiness may be substantially mediated by competency – a hypothesis this study test empirically through covariate analysis.

Teaching experience is another frequently cited demographic predictor, often treated as a proxy for pedagogical maturity. Trotter's stages of teacher development (1986) provide a theoretical basis for this assumption, proposing that experience enables teachers to transition from novice rule-following toward expert intuitive decision-making and adaptive professional judgement. Empirically, Bezeau et al. (2023) and Putra et al. (2022) found that more experienced teachers demonstrated stronger planning and implementation readiness is demonstrably non-linear. Kudjordiji et al. (2023) found no significant differences between experienced and less experienced teachers in effective assessment implementation, while Ngo (2020) and Yuh and Husaina (2020) caution that years of service without continuous reflective practice may lead to professional stagnation or entrenched resistance to framework like PBD. This suggests that experience is necessary but insufficient condition for readiness and that its predictive value depends on whether it has been accompanied by deliberate professional growth rather than routine repetition.

Regarding gender, empirical findings are markedly inconsistent across contexts and this inconsistency itself warrants critical examination rather than simple acknowledgement. Some studies report that female PHE teachers demonstrate more systematic lesson planning and more consistent use of formative assessment practices (Kern et al, 2022; Oduro-Okiyireh, 2024), while others find no significant gender-based differences in assessment literacy or readiness levels (Awuah et al., 2024; Yusoff et al., 2024). At the Malaysian level, Nurul Huda and Anuar (2022) and Nur Sabrina et al. (2024) found that male teachers reported higher confidence and certain practical skills in PBD implementation, whereas Astiwi et al. (2024) found female teachers scored higher on motivational and socio-emotional dimensions of professional competency. These contradictions are unlikely to reflect genuine instability in the gender-competency relationship. More plausibly, they reflect methodological heterogeneity across studies – differences in the competency or readiness constructs measured, the subject areas examined, the cultural and institutional contexts in which data were collected, and whether studies controlled for confounding variables such as specialization or training exposure. In the Malaysian PHE context, where female teachers may be disproportionately assigned to non-option teaching roles or have differential access to subject-specific professional development, observed gender differences may largely be artefacts of these structural inequities rather than indicators of intrinsic gender-based capability differences. This study addresses this ambiguity by statistically controlling for competency dimensions, thereby isolating whether any gender effect on PBD readiness is genuinely attributable to gender or to its association with underlying professional competencies.

Professional training represents the demographic factor with the most consistent association with both competency and readiness across the literature. Consistent with Fuller's Concern Theory (1969), structured and sustained professional development helps shift teacher's concern from self-adequacy toward student impact – the orientation most conducive to effective formative assessment practice (Balbi et al., 2024; Lam et al., 2024). In the Malaysian context, Xin and Nasri (2024) found that teachers who had attended PBD-specific training demonstrated

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higher confidence and greater proficiency in formative assessment implementation. However, the literature consistently distinguishes between the effects of meaningful, practice-based professional development and those of brief, administratively driven training. Malik et al. (2021) and Reddy (2024) both note that one-off briefings or highly theoretical programmes may raise conceptual awareness without producing durable changes in classroom practice, while Marzaini et al. (2023) and Zakaria and Nazarudin (2024) emphasise that sustained, practically oriented programmes with adequate follow-up support are needed to translate training exposure into consistent assessment behaviour. Collectively, the literature reveals that no single demographic factor is dominant or stable predictor of PBD readiness or teacher competency. Rather, readiness is shaped through the interaction of individual background, contextual conditions and professional competency, with demographic characteristics functioning largely as proxies for differential access to knowledge, skills and attitudinal development. In this study, demographic factors are therefore treated as antecedent variables that influence the formation of competency dimensions, which in turn determine PBD readiness. The MANCOVA design employed allows this study to test whether demographic effects on readiness persist independently once competency dimensions are statistically controlled – thereby distinguishing genuine demographic influence from effects that are mediated by underlying professional competency.

Conceptual Framework

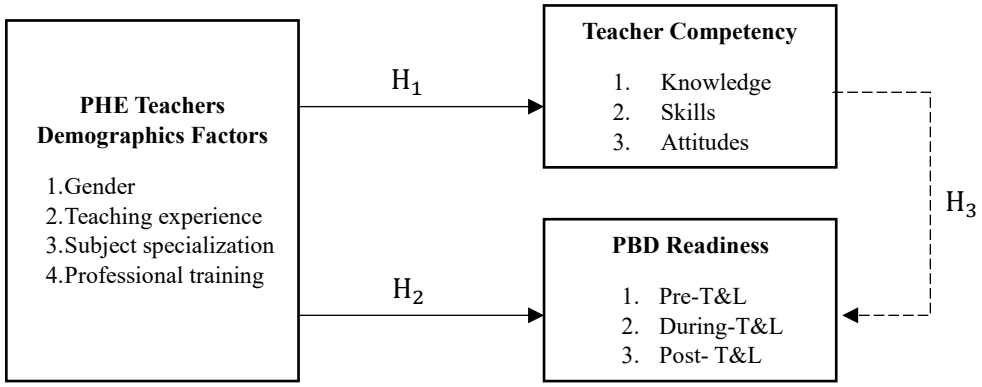

Figure 1: Conceptual Framework

Figure 1 illustrates the conceptual framework of the study which is synthesized from the integration of Trotter's Teacher Development Theory (1986), Fuller's Theory of Concerns (1969) and the Iceberg Competency Model (Hay McBer, 1996). This framework depicts the dynamic relationship between demographic factors of PHE teachers, their multidimensional competency dimensions and their readiness stages in implementing PBD.

Operationally, the framework is structured to address the following hypotheses:

H_1: There is significant difference in teacher competency dimensions based on demographic factors (gender, teaching experience, specialization and professional training) among primary PHE teachers in Selangor.
H_2: There is significant difference in PBD readiness based on demographic factors (gender, teaching experience, specialization and professional training) among primary PHE teachers in Selangor.

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H_3: There is significant difference in PBD readiness based on demographic factors (gender, teaching experience, specialization and professional training) after controlling teacher competency dimensions as covariates among primary PHE teachers in Selangor.

Methodology

Research Design

This study adopted a predictive correlational research design using a quantitative cross-sectional survey approach. The design was selected to analyse the relationships between PHE teacher competency dimensions and PBD readiness and to determine the predictive power of these dimensions (Creswell & Creswell, 2023). The study was conducted in Selangor, the most populous state in Malaysia, representing approximately 15% of the national teacher population (N = 61 587) (Ministry of Education, 2024b). The selection of Selangor provides a diverse and representative demographic profile, which is critical for the generalizability of the multivariate findings.

