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Exploring Secondary School Design and Technology Teachers' Understanding of Performance Levels in Classroom Assessment

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ABSTRACT

This study aimed to explore Design and Technology (RBT) teachers' understanding of Performance Levels (TP) in Classroom Assessment (PBD) at the secondary school level. Assessment Literacy Theory and Constructive Alignment Theory provided interpretive lenses for examining how teachers interpreted Performance Standards, used learning evidence and exercised professional judgement in implementing PBD. The study adopted an exploratory qualitative approach within an interpretivist paradigm. Three RBT teachers from a selected secondary school in Batu Pahat, Johor, Malaysia, were purposively selected based on their teaching experience, direct involvement in PBD and experience in determining students' TP. Data were collected through semi-structured interviews and analysed using inductive thematic analysis. The analysis identified four main themes comprising twelve subthemes: teachers' understanding of PBD and Performance Levels, factors influencing assessment practices, challenges in implementing PBD in RBT, and professional support for strengthening assessment practices. Participants' accounts suggested that understanding Performance Standards alone might not be sufficient to support consistent decisions about TP, which also required sufficient, appropriate learning evidence, professional judgement and contextual support. The study highlights the need for subject-specific training, moderation, clearer guidance on learning evidence and professional collaboration to strengthen teachers' assessment literacy, alongside adequate practical facilities to support assessment implementation. These measures may support more valid, consistent and fair assessment practices in RBT.

1. INTRODUCTION

Classroom assessment has become an important component of contemporary education because it enables teachers to monitor students' learning progress continuously and make informed instructional decisions. The use of formative and authentic assessment aligns with the global emphasis on inclusive, meaningful

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and high-quality education. Teachers are therefore expected not only to deliver subject content but also to gather evidence of learning, evaluate students' achievement and provide feedback that supports further learning (UNESCO, 2020; United Nations, 2015). Effective classroom assessment depends largely on teachers' ability to understand curriculum standards, assessment criteria and evidence of student learning (Brookhart, 2017; Stiggins, 2014).

In Malaysia, Classroom Assessment, known as Pentaksiran Bilik Darjah (PBD), is an integral part of the teaching and learning process. PBD represents a shift from assessment that relies mainly on examinations towards a more continuous and holistic approach. Teachers are required to assess students through methods such as observation, oral interaction, written work, practical activities and project-based tasks. The Curriculum and Assessment Standard Document, known as Dokumen Standard Kurikulum dan Pentaksiran (DSKP), guides teachers in planning instruction, conducting assessment and determining students' Performance Levels, known as Tahap Penguasaan (TP), based on prescribed Performance Standards (KPM, 2019).

To determine Performance Levels, teachers must interpret evidence collected throughout the learning process rather than rely on a single test score. Teachers must relate the evidence to the relevant Content Standards, Learning Standards and Performance Standards before making assessment decisions. This process involves professional judgement because students may demonstrate their learning through different forms of evidence and at different stages of development. Previous studies have reported that teachers may experience difficulties interpreting Performance Standards, distinguishing between adjacent Performance Levels and applying assessment criteria consistently (Saliman & Mahamod, 2023; Thiagarajan & Tan, 2023). Differences in teachers' knowledge, professional experience and access to assessment guidance may consequently produce variations in assessment decisions.

These challenges are particularly significant in Design and Technology, known as Reka Bentuk dan Teknologi (RBT). Unlike subjects that rely predominantly on written responses, RBT involves theoretical knowledge, design processes, practical skills, problem-solving, sketches, project work and product development. Teachers are therefore required to evaluate both the process and the final outcome of students' work. Evidence may include classroom observations, design sketches, practical procedures, project documentation, oral explanations and completed products. This diversity of evidence makes determining Performance Levels more complex because teachers must consider students' cognitive, psychomotor and affective development in a balanced manner (Ahmad Termizi & Nordin, 2022; Sahaat & Mohamad Nasri, 2020).

The complexity of RBT assessment also requires teachers to possess adequate assessment literacy. Assessment literacy refers to the knowledge and skills required to select appropriate assessment methods, interpret learning evidence, apply assessment criteria and make valid assessment decisions (Abell & Siegel, 2011; Brookhart, 2018). From an assessment literacy perspective, teachers are expected not only to understand assessment standards but also to evaluate the relevance and sufficiency of learning evidence and use that evidence to make defensible professional judgements. This principle is closely related to Constructive Alignment Theory, which emphasises consistency between intended learning outcomes, teaching and learning activities, and assessment tasks (Biggs, 1996). In the RBT context, constructive alignment provides a basis for examining whether learning activities and assessment tasks allow students to demonstrate the competencies described in the curriculum and Performance Standards.