Population and Sampling Procedure

The target population consisted of 5832 PHE teachers from 447 national schools in Selangor. Based on Cochran's (1977) formula and cross-validated with G*Power 3.1.9.7 (power = 0.95, $f^2 = 0.15$), a minimum sample size of 348 was required. To account for a 20% non-response rate, 451 teachers were initially targeted. A proportionate stratified random sampling technique was employed across 10 District Education Offices (PPD) to ensure balanced representation as showed in Table 1. After screening for missing data and multivariate outliers using Mahalanobis distance ($p < .001$ criterion), 430 responses were retained for analysis. This sample size exceeds recommended thresholds for multiple regression modelling in social science research and provides adequate statistical power for detecting medium to large effect sizes (Hair et al., 2022).

Table 1: Population and Sample Size Distribution by Districts

No.	Districts	Population(N_h)	Sample Size (n_h)
1	Gombak	762	58
2	Hulu Langat	1049	81
3	Hulu Selangor	298	23
4	Klang	952	74
5	Kuala Langat	318	25
6	Kuala Selangor	354	27
7	Petaling Perdana	1083	84
8	Petaling Utama	527	41
9	Sabak Bernam	159	12
10	Sepang	330	26
	Total	**5832**	**451**

Instrumentation

Data were collected using a structured questionnaire consisting of three sections: demographic information, teacher competency and CBA readiness (Table 2). Seven items captured demographic characteristics in Section A, including gender, teaching specialization, teaching

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experience and prior exposure to CBA-related training. Section B comprised 30 items measuring three competency dimensions (knowledge, skills and attitudes), adapted from Nur Sabrina et al. (2024). Section C comprised 21 items assessing CBA readiness across three instructional phases, (pre-, during- and post-instruction) adapted from Yuh & Husaina (2020). All items in Sections B and C were rated on a five-point Likert scale (1= Strongly Disagree to 5 = Strongly Agree). Likert-type scaling was widely used for capturing latent perceptions in educational research and is suitable for parametric statistical analysis when distributional assumptions are met (Colman et al., 1997).

Table 2: Instrument Structure

Section	Variables	No. Items	Sample items	Sources
A	Demographics information	7	Gender, teaching specialization, teaching experience, course attendance	
B	Teacher Competency	30	Knowledge, skills and attitudes that distinguish observable performance capability	Nur Sabrina et al. (2024)
C	CBA Readiness	21	Three phases construct: Before instruction (planning), during instruction (implementation) and after instruction (recording, analysis, follow up and reporting)	Yuh & Husaina (2020)
	Total items	**58**		

Validity and Reliability

Content Validity

Content validity was evaluated by five subject-matter experts using the Item Content Validity Index (I-CVI) and Scale Content Validity Index (S-CVI) recommended for ensuring item relevance and construct representativeness in adapted instruments (Polit & Beck, 2006). Items exceeding the recommended threshold (I-CVI > .78; S-CVI/Ave = .9765) were retained. Minor wording refinements were implemented based on expert feedback to improve clarity and contextual alignment.

Pilot Testing

A pilot study involving 30 primary PHE teachers was conducted to evaluate clarity, contextual alignment and preliminary internal consistency. Preliminary reliability estimates were acceptable ($\alpha > .80$). Pilot data were excluded from the main analysis.

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Construct Validity and Reliability (Main Sample)

Exploratory Factor Analysis (EFA) was conducted using the main sample ($N = 430$) to examine the dimensional structure within the study context (Hair et al., 2022; Pallant, 2020). Kaiser-Meyer Olkin (KMO) values exceeded .90 and Bartlett's test was significant ($p < .001$), indicating sampling adequacy. All items loaded above .60 on their respective components with no substantial cross-loadings. The extracted factors explained 70.93% (competency) and 75.58% (readiness) of total variance. Internal consistency reliability was assessed using Cronbach's alpha. Competency ($\alpha = 0.973$) and CBA readiness ($\alpha = 0.958$) demonstrated strong internal consistency. While a value above .95 may suggest redundancy, dimensional clarity was supported through factor analysis.

Data analysis

Data were analysed using IBM Statistical Package for Social Science (SPSS) Version 30. Descriptive statistics were computed to summarise demographic characteristics. Prior to hypothesis testing, assumptions of normality, linearity, homoscedasticity and multicollinearity were examined to ensure compliance with parametric (Hair et al., 2022). All tolerance values exceeded .10 (range .295 - .488) and VIF values were below 4 (2.051-3.394), indicating no multicollinearity concerns (Tabachnick & Fidell, 2019). Multivariate Analysis of Variance (MANOVA) was employed to test for significant differences in competency and readiness based on demographics. Finally, Multivariate Analysis of Covariance (MANCOVA) was utilized to determine if demographic differences in PBD readiness remained significant after controlling for the influence of teacher competency dimensions.

Results

Demographic Overview

Table 3: Demographic Overview of Respondents (*N*=430)

Demographic	Frequency (*f*)	Percentage (%)
Gender		
Male	209	48.6
Female	**221**	**51.4**
Teaching Specialization		
Physical and Health Education (PHE)	173	40.2
Non-option	**257**	**59.8**
Teaching Experience		
1 until 5 years	**193**	**44.9**
6 until 10 years	61	14.2
11 until 15 years	87	20.2
More 16 years	89	20.7
Professional Exposure		
Ever	**285**	**66.3**
Never	145	33.7

Table 3 presents the demographic distribution of the respondents (N = 430). The sample comprised 51.4% female (n=221) and 48.6% male teachers (n=209). A total of 40.2% (n=173)

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were formally trained in PHE, while 59.8% (n=257) were non-option teachers assigned to teach the subject. In terms of teaching experience, the largest group (44.9%) had between and 5 years of experience, followed by those with more than 16 years of experience (20.7%) and 11-15 years (20.2%). The smallest proportion consisted of 61 teachers with 6-10 years of experience (14.2%). Regarding professional exposure, 66.3% (n=285) reported attending at least one CBA-related course, whereas 33.7% (n = 145) had not received formal CBA training.

Multivariate Analysis of Variance (MANOVA) on Teacher Competency

A one-way MANOVA was conducted to test Hypothesis 1 (H_1), examining the differences in teacher competency dimensions (knowledge, skills and attitudes) based on demographic factors. Descriptive statistics indicated that PHE teachers generally perceive their competency levels to be high across all dimensions ($M > 3.93$), suggesting a generally positive baseline of professional self-efficacy across the sample.

Table 4: MANOVA Analysis on Teacher Competency Dimensions

Effects	*Pillai's Trace (V)*	*F*	*df hypotesis*	*df error*	*p*	*Partial eta squared* (η_p^2)
Gender	0.014	1.844[b]	3	396	0.139	0.014
Specialization	0.048	6.647[b]	3	396	< 0.001	0.048
Teaching experience	0.056	2.537	9	1194	0.007	0.019
Training attendance	0.033	4.439[b]	3	396	0.004	0.033
Interaction Gender*Specialization*Experience *Training	0.015	0.668	9	1194	0.738	0.005

significant $p < 0.05$

Based on Table 4, the multivariate test results (*Pillai's Trace*) revealed significant main effects for specialization ($V = 0.048$, F [3,396] = 6.647, $p < 0.001$, $n_p^2 = 0.048$), teaching experience ($V = 0.056$, F [9,1194] = 2.537, $p = 0.007$, $n_p^2 = 0.019$) and training attendance ($V = 0.033$, F [3,396] = 4.439, $p = 0.004$, $n_p^2 = 0.033$). Conversely, gender ($p = 0.139$) and all interaction effects ($p = 0.738$) were not significant. It is notable that all significant effects yielded small effect sizes ($n_p^2 = 0.019 – 0.0048$), indicating that while demographic subgroups differ significantly in their competency profiles, these differences account for only a modest proportion of the total variance.

Table 5: Univariate ANOVA Test on Teacher Competency Dimensions

Variables	Effects	*Type III sum of squares*	*DF*	*Mean square*	*F*	*p*	*Partial eta squared*
Knowledge	Gender	0.432	1	0.432	1.580	0.209	0.004
	Specialization	4.854	1	4.584	17.739	< 0.001*	0.043
	Teaching experience	2.620	3	0.873	3.192	0.024*	0.023

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	Training attendance	3.043	1	3.043	11.122	< 0.001*	0.027
	Gender*Specialization*Experience*Training	0.100	3	0.033	0.122	0.947	0.001
	Error	108.907	398	0.274			
	Total	738.460	430				
Skills	Gender	0.021	1	0.021	0.065	0.799	0.000
	Specialization	2.352	1	2.352	7.298	0.007*	0.018
	Teaching experience	0.212	3	0.071	0.219	0.883	0.002
	Training attendance	2.913	1	2.913	9.039	0.003*	0.022
	Gender*Specialization*Experience*Training	0.930	3	0.310	0.962	0.411	0.007
	Error	128.270	398	0.322			
	Total	7373.500	430				
Attitudes	Gender	0.010	1	0.010	0.030	0.863	0.000
	Specialization	2.924	1	2.924	8.543	0.004*	0.021
	Teaching experience	0.204	3	0.068	0.198	0.898	0.001
	Training attendance	3.402	1	3.402	9.936	0.002*	0.024
	Gender*Specialization*Experience*Training	0.272	3	0.091	0.264	0.851	0.002
	Error	136.250	398	0.342			
	Total	7385.260	430				

significant $p < 0.05$

Follow-up univariate analyses (Table 5) revealed that knowledge was significantly influenced by specialization ($p < 0.001$), teaching experience ($p = 0.024$) and training attendance ($p < 0.001$). Skills and attitudes both were significantly influenced by specialization and training attendance ($p < 0.05$) but interestingly not by teaching experience. This differential pattern is theoretically informative: it suggests that pedagogical content knowledge (PCK), which is closely tied to formal subject training (Radionova & Logvinova, 2023), may be more sensitive to a specialization than attitudinal or skills-based dimensions, which may develop through broader professional experience regardless of subject background. The small-to-medium effect sizes observed (n_p^2 ranging from 0.018 to 0.043) indicate that while statistically significant, the practical magnitude of these demographic differences should be interpreted with caution.

Post-hoc Tukey HSD tests for the knowledge dimension that showed on Table 6, indicated that novice teachers (1-5 years) possessed significantly lower knowledge scores compared to those with 11-15 years ($p < 0.001$) and over 16 years ($p < 0.001$) of experience.

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Table 6: *Post-hoc* Tukey HSD for Knowledge Dimension on Teaching Experience

(I) Experience	(J) Experience	Mean Difference (I-J)	SP	*p*	95% CI (*Lower, Upper*)
1 - 5 years	6 - 10 years	-0.104	0.077	0.528	(-0.302, 0.094)
	11 - 15 years	-0.313	0.068	< 0.001	(-0.487, -0.139)
	More 16 years	-0.291	0.670	< 0.001	(-0.464, -0.118)

Significant $p < 0.05$

Consequently, H_1 is partially supported. The null hypothesis was rejected for specialization, teaching experience and training attendance but failed to be rejected for gender.

Multivariate Analysis of Variance (MANOVA) on PBD Readiness

For Hypothesis 2 (H_2), a MANOVA was performed on the three stages of PBD readiness (pre-, during- and post-T&L). The results on Table 7 indicated significant multivariate effects for specialization ($V = 0.035$, F [3,396] = 4.841, $p = 0.003$, $n_p^2 = 0.035$) and training attendance ($V = 0.038$, F [3,396] = 5.178, $p = 0.002$, $n_p^2 = 0.038$). However, gender ($p = 0.813$) and teaching experience ($p = 0.493$) did not yield significant differences in readiness.

Table 7: MANOVA Analysis on PBD Readiness

Effects	*Pillai's Trace (V)*	*F*	*df hypotesis*	*df error*	*p*	*Partial eta squared* (η_p^2)
Gender	0.002	0.318^b	3	396	0.813	0.002
Specialization	0.035	4.841^b	3	396	0.003*	0.035
Teaching experience	0.021	0.935	9	1194	0.493	0.007
Training attendance	0.038	5.178^b	3	396	0.002*	0.038
Interaction Gender*Specialization*Experience*Training	0.015	0.684	9	1194	0.724	0.005

significant $p < 0.05$

Univariate ANOVA analysis on Table 8 further clarified these effects. Specialization showed significant differences in the pre-T&L phase ($p < 0.001$) and during- T&L ($p = 0.002$) phases but not in the post-T&L ($p = 0.056$). Training attendance significantly influenced the pre-T&L ($p = 0.043$) and post-T&L ($p = 0.003$) phases but had no significant effect during the actual T&L implementation ($p = 0.856$). Taken together, these phase-specific patterns indicate that the influence of demographic characteristics on PBD readiness is not uniform across instructional stages and that different demographic factors appear to be salient at different points in the assessment cycle.

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Table 8: Univariate ANOVA Test on PBD Readiness Constructs

Variables	Effects	*Type III sum of squares*	*DF*	*Mean square*	*F*	*p*	*Partial eta squared*
Pre-T&L	Gender	0.012	1	0.012	0.043	0.836	0.000
	Specialization	3.633	1	3.633	13.276	< 0.001*	0.032
	Teaching experience	0.389	3	0.130	0.474	0.701	0.004
	Training attendance	1.128	1	1.128	4.121	0.043*	0.010
	Gender*Specialization*Experience*Training	0.396	3	0.132	0.482	0.695	0.004
	Error	108.910	398	0.274			
	Total	7901.389	430				
During T&L	Gender	0.127	1	0.127	0.381	0.538	0.001
	Specialization	3.142	1	3.142	9.396	0.002*	0.023
	Teaching experience	0.748	3	0.249	0.746	0.525	0.006
	Training attendance	0.011	1	0.011	0.033	0.856	0.000
	Gender*Specialization*Experience*Training	0.407	3	0.136	0.406	0.749	0.003
	Error	133.083	398	0.334			
	Total	7687.086	430				
Post-T&L	Gender	0.003	1	0.003	0.008	0.930	0.000
	Specialization	1.477	1	1.477	3.679	0.056	0.009
	Teaching experience	1.361	3	0.454	1.130	0.337	0.008
	Training attendance	3.492	1	3.492	8.700	0.003*	0.021
	Gender*Specialization*Experience*Training	0.502	3	0.167	0.417	0.741	0.003
	Error	159.768	398	0.401			
	Total	7142.639	430				

significant $p < 0.05$

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Thus, H_2 is partially supported. Specialization (n_p^2 = 0.035) and training attendance (n_p^2 = 0.038) emerged as significant multivariate predictors of PBD readiness, albeit with small effect sizes, while gender and teaching experience produce no significant multivariate effects. The phase-specific univariate results further indicate that the influence of these demographic factors operates selectively across the three stages of PBD implementation rather than uniformly.