Despite the importance of assessment literacy and constructive alignment, several issues continue to affect the implementation of PBD. Teachers may face time constraints, difficulties in recording practical evidence, inconsistent student participation and insufficient resources for workshop-based activities. Assessing higher Performance Levels can also be challenging because teachers must determine whether students can apply knowledge independently, demonstrate creativity and produce high-quality outcomes. Furthermore, the absence of systematic moderation and subject-specific assessment guidance may cause teachers to interpret similar evidence differently (Jonathan & How, 2024; Pua & Ibrahim Mukhtar, 2024).

Previous research on PBD in Malaysia has largely examined its general implementation, teachers' knowledge and readiness, leadership support, and assessment practices in specific academic subjects. For instance, Ahmad et al. (2022) examined the role of middle leaders in supporting PBD implementation, while Ng et al. (2023) investigated teachers' knowledge, skills and readiness in implementing PBD. Studies in language education have also examined teachers' practices in implementing and reporting PBD in Bahasa Melayu and formative assessment practices in English-language writing (Saliman & Mahamod, 2023; Thiagarajan & Tan, 2023). In contrast, studies related to RBT have more commonly focused on challenges associated with practical teaching, facilities and the implementation of the subject (Jonathan & How, 2024; Sahaat & Mohamad Nasri, 2020). Research that specifically explores how secondary school RBT teachers understand Performance Levels and Performance Standards, use learning evidence and exercise professional judgement in determining students' TP remains limited. The practical and project-oriented nature of RBT creates assessment demands that may not be fully represented in studies of other subjects. A deeper understanding of how teachers interpret assessment standards is therefore needed to explain how they use the DSKP, evaluate learning evidence and exercise professional judgement when determining students' Performance Levels.

Accordingly, this study explored secondary school RBT teachers' understanding of Performance Levels in Classroom Assessment. Assessment Literacy Theory was used to interpret how teachers understood assessment standards, evaluated learning evidence and exercised professional judgement, while Constructive Alignment Theory was used to examine the relationships between intended learning outcomes, teaching and learning activities, and assessment evidence. Together, these perspectives provided interpretive lenses for understanding teachers' assessment practices, challenges and professional support needs in the context of RBT.

1.1 Purpose of the Study

This study aimed to explore secondary school RBT teachers' understanding of PBD implementation in RBT teaching and learning. Guided by Assessment Literacy Theory and Constructive Alignment Theory, the study focused on how teachers understood the concept of PBD, interpreted Performance Levels and Performance Standards, used learning evidence and exercised professional judgement in classroom assessment practices.

Specifically, the study sought to:

1. explore RBT teachers' understanding of Performance Levels and Performance Standards in PBD;
2. identify the factors influencing RBT teachers' understanding and practices in the implementation of PBD;
3. explore the challenges encountered by RBT teachers in implementing PBD; and
4. analyse the forms of support required to assist RBT teachers in implementing PBD.

1.2 Research Questions

Based on the purpose of the study, the following research questions guided the investigation:

1. How do RBT teachers understand the concept and implementation of PBD in RBT?
2. What factors influence RBT teachers' understanding and practices in the implementation of PBD?
3. What challenges do RBT teachers encounter in implementing PBD?
4. What forms of support are required to enhance the consistency and effectiveness of PBD implementation in RBT?

2. LITERATURE REVIEW

2.1 Classroom Assessment and Performance Levels

Classroom Assessment in Malaysia is designed to be a continuous and formative process that supports learning through evidence gathered during classroom activities. Official guidance emphasises that assessment should be holistic, authentic and based on multiple methods. Teachers are expected to assess students' progress using evidence from observations, oral responses, written tasks, practical work and projects before reporting Performance Levels (KPM, 2019). This approach differs from evaluation that focuses on the overall effectiveness of a programme or curriculum, as Classroom Assessment is primarily concerned with individual students' learning and the instructional decisions informed by the evidence collected.

Performance Levels represent standards-based descriptions of students' progress rather than conventional examination marks. To determine these levels, teachers must consider the quality and complexity of the learning demonstrated. Lower levels generally reflect foundational knowledge and basic performance, whereas higher levels require application, analysis, problem-solving, improvement and independent transfer of learning. Previous studies have highlighted challenges in making such judgements. For example, Ng et al. (2023) reported variations in teachers' knowledge, skills and readiness in implementing PBD, while Saliman and Mahamod (2023) identified challenges in teachers' implementation and reporting of PBD. Collectively, these findings suggest that understanding assessment procedures does not necessarily ensure consistent interpretations of students' achievement. Difficulties may become more apparent when Performance Level descriptors are broad or when the available evidence is inconsistent, highlighting the importance of shared interpretations, clear criteria and moderation.