Multivariate Analysis of Covariance (MANCOVA)

To address Hypothesis 3 (H_3), a one-way MANCOVA was executed. This analysis aimed to determine if demographic factors still exerted a significant influence on PBD readiness once the confounding effects of teacher competency (knowledge, skills and attitudes) were statistically controlled as covariates.

The multivariate results using Pillai's Trace statistic in Table 9 revealed a significant shift in the findings compared to the initial MANOVA. Once competencies were controlled, specialization (p = 0.411) and teaching experience ((p = 0.478) which were previously significant, lost their statistical significance, indicating that the previously observed demographic effects were largely attributable to the underlying competency differences associated with those demographic characteristics. Only training attendance remained a statistically significant independent effect on PBD readiness (V = 0.030, F [3,393] = 4.099, p = 0.007).

Table 9: MANCOVA Analysis on PBD Readiness After Controlling Teacher Competency Dimensions

Effect	*Pillai's Trace (V)*	*F*	*df hypotheses*	*df error*	*p*	*Partial eta squared* (η_p^2)
Constant Factor						
Gender	0.002	0.326^b	3	393	0.807	0.002
Specialization	0.007	0.962^b	3	393	0.411	0.007
Teaching experience	0.022	0.953	9	1185	0.478	0.007
Training attendance	0.030	4.009^b	3	393	0.007*	0.030
Covariate						
Knowledge	0.043	5.9566^b	3	393	<0.001*	0.043
Skills	0.135	20.390^b	3	393	<0.001*	0.135
Attitudes	0.145	22.135^b	3	393	<0.001*	0.145

significant p < 0.05

For the covariates, all three dimensions of competency showed a significant and substantive impact on readiness, with attitudes (V = 0.145, F [3,393] = 22.135, p < 0.001, η_p^2 = 0.145) and skills (V = 0.135, F [3,393] = 20.390, p < 0.001, η_p^2 = 0.135) demonstrating moderate-to-large effect sizes, while knowledge (V = 0.043, F [3,393] = 5.9566, p < 0.001, η_p^2 = 0.043) showed a smaller effect. Table 10 showed follow-up univariate analysis specifically for training attendance revealed that it only maintained a significant effect on PBD readiness during-T&L (F [1,395] = 9.104, p = 0.003, η_p^2 = 0.023).

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Table 10: Univariate Analysis on Training Attendance

PBD Readiness	Effect	*Type III sum of square*	*DF*	*Mean square*	*F*	*p*	*Partial eta squared* (η_p^2)
	Constant						
	Factor						
Pre-T&L	Training attendance	0.070	1	0.070	0.535	0.465	0.001
	Covariate						
	Knowledge	1.589	1	1.589	12.115	< 0.001*	0.030
	Skills	2.980	1	2.980	22.724	< 0.001*	0.054
	Attitudes	5.565	1	5.565	42.438	< 0.001*	0.097
During-T&L	**Constant**						
	Factor						
	Training attendance	1.869	1	1.869	9.104	0.003*	0.023
	Covariate						
	Knowledge	1.735	1	1.735	8.451	0.004*	0.021
	Skills	2.377	1	2.377	11.579	< 0.001*	0.028
	Attitudes	5.157	1	5.157	25.126	< 0.001*	0.060
Post-T&L	**Constant**						
	Factor						
	Training attendance	0.248	1	0.248	1.136	0.287	0.003
	Covariate						
	Knowledge	0.045	1	0.045	0.207	0.649	0.001
	Skills	10.560	1	10.560	48.351	< 0.001*	0.109
	Attitudes	6.582	1	6.582	30.136	< 0.001*	0.071

significant $p < 0.05$

Notably, the analysis of adjusted means in Table 11 revealed that, after controlling for competency, teachers who had not attended formal PBD training recorded a marginally higher adjusted mean (M_{adj} = 4.224) during implementation compared to those who had (M_{adj} = 4.156), after levelling for their competency.

Table 11: Estimated Marginal Means of PBD Readiness Towards Training Attendance

PBD Readiness	Training Attendance	Mean Adjustment (M_{adj})	Standard Error (*SE*)	95% CI *(Lower, Upper)*
Pre- T&L	Yes	4.256^a	0.025	(4.207, 4.306)
	No	4.260^a	0.047	(4.168, 4.353)
During- T&L	Yes	4.156^a	0.031	(4.049, 4.218)
	No	4.224^a	0.059	(4.108, 4.339)
Post-T&L	Yes	4.045^a	0.032	(3.981, 4.108)
	No	4.003^a	0.061	(3.884, 4.122)

a Covariates appearing in the model are evaluated at the following values:
KNOWLEDGE = 4.205, SKILLS= 4.100, ATTITUDES = 4.102

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Note: Adjusted means refer to the estimated marginal means that have been adjusted after controlling for the influence of covariates (knowledge, skills and attitudes)

Regarding the covariates' contribution, attitudes was the most consistent predictor across all three stages of readiness (pre-, during- and post-T&L), suggesting that attitudinal commitment functions as a stable driver of PBD implementation regardless of instructional phase. Skills demonstrated the largest single effect at the post-T&L phase ($\eta_p^2 = 0.109$), highlighting that significantly influenced pre-T&L and during T&L phases but was not a significant factor for the post-T&L phase ($p = 0.649$).

In conclusion, H_3 partially supported. The MANCOVA results that specialization and teaching experience do not independently predict PBD readiness once professional competency is statistically controlled, confirming that their apparent influence in MANOVA was attributable to underlying competency differences rather than to demographic characteristics per se. Training attendance retained a significant independent effect specifically on the during T&L implementation phase, suggesting that formal training contributes to readiness through pathways that are not fully captured by the three measured competency dimensions. Overall, the covariate analyses establish that attitudinal commitment and practical skills are substantially stronger determinants of PBD readiness than demographic background variables.

Discussion

The Demographics-Competency-Readiness Nexus

The central finding of this study concerns the relationship between teacher demographics, competency dimensions and PBD readiness among PHE teachers in Selangor. Initial MANOVA results indicated that subject specialization, teaching experience and training attendance significantly predicted both competency and readiness, a pattern consistent with the developmental stages proposed in Trotter's theory (1986). However, MANCOVA substantially altered this picture. Once internal competencies (knowledge, skills and attitudes) were statistically controlled as covariates, the previously observed effects of specialization and teaching experience were effectively nullified. This pattern is consistent with what may be termed a "professional levelling" effect, aligning with recent findings that non-option teachers can achieve equivalent readiness when provided with adequate professional support (Angelina et al., 2024; Mohamed Faizul Mat Som et al., 2021). Consequently, this study posits that demographic labels are merely proxies for underlying professional attributes and readiness is primarily a function of the internal competency dimensions described in the Iceberg Model (Hay McBer, 1996).

Internal Drivers

The consistent significance of all three competency dimensions as covariates underscores the centrality of professional competence in driving PBD implementation. Among the three dimensions, professional attitude emerged as the most consistent and resilient anchor across the pre-, during- and post-teaching phase. This finding confirms that PBD implementation is not merely a procedural requirement but a fundamentally a dispositional one (Ahmat et al., 2022; Kamazakira, 2022). A teacher with a positive professional is better positioned to maintain assessment integrity even under systemic pressures (Sahid & Hashim, 2022). In contrast, practical skills demonstrated their strongest effect during the post-teaching phase ($\eta_p^2 = 0.109$),

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highlighting the technical rigour required for data interpretation and mastery-level reporting a challenge well-documented in the PHE assessment literature (Thoomeran et al., 2024; Zakaria et al., 2024a).

The Training Paradox

A noteworthy finding is the 'Training Paradox" revealed through the analysis of adjusted means. After controlling for competency, teachers who had not attended formal PBD training reported a marginally higher adjusted mean readiness score during implementation (M_{adj} = 4.224) than their trained counterparts (M_{adj} = 4.156). This finding can be interpreted through Fuller's Theory of Concerns (1969): formal training likely heightens teacher's awareness of the complexities of authentic assessment, generating increased "impact concerns" and more self-appraisal (Hajmi & Jamaludin, 2023; Norazida et al., 2023). Conversely, teachers without such exposure may report higher perceived readiness precisely because they are less aware of the pedagogical demands of the PBD framework. This interpretation suggests that current training models may succeed in raising theoretical awareness while failing to build the practical confidence necessary for effective classroom implementation (Malik et al., 2021; Reddy, 2024; Sheehan, 2020).

Gender and Seniority Myths

Furthermore, the consistent non-significance of gender across all multivariate and covariance analyses provides strong empirical evidence for "professional convergence" in the PHE domain. This challenges long-standing stereotypes associating physical education performance with gender-specific capabilities, aligning with previous research that found no significant gender differences in assessment literacy (Awuah et al., 2024; Yusoff et al., 2024). Similarly, the loss of significance for teaching experience once competency was controlled challenges the seniority-driven expertise myth. It confirms that professional development is not a passive outcome of time, but a result of deliberate and reflective growth, as experience without continuous learning may lead to professional stagnation (Ngo, 2020; Yuh & Husaina, 2020).
Ultimately, this study clarifies that teacher competency is the fundamental engine driving PBD readiness, while demographic factors act as secondary catalysts. The results provide a clear mandate for educational policymakers to shift focus from one-off administrative briefings toward sustained, competency based professional development that addresses the practical and reflective needs of teachers (Marzaini et al., 2023; Zakaria & Nazarudin, 2024).

Conclusion

This study employed a MANOVA-MANCOVA framework to disentangle the relative contributions of demographic characteristics and professional competency to PBD readiness among PHE teachers in Selangor. Three conclusions emerge from this analysis. First, while specialization and teaching experience initially predicted differences in both competency and readiness, these effects were rendered non-significant once competency dimensions were controlled – indicating that what appears to be a demographic advantage is, in practice, a competency advantage. Second, the "Training Paradox" revealed that formal training, paradoxically, was associated with slightly lower perceived readiness during implementation after competency adjustment, pointing to a gap between the critical awareness that training fosters and the practical confidence it builds. Third, professional attitude was the most robust predictor of readiness across all three instructional phases, consistently outperforming both

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demographic variables and other competency dimensions. Taken together, these findings challenge policies that treat demographic characteristics as reliable proxies for teacher capability and support a reorientation of professional development towards sustained, competency-focused practise rather than discrete administrative briefings.

Recommendations for Policy and Practice

Based on the findings, several strategic recommendations are proposed to enhance the quality of PBD implementation in Malaysian primary schools:

First, the Ministry of Education (MOE) and State Education Departments (JPN) should transition from "one-off" administrative briefings toward sustained, competency-based professional development. Since the study found that training did not significantly improve readiness during actual teaching, future programs should emphasize clinical supervision, hands-on simulations in the field (on-site coaching) and peer-mentoring. This approach would ensure that theoretical knowledge is translated into practical pedagogical skills, reducing the "shock of reality" often felt by teachers during implementation.

Second, given that professional attitude was the most consistent predictor of readiness across all phases, professional development should incorporate elements of psychological and motivational scaffolding. Rather than focusing solely on DSKP technicalities, training modules should address teacher self-efficacy and professional values. Cultivating a growth mindset and a sense of ownership over the PBD process is essential to move teachers from "technical compliance" to "impact-oriented" assessment.

Third, school administrators should facilitate a collaborative professional culture to bridge the gap between specialized and non-specialized teachers. Since the study proved that non-option teachers can achieve equivalent readiness levels if their competencies are developed, Professional Learning Communities (PLC) within schools should be utilized for "cross-specialization coaching". This would allow veteran and specialized teachers to share their knowledge and skills with novice and non-option teachers, creating a more homogenous and resilient teaching workforce.

Suggestions for Future Research

While this study offers significant insights, it is not without limitations. Future research should consider a longitudinal approach to track how teacher competency and readiness evolve over several years of PBD implementation. Additionally, incorporating qualitative measures, such as classroom observations and in-depth interviews, would provide a richer context regarding the "Training Paradox" and the specific barriers teachers face during the implementation phase. Finally, expanding the scope to include secondary school teachers or comparing different states in Malaysia would enhance the generalizability of the findings and offer a more comprehensive national outlook on assessment literacy.

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References

Ahmat, N., Azmee, N. A., Hamed, N. H. M., Zamzamir, Z., Zahari, N. S., Shafie, S., Mohamed, N. A., & Raja-Ma'amor-Shah, R. N. F. A. (2022). Knowledge, skills and attitude of pre-service mathematics teachers towards higher-order thinking skills. *International Journal of Educational Methodology*, *8*(4), 795–804. https://doi.org/10.12973/ijem.8.4.795

Almahal, E. A., Osman, A. a. A., Tahir, M. E., Hamdan, H. Z., Gaddal, A. Y., Alkhidir, O. T. A., & Gasmalla, H. E. E. (2023). Fostering formative assessment: teachers' perception, practice and challenges of implementation in four Sudanese medical schools, a mixed-method study. *BMC Medical Education*, *23*(1). https://doi.org/10.1186/s12909-023-04214-3

Alonzo, D., Labad, V., Bejano, J., & Guerra, F. (2021). The policy-driven dimensions of teacher beliefs about assessment. *˜the œAustralian Journal of Teacher Education*, *46*(3), 36–52. https://doi.org/10.14221/ajte.2021v46n3.3

Angelina, D., Emillen, S., Fatin Nadia, A. K., & Lydia, A. T. (2024). Pengetahuan, kemahiran dan motivasi guru bahasa Melayu bukan opsyen di sekolah kebangsaan daerah Tatau dan Sebauh. *Jurnal Pendidikan Bahasa Melayu*, *14*(2), 165–182.