2.2 Assessment Literacy and Professional Judgement

Assessment literacy is fundamental to the reliable determination of Performance Levels. Abell and Siegel (2011) conceptualised assessment literacy as knowledge of the purposes of assessment, the content to be assessed, appropriate assessment strategies, and the interpretation and use of assessment results. More recent work has emphasised that assessment literacy develops socially and contextually through professional interaction, experience and institutional practices (Pastore, 2023). While Abell and Siegel (2011) emphasised the knowledge and competencies required for sound assessment, Pastore (2023) highlighted the importance of the professional and contextual environments in which those competencies are developed and applied. Together, these perspectives indicate that assessment literacy involves both technical knowledge and the ability to interpret evidence within a specific teaching context.

In Classroom Assessment, teachers need to understand curriculum standards, identify relevant evidence, apply appropriate criteria, recognise possible bias and communicate assessment decisions. Applying these competencies becomes more complex when learning is demonstrated through practical processes rather than standardised written responses. This is particularly relevant to RBT, where assessment may involve evidence of the learning process, product quality, students' explanations, improvement, creativity and the responsible use of tools.

Professional judgement is therefore unavoidable, but it should remain evidence based. Brookhart (2018) argued that appropriate and clearly defined criteria are essential for supporting valid judgements through the use of rubrics. In RBT, a high-quality final product alone may not demonstrate that a student understood the design process or completed it independently. Conversely, an imperfect product may still provide evidence of meaningful learning, problem-solving or improvement during the process. Therefore, professional judgement should draw on multiple sources of evidence rather than rely on a single outcome. This requirement reinforces the relationship between assessment literacy and teachers' ability to make defensible decisions about Performance Levels.

2.3 Authentic Assessment and Constructive Alignment in RBT

Authentic assessment is particularly relevant to RBT because students are expected to apply knowledge and skills in realistic design and production tasks. Teachers need to observe how students identify problems, generate ideas, produce sketches, select materials, use tools, construct products and evaluate outcomes. Unlike subjects in which achievement may be demonstrated predominantly through written responses, RBT requires teachers to consider evidence generated throughout the design and production processes.

Studies related to RBT have identified several practical challenges that may affect this assessment process. Jonathan and How (2024), Pua and Ibrahim Mukhtar (2024), and Sahaat and Mohamad Nasri (2020) highlighted issues associated with instructional time, practical activities, facilities, equipment and the collection of evidence in technical or RBT-related contexts. These studies also indicate that limitations in the practical learning environment can restrict students' opportunities to demonstrate their competencies. Consequently, such constraints may influence both the quantity and quality of evidence available to teachers when determining Performance Levels.

Constructive Alignment Theory provides a useful framework for understanding this issue. When Learning Standards, classroom activities, assessment tasks and Performance Standards are aligned, the evidence generated is more likely to represent the intended learning outcomes. In contrast, when assessment focuses mainly on the final product while the intended learning emphasises design reasoning, practical processes or iterative improvement, the assigned Performance Level may not fully represent a student's actual competencies. Constructive alignment is therefore not merely a planning principle but an important condition for valid Classroom Assessment in RBT.*2.4 Professional Collaboration and Assessment Support*

Professional collaboration may strengthen both assessment literacy and constructive alignment. Subject-panel discussions, professional learning communities, mentoring and moderation provide opportunities for teachers to examine students' work, compare interpretations and develop shared expectations regarding Performance Standards.

Ahmad et al. (2022) highlighted the role of middle leaders in supporting the implementation of Classroom Assessment, while national guidance similarly assigns school leaders and subject panels responsibility for supporting consistent assessment practices (KPM, 2019). These perspectives complement Pastore's (2023) view that assessment literacy develops through professional and contextual interaction rather than through individual knowledge alone. Professional support may therefore be particularly important for novice teachers and for subjects such as RBT, where student products and practical performances can vary considerably.

Collaborative moderation is also relevant because teachers may interpret the same Performance Standards differently when examining complex or diverse forms of evidence. Through structured discussion of students' sketches, project records, practical work and completed products, teachers can compare their reasoning and develop more consistent interpretations of the standards. Such professional interaction can help transform individual professional judgement into a more transparent and collectively supported assessment process.

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2.5 Synthesis and Research Gap

The literature indicates that effective Performance Level determination in RBT depends on several interconnected elements: knowledge of assessment standards, interpretation of learning evidence, assessment literacy, professional judgement, constructive alignment, professional collaboration and adequate practical resources. Previous studies have provided important insights into teachers' readiness to implement PBD and their implementation practices (Ng et al., 2023), assessment practices in other subject contexts (Saliman & Mahamod, 2023), leadership and professional support (Ahmad et al., 2022), and practical challenges associated with RBT and technical education (Jonathan & How, 2024; Pua & Ibrahim Mukhtar, 2024; Sahaat & Mohamad Nasri, 2020). However, these strands of research have generally been examined separately.

Limited research has specifically examined how secondary school RBT teachers understand Performance Levels and Performance Standards, interpret different forms of learning evidence and exercise professional judgement when determining students' TP. This gap is significant because the practical and project-oriented nature of RBT creates assessment demands that may differ from those in predominantly written or academic subjects. The present study therefore addresses this gap by exploring RBT teachers' understanding, assessment practices, implementation challenges and professional support needs within a secondary school context.

3. METHOD

3.1 Research Design

This study employed an exploratory qualitative approach within an interpretivist paradigm. This approach was selected because the study sought to understand how teachers interpreted Performance Levels and learning evidence and exercised professional judgement in their everyday Classroom Assessment practices. The study did not aim to measure teachers' assessment competence numerically or produce statistical generalisations. Instead, it focused on the meanings teachers attached to their assessment experiences and professional decisions (Creswell & Creswell, 2018).

3.2 Study Setting and Participants

The study was conducted in a selected secondary school offering RBT in Batu Pahat, Johor, Malaysia. The identity of the school was not disclosed to protect confidentiality.

Three RBT teachers were selected through purposive sampling. Participants were required to be secondary school RBT teachers who had at least two years of RBT teaching experience, were directly involved in Classroom Assessment, had experience in determining students' Performance Levels and using the DSKP and Performance Standards, and were willing to participate voluntarily in the interviews. Purposive sampling was appropriate because the study required information-rich participants with direct experience of the issue under investigation (Palinkas et al., 2015).

The use of three participants reflected the bounded and exploratory nature of the study, which focused on obtaining in-depth accounts from teachers with direct experience of RBT Classroom Assessment within a single school rather than achieving statistical representativeness. The participants had between two and

nine years of RBT teaching experience, providing perspectives that reflected different levels of teaching experience and included subject-panel leadership. The study made no claim to broad population representation or data saturation.

Participants were identified using the codes P1, P2 and P3 to protect their identities.

Table 1. Profile of the Research Participants

Participant	RBT teaching experience	Option / specialisation	Background / role
P1	9 years	Mechanical Engineering and Mathematics	RBT teacher and Head of the RBT Subject Panel
P2	6–7 years	Living Skills–Home Economics	Experienced RBT teacher involved in RBT and Classroom Assessment
P3	2 years	Design and Technology	RBT teacher involved in Classroom Assessment at the lower secondary level

3.3 Research Instrument

The researcher served as the primary instrument in the study, while the semi-structured interview protocol functioned as a supporting guide to ensure that the interviews remained aligned with the study's purpose and research questions.

Prior to data collection, the interview protocol was reviewed by two experts with complementary roles. A secondary school RBT teacher who also served as an Assistant Principal for Co-curricular Affairs reviewed the protocol from a content perspective, particularly in relation to RBT and Classroom Assessment practices. An academic from Universiti Tun Hussein Onn Malaysia (UTHM) reviewed the protocol for face validity, clarity of language and the appropriateness of the interview questions.

The interview questions addressed teachers' understanding of Performance Levels and Performance Standards, their use of learning evidence, factors influencing assessment practices, implementation challenges and the forms of professional support required. No pilot interview was conducted; instead, the protocol was refined based on expert review before the study interviews were conducted.

3.4 Data Collection Procedure

The interviews were conducted face-to-face in Bahasa Malaysia, and each lasted approximately 30–60 minutes. Before each interview, participants received information about the purpose and procedures of the study. Written informed consent was obtained from all participants.

With the participants' permission, each session was audio-recorded, and brief field notes were taken to capture key points and relevant contextual information. The audio recordings were initially transcribed using TurboScribe, an AI-assisted transcription tool. Each generated transcript was subsequently checked manually against the original audio recording and corrected where necessary to improve transcription accuracy. The verified transcripts were then organised according to participant codes.