Asamoah, D., Shahrill, M., & Latif, S. N. A. (2024). Teachers' perceptions of school assessment climate and realities of assessment practices in two educational contexts. *Frontiers in Education*, *9*. https://doi.org/10.3389/feduc.2024.1278187

Ashma, S., Darayani, J., Noor Marina, Y., & Nurhidayah, M. H. (2022). Tahap pemahaman dan integriti guru bahasa Melayu dalam melaksanakan pentaksiran bilik darjah di sekolah rendah. *Jurnal Pendidikan Bahasa Melayu*, *12*(2), 118–124. https://spaj.ukm.my/jpbm

Astiwi, W., Siswanto, D. H., & Suryatama, H. (2024). Description regarding the influence of teacher qualifications and competence on early childhood learning achievement. *Asian Journal of Applied Education (AJAE)*, *3*(3), 347–358. https://doi.org/10.55927/ajae.v3i3.10360

Atan, N. A., Mohamad, Z., Yaacob, N., & Shafie, N. (Eds.). (2020). *Amalan pentaksiran bilik darjah (PBD) bagi pentaksiran autentik dalam kalangan guru sekolah rendah.* (2nd ed., Vols. 245–253). Proceedings of International Conference on The Future of Education (IConFEd). https://www.ipgktb.edu.my/iconfed/compilation_of_paper_iconfed2018_volum2/index.html

Awuah, F., Attom, L. E., Eshun, I., & Bordoh, A. (2024). Assessment beliefs, practices and competence Vis-À-Vis demographic characteristics of senior high school social studies teachers in Ghana. *East African Journal of Education and Social Sciences*, *5*(4), 75–86. https://doi.org/10.46606/eajess2024v05i04.0395

Balbi, A., Bonilla, M., Curione, K., Ibarra, A., & Menese, P. (2024). Impact of a professional development programme in formative assessment for mathematics teachers. *Professional Development in Education*, 1–16. https://doi.org/10.1080/19415257.2024.2433051

Berhanu, K. Z. (2024). The influence of teachers' attitude towards performance appraisal system on their job performance as mediated by secondary school teachers' motivation. *Participatory Educational Research*, *11*(5), 169–187. https://doi.org/10.17275/per.24.69.11.5

Bezeau, D., Turcotte, S., Desbiens, J., Spallanzani, C., Roy, M., Vandercleyen, F., & Beaudoin, S. (2023). Physical education teachers' assessment practices in health education. *Physical Education and Sport Pedagogy*, 1–13. https://doi.org/10.1080/17408989.2023.2230280

Bores-García, D., Barba-Martín, R. A., González-Calvo, G., & Hortigüela-Alcalá, D. (2023). The use of a rating scale as a formative and shared assessment tool in physical

education. In *Advances in educational marketing, administration, and leadership book series* (pp. 75–91). https://doi.org/10.4018/978-1-6684-6086-3.ch005

Carrillo-López, P. J. (2023). Formative assessment of physical education teachers and self-concept level of primary school children. *Central European Journal of Sport Sciences and Medicine*, *41*, 35–47. https://doi.org/10.18276/cej.2023.1-04

Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). John Wiley.

Colman, A. M., Norris, C. E., & Preston, C. C. (1997). Comparing rating scales of different lengths: Equivalence of scores from 5-Point and 7-Point scales. *Psychological Reports*, *80*(2), 355–362. https://doi.org/10.2466/pr0.1997.80.2.355

Creswell, J. W., & Creswell, J. W. (2023). *Research design: Qualitative, quantitative and mixed methods approaches* (6th ed.). Sage Publications Ltd.

Dhanapalan, R. (2025). *Pemahaman dan perlaksanaan pentaksiran bilik darjah (PBD) dalam kalangan guru bukan opsyen bahasa Inggeris di Sekolah Jenis Kebangsaan Tamil (SJKT).* [Doctoral thesis]. Universiti Utara Malaysia.

Fuller, F. F. (1969). Concerns of teachers: A developmental conceptualization. *American Educational Research Journal*, *6*(2), 207–226. https://doi.org/10.3102/00028312006002207

Granada, G. D., & Oco, R. M. (2024). Classroom management and teaching competencies of elementary teachers. *International Journal of Multidisciplinary Research and Analysis*, *07*(03). https://doi.org/10.47191/ijmra/v7-i03-50

Gengatharan, K., Rahmat, A., Zulezwan, A. M., & Nor Fazila, A. M. (2023). The effectiveness of health education assessment module for lower primary students in classroom-based assessment. *Universiti Sultan Idris. Ann Appl Sport Sci11(1): E1088, 2023.* http://www.aassjournal.com

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2022). Partial least squares structural equation modeling (PLS-SEM) using R. In *Classroom companion: Business* (3rd ed.). Sage. https://doi.org/10.1007/978-3-030-80519-7

Hajmi, H., & Jamaludin, K. (2023). Kesediaan guru dalam pelaksanaan pentaksiran bilik darjah di sekolah rendah. *Jurnal Dunia Pendidikan*. https://doi.org/10.55057/jdpd.2022.4.4.10

Hanapi, N., Zainal Abidin, M., & Mohd Noor, N. (2020). Kesediaan guru pelatih dari aspek pengetahuan dan kemahiran mengajar. *Jurnal Pendidikan*, *45*(2), 123–134.

Hartono, M., Nurcahyani, A., Kurniawan, W. R., & Akhiruyanto, A. (2024). Competency and performance of physical education teachers for elementary school in Semarang Indonesia. *Journal of Innovation in Educational and Cultural Research*, *5*(2), 349–355. https://doi.org/10.46843/jiecr.v5i2.1658

Hay, M. (1996). *Scaled Competency Dictionary*. Boston:Hay/McBer.

Hollenstein, L., & Brühwiler, C. (2024). The importance of teachers' pedagogical-psychological teaching knowledge for successful teaching and learning. *Journal of Curriculum Studies*, *56*(4), 480–495. https://doi.org/10.1080/00220272.2024.2328042

Kamazakira, K. (2022). Tinjauan kompetensi guru tadika swasta terhadap kurikulum standard prasekolah kebangsaan (KSPK 2017) di daerah Kuantan. *Jurnal Ilmi*, *12*(1), 84-97.