3.5 Data Analysis

The data were analysed inductively using Braun and Clarke's (2006) six-phase thematic analysis framework. The process involved familiarisation with the data, generating initial codes, developing potential themes, reviewing themes, defining and naming themes, and producing the final report.

The research questions guided the analysis to maintain alignment with the study's focus but did not serve as predetermined coding categories. Initial codes were generated from meaningful excerpts in the interview transcripts based on recurring patterns relevant to the research questions.

An AI-assisted tool was used to support the initial coding process by suggesting possible codes from selected transcript excerpts. These suggestions were treated as preliminary analytical prompts rather than final codes. The researcher reviewed the suggested codes against the original transcripts and retained, modified, merged or rejected them as appropriate. Final interpretive decisions remained the responsibility of the researcher. The codes retained following this review were subsequently grouped into subthemes and main themes based on recurring patterns of meaning.

In practice, the analysis was organised into five working stages:

1.organising the interview data;
2.repeatedly reviewing the transcripts;
3.identifying meaningful excerpts;
4.generating and reviewing codes; and
5.developing subthemes and main themes.

These five operational stages supported the systematic implementation of Braun and Clarke's (2006) six-phase thematic analysis framework rather than replacing it.

Assessment Literacy Theory and Constructive Alignment Theory were subsequently used as interpretive lenses after the codes, subthemes and main themes had been developed from the interview data.

3.6 Translation of Interview Excerpts

Selected interview excerpts were translated from Bahasa Malaysia into English for reporting. The translations prioritised conceptual equivalence and preservation of the participants' intended meanings rather than literal reproduction of informal expressions or code-switching.

The translated excerpts were subsequently reviewed by the research supervisor against the original Bahasa Malaysia excerpts to check that the meaning had been conveyed consistently and accurately. Where necessary, wording was refined to preserve the participants' intended meanings. Participant codes and original transcript line references were maintained to ensure traceability.

3.7 Trustworthiness

Trustworthiness was strengthened through audio recording, verbatim transcription, repeated reading of the transcripts, source triangulation across P1, P2 and P3, direct quotations, an audit trail, review of the analysis with the research supervisor and thick description of the participants and research context.

Source triangulation involved comparing the interview accounts of the three participants to identify similarities and differences in their perspectives. These strategies supported credibility, dependability, confirmability and transferability in qualitative research (Korstjens & Moser, 2018; Nowell et al., 2017).

The study did not employ methodological triangulation through classroom observations, document analysis, Classroom Assessment records, rubrics or students' work. Therefore, triangulation in this study referred specifically to comparisons across participant accounts rather than across multiple data collection methods.

3.8 Ethical Considerations

Ethical principles were observed throughout the study. Participants received information about the purpose and procedures of the research, gave informed consent, participated voluntarily and had the right to withdraw. The names of the participants and the school were not disclosed. Audio files, transcripts, field notes and analytic records were stored securely and used only for academic purposes.

3.9 Study Limitations

This study was limited to three RBT teachers from one selected secondary school in Batu Pahat, Johor, Malaysia, and relied primarily on participants' accounts obtained through semi-structured interviews. The study did not involve classroom observations, document analysis, Classroom Assessment records, rubrics or students' work.

The use of semi-structured interviews enabled an in-depth exploration of teachers' interpretations, experiences and professional judgements. However, reliance on one primary data collection method meant that the findings represented teachers' reported perspectives and practices rather than direct observations of their actual Classroom Assessment practices. The absence of methodological triangulation also limited opportunities to compare participants' interview accounts with documentary or observational evidence.

Accordingly, the findings should be interpreted as an in-depth and context-specific understanding of the participating teachers' perspectives rather than as a direct assessment of their competence or a basis for statistical generalisation to all RBT teachers. Future studies may strengthen methodological triangulation by combining interviews with classroom observations and the analysis of assessment records, rubrics and samples of students' work.

4. FINDINGS

4.1 Overview of Themes and Subthemes

Inductive thematic analysis produced four main themes and twelve subthemes. The themes captured teachers' understanding of Classroom Assessment and Performance Levels, factors influencing their assessment practices, challenges encountered during implementation, and the forms of professional support required. Table 2 presents an overview of the main themes and subthemes. Each subtheme is illustrated by a translated interview excerpt and accompanied by a concise interpretation of the participants' accounts in relation to the study's focus.