Kern, B. D., Wilson, W. J., Malinowski, P., & Wallhead, T. (2022). Pedagogical practices among teachers of different demographics and dispositions toward change: Results of a multi-region survey of U.S. physical educators. *Journal of Teaching in Physical Education*, *42*(2), 256–266. https://doi.org/10.1123/jtpe.2021-0192

Kong, C. H., & Denise, K. C. L. (2024). Tahap literasi fizikal guru pendidikan jasmani sekolah rendah di sarawak. *Malaysian Journal of Social Sciences and Humanities (MJSSH), 9*(7), e002890. https://doi.org/10.47405/mjssh.v9i7.2890

Kudjordji, S. K., Narh-Kert, M., Budu, G. B., Wotordzor, P. W., & Addo, C. (2023). Impact of socio-demographic variables of basic level teachers' school-based assessment practices in Jasikan municipality, Ghana. *East African Journal of Education and Social Sciences*, *4*(3). https://doi.org/10.46606/eajess2023v04i03.0280

Lam, L., Lien, V. P., Hung, L. T., & Vy, N. T. P. (2024). Impact of professional development activities on teachers' formative assessment practices. *International Journal of Evaluation and Research in Education (IJERE)*, *13*(5), 3028. https://doi.org/10.11591/ijere.v13i5.29588

Li, N. K. N. (2024). A study on interdisciplinary cooperative teaching of physical education teachers in the context of physical education and health curriculum integration. *EPRA International Journal of Research & Development (IJRD)*, 215–218. https://doi.org/10.36713/epra16153

Malik, M. a. A., Madzuki, N. I., Hizam, N. S. S., Kamal, N. H. S., Yusof, N. S. H. C., Suhaimin, M. F., & Zulkifli, S. N. (2021). Teachers' readiness and practices in school-based assessment implementation: primary education in Malaysia. *International Journal of Advanced Research in Future Ready Learning and Education*, *23*(1), 1–9. https://doi.org/10.37934/frle.23.1.19

Marnizam, F. I., & Ali, S. R. (2021). Evaluation of the implementation of classroom assessment (PBD) among primary school mathematics teachers. *Jurnal Pendidikan Sains Dan Matematik Malaysia*, *11*(2), 81–94. https://doi.org/10.37134/jpsmm.vol11.2.7.2021

Marzaini, A. F. M., Sharil, W. N. E. H., Supramaniam, K., & Yusoff, S. M. (2023). The teachers' professional development in the implementation of CEFR-Aligned classroom-based assessment. *Asian Journal of Assessment in Teaching and Learning*, *13*(1), 1–14. https://doi.org/10.37134/ajatel.vol13.1.1.2023

Mat Said, A. R., Che Omar, M., Omar, N., & Ghazali, M. A. (2023). Meningkatkan pembangunan profesional dan kompetensi guru kementerian pendidikan Malaysia: Satu analisis kritis. *Journal of Educational Research and Management (GERMANE)*, *3*(1), 63-71.

McMillan, J. H. (2022). Classroom assessment. In *Elsevier eBooks* (pp. 519–528). https://doi.org/10.1016/b978-0-12-818630-5.10064-8

Ministry of Education. (2024a). *Annual Report 2023 Malaysia Education Blueprint 2013-2025*. Ministry of Education.

Ministry of Education. (2024b). *Malaysia Youth Statistic 2023 / 2024* (Vol. 11). Institute for Youth Research Malaysia (IYRES). https://www.iyres.gov.my/images/penerbitan/Statistik%20Belia%20Malaysia%202023%202024%20Vol.11.pdf

Mohamed Faizul Mat Som, Syed Kamaruzaman Syed Ali, Shahrir Jamaludin, & Faiz Baharan. (2021). Tahap amalan penaakulan pedagogi guru pendidikan jasmani sekolah menengah dari aspek kefahaman dan transformasi: Satu kajian di daerah Klang Selangor. *Jurnal Kurikulum & Pengajaran Asia Pasifik (Juku), Universiti Malaya, Kuala Lumpur. 9(1), 11-19*, *9(1)* (11–19).

Monacis, D., Annoscia, S., Limone, P., & Colella, D. (2023). Examine the effects of a reproduction and production teaching styles interventions in primary schoolchildren. What implications for physical education teachers? *Preprint.org*. https://doi.org/10.20944/preprints202309.1595.v1

Nagaretnam, M., & Mahmud, M. S. (2022). Kesediaan guru dan keberkesanan pelaksanaan pengajaran matematik abad ke-21 di sekolah rendah: Sebuah tinjauan literatur. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *7*(11), e001876. https://doi.org/10.47405/mjssh.v7i11.1876

Nasim, F., Khan, E. A., Qaisara, R., & Shoqat, I. (2024). Teaching competencies based on comparative assessment at diverse school levels. *Pakistan Journal of Humanities and Social Sciences*, *12*(1). https://doi.org/10.52131/pjhss.2024.v12i1.2033

Ngo, J. S. (2020). Perbezaan jantina dan pengalaman mengajar guru bahasa Melayu sekolah jenis kebangsaan Cina terhadap pengajaran pendidikan keselamatan jalan raya. *Jurnal Pendidikan Bahasa Melayu*, *10*(2), 82–92.

Norazida, I., Muhammad Azhar, Z., & Harris Shah, A. H. (2021). Kajian pentaksiran bilik darjah dalam kalangan guru bahasa Arab: Satu tinjauan sistematik. *Online Journal of Islamic Education*, *11*(2), 51–64.

Nur Sabrina, A. M. R., Nur Athirah Hamizah, Y., Nor Farahin, A. M., & Loo, S. Jing. (2024). Tahap pengetahuan, kemahiran dan sikap guru bahasa Melayu dalam melaksanakan pentaksiran bilik darjah di sekolah rendah. *Jurnal Pendidikan Bahasa Melayu; Malay Language Education (MyLEJ), 1*, *14*(1), ISSN 2180-4842.

Nurul Huda, M. F., & Anuar, A. (2022). Kesediaan guru sejarah melaksanakan pentaksiran bilik darjah dalam pengajaran dan pembelajaran. *International Conference on Business Studies and Education (ICBE)*.

Oduro-Okyireh, G. (2024). Understanding the impact of teacher demographics on assessment for learning strategies in Ghana's educational system. *European Journal of Education Studies*, *11*(10). https://doi.org/10.46827/ejes.v11i10.5552

Onyango, E. O., Indoshi, F. C., & Nyangara, K. (2024). Assessing teacher knowledge and skills for competency based formative assessment of mathematical activities in public pre-primary schools in Gem sub-county, Kenya. *International Journal for Multidisciplinary Research*, *6*(2). https://doi.org/10.36948/ijfmr.2024.v06i02.17343

Permana, R., Isti'adah, F. N., Dewi, R. S., Nurkamilah, M., Fitri, S., Nofrizal, D., Purba, P. H., Pranata, D. Y., S, A., & Sari, L. P. (2024). Instrument for assessing physical literacy skills competence in primary school Tasikmalaya, Indonesia. *Retos*, *58*, 477–484. https://doi.org/10.47197/retos.v58.107671

Pallant, J. (2020). SPSS survival manual. In *Routledge eBooks*. https://doi.org/10.4324/9781003117452

Polit, D. E., & Beck, C. T. (2006). *Essentials of nursing research* (6th ed.). Lippincott Williams & Wilkins, Philadelphia.

Putra, Z. H., Hermita, N., Afrillia, Y. M., & Dahnilsyah, D. (2022). The effect of gender, teaching experience, educational background, and the school type on teachers' mathematical, didactic, and technological competences. *Perspectives of Science and Education*, *60*(6), 612–624. https://doi.org/10.32744/pse.2022.6.37

Radionova, O., & Logvinova, Y. (2023). Readiness for the formation of students' health-preserving competence as a result of the training of future physical education teachers. *Scientific Journal of National Pedagogical Dragomanov University Series 15 Scientific and Pedagogical Problems of Physical Culture (Physical Culture and Sports)*, *3(162)*, 333–337. https://doi.org/10.31392/npu-nc.series15.2023.3k(162).69

Razak, R. A., Yusoff, S. M., Leng, C. H., & Marzaini, A. F. M. (2023). Evaluating teachers' pedagogical content knowledge in implementing classroom-based assessment: A case study among ESL secondary school teachers in Selangor, Malaysia. *PLoS ONE*, *18*(12), e0293325. https://doi.org/10.1371/journal.pone.0293325

Reddy, N. D. M. R. (2024). Attitude and competencies of teachers at the secondary level regarding continuous and comprehensive evaluation implementation. *EPRA International Journal of Multidisciplinary Research (IJMR)*, 79–84. https://doi.org/10.36713/epra19334

Rothinam, N. (2023). The relationship between self-efficacy and attitude towards assessment literacy among teachers. *European Proceedings of Educational Sciences*, *7*, 499–511. https://doi.org/10.15405/epes.23097.45

Sahid, S. M., & Hashim, S. (2022). Sikap guru sejarah terhadap kemahiran pemikiran sejarah (KPS). *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *7*(11), e001898. https://doi.org/10.47405/mjssh.v7i11.1898

Said, A. R. B. M., Omar, M. B. C., Omar, N. B., & Ghazali, M. a. B. (2022). Malaysian teacher standards and the professionalism development of Islamic education teachers. *International Journal of Health Sciences*, 11975–11983. https://doi.org/10.53730/ijhs.v6ns2.8232

Shahudin, M. S., & Jamaludin, K. A. (2024). Kepentingan dan cabaran pelaksanaan kurikulum pendidikan seni visual sekolah rendah menggunakan teknologi maklumat dan komunikasi. *Jurnal Dunia Pendidikan*. https://doi.org/10.55057/jdpd.2024.6.1.10

Sheehan, S. (2020). What teachers think about assessment and how it influences their classroom-based assessment practices – the results of a global survey. *VNU Journal of Foreign Studies*, *36*(4). https://doi.org/10.25073/2525-2445/vnufs.4580

Slingerland, M., Weeldenburg, G., & Borghouts, L. (2024). Formative assessment in physical education: teachers' experiences when designing and implementing formative assessment activities. *European Physical Education Review*, *30*(4), 620–637. https://doi.org/10.1177/1356336x241237398

Spencer, L. M., & Spencer, S. M. (1991). *Competence at work: Models for superior performance. New York: John Wiley & Sons, Inc.* New York: John Wiley & Sons Inc.

Supriyadi, A. (2023). Inside assessment practices: Exploring perspectives of vocational high school teachers. *Tefla Journal (Teaching English as Foreign Language and Applied Linguistics Journal)*, *5*(1), 35–41. https://doi.org/10.35747/tefla.v5i1.681

Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Pearson.

Thomeeran, H., Selvarajoo, P. C. B., Ghazali, N. H. B. M., Hamid, S. A., & Bahar, B. (2024). Problems in the implementation of classroom assessment (PBD) in Malaysian schools. *International Journal of Academic Research in Business and Social Sciences*, *14*(12). https://doi.org/10.6007/ijarbss/v14-i12/21765

Trotter, R. (1986). The mystery of mastery. *Psychology Today*, *20*(7), 32–38.

Xin, K. K., & Nasri, N. B. M. (2024). The readiness level of primary school teachers towards the implementation of classroom-based assessment (PBD). *International Journal of Academic Research in Progressive Education and Development*, *13*(4). https://doi.org/10.6007/ijarped/v13-i4/23224

Yahya, S. M. N. S., Jamaludin, K. A., & Mazalan, N. S. (2024). Challenges faced by non-optional teachers in physical education: A comprehensive review. *International Journal of Academic Research in Progressive Education and Development*, *13*(1). https://doi.org/10.6007/ijarped/v13-i1/21211

Yeh, L. H. (2021). Cabaran yang dihadapi pendidikan seni visual dengan pentaksiran bilik darjah di sekolah rendah daerah Hilir Perak. *Jurnal Seni Dan Pendidikan Seni*, *9*(1), 46–57.

Yılmaz, M., Karakaya, Y. E., & Savucu, Y. (2020). The state of preparedness of prospective physical education and sports teachers. *Pedagogy of Physical Culture and Sports*, *24*(6), 323–330. https://doi.org/10.15561/26649837.2020.0608

Yuh, T. J., & Husaina, B. K. (2020). Pentaksiran bilik darjah dan prestasi murid sekolah jenis kebangsaan Cina di Hulu Langat, Selangor. *Jurnal Kepimpinan Pendidikan, 7*(3), eISSN 2289-9669.

Yusoff, S. M., Leng, C. H., Razak, R. A., Basal, M. H., & Marzaini, A. F. M. (2024). Conceptions of assessment: Perceptions of physical and health education teachers in

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume: 8 Issue: 30 (June 2026) PP. 314-339

Selangor, Malaysia. *Pertanika Journal of Social Science & Humanities*, *32*(1), 189–216. https://doi.org/10.47836/pjssh.32.1.09

Zakaria, M. N., & Nazarudin, M. N. (2024). Inspiring moves: How practicum teacher's engagement and encouragement boost students' self-efficacy in physical education class. *International Journal of Academic Research in Progressive Education and Development*, *13*(3). https://doi.org/10.6007/ijarped/v13-i3/22062

Zakaria, Z., Mohamed, A. M. D., Ghani, D. Z. A., & Ali, M. A. (2024a). Assessment under duress: Challenges to physical education assessments and the emergence of compromised norms. *International Journal of Academic Research in Progressive Education and Development*, *13*(3). https://doi.org/10.6007/ijarped/v13-i3/21675

Zakaria, Z., Rizal, A. I. S. A., & Mohamed, A. M. D. (2024b). Assessment in action: Investigating the practices of Malaysian physical and health education teachers. *International Journal of Academic Research in Progressive Education and Development*, *13*(1). https://doi.org/10.6007/ijarped/v13-i1/21046