Table 2. Main themes and Subthemes

Main theme	Subthemes
Theme 1: Teachers' understanding of the concept and implementation of Classroom Assessment in RBT	1.1 Classroom Assessment as continuous assessment during teaching and learning 1.2 Interpretation of Performance Levels based on the DSKP and Performance Standards 1.3 Assessment of cognitive, psychomotor and affective domains in RBT
Theme 2: Factors influencing teachers' understanding and Classroom Assessment practices in RBT	2.1 Learning evidence as the basis for determining Performance Levels 2.2 Students' effort, attitudes and participation in teachers' assessment decisions 2.3 Professional experience, mentors and colleagues in supporting teachers' understanding
Theme 3: Challenges in implementing Classroom Assessment in RBT	3.1 Student absenteeism and difficulties in collecting learning evidence 3.2 Difficulties in assessing higher Performance Levels in practical and project-based tasks 3.3 Inconsistent student engagement affecting Performance Level determination
Theme 4: Professional support for strengthening Classroom Assessment in RBT	4.1 The need for RBT-specific Classroom Assessment training 4.2 Professional learning communities, mentoring and subject-panel discussions as professional support 4.3 Teacher autonomy and RBT facilities in strengthening Classroom Assessment

4.2 ***Theme 1:*** *Teachers' understanding of the concept and implementation of Classroom Assessment in RBT*

4.2.1 Classroom Assessment as continuous assessment during teaching and learning

The participants understood Classroom Assessment as an ongoing process embedded in teaching and learning. They did not restrict assessment to examinations or written worksheets. Instead, they described observing students' responses, participation, work processes and completed tasks throughout lessons. P2 described PBD as a continuous process involving different classroom methods, including questioning and prompting, while P3 emphasised students' work, responses and participation as evidence gathered during teaching and learning.

> *"Classroom Assessment is continuous. I conduct it during teaching and learning. It does not depend only on examinations; it is based on students' work, reactions and whether they are active or passive."* (P3, Lines 18–22; translated from Bahasa Malaysia)

Taken together, the participants' responses indicate that Classroom Assessment was viewed as a continuous process in which learning evidence was gathered progressively during teaching and learning rather than through examinations alone.

4.2.2 Interpretation of Performance Levels based on the DSKP and Performance Standards

The participants regarded the DSKP and its Performance Standards as essential references for determining students' Performance Levels. P2 explained that teachers needed to refer to the DSKP because the expected achievement at each level had already been specified. P3 similarly described the document as a guide to understanding the progression from TP1 to TP6.

> *"The first thing I refer to is the DSKP. It is very important because it shows the level of understanding from TP1 to TP6."* (P3, Lines 25–29; translated from Bahasa Malaysia)

The findings indicate that the DSKP and Performance Standards functioned as the main references for interpreting students' Performance Levels and guiding teachers' assessment decisions.

4.2.3 Assessment of cognitive, psychomotor and affective domains in RBT

The participants understood RBT assessment as a holistic process involving cognitive, psychomotor and affective domains. P1 emphasised that assessment should not focus solely on students' cognitive performance because RBT involves substantial practical and hands-on activities. P2 similarly described the use of multiple forms of evidence, including observation, questioning, workbooks, practical activities, projects and students' completed work.

> *"RBT involves a great deal of hands-on and practical work. Assessment cannot focus only on students' cognitive ability; it must also examine their practical skills in projects and hands-on activities."* (P1, Lines 19–24; translated from Bahasa Malaysia)

These accounts indicate that participants viewed RBT assessment as a holistic process requiring teachers to consider students' knowledge, practical skills and participation across different learning activities.

4.3 ***Theme 2:*** *Factors influencing teachers' understanding and Classroom Assessment practices in RBT*

4.3.1 Learning evidence as the basis for determining Performance Levels

The participants consistently described learning evidence as the primary basis for determining students' Performance Levels. P2 emphasised evidence such as workbooks, practical work and students' products, while P1 referred to design sketches, techniques, work processes, planning and oral questioning as evidence used to support assessment decisions.

> *"The most important basis for determining a Performance Level is the evidence. A workbook is evidence, and in RBT the practical work and the product are also evidence."* (P2, Lines 125–128; translated from Bahasa Malaysia)

The findings indicate that teachers relied on multiple forms of learning evidence to support their decisions about Performance Levels rather than relying on a single source of evidence.

4.3.2 Students' effort, attitudes and participation in teachers' assessment decisions

The participants described students' effort, attitudes and participation as factors influencing their assessment decisions. P1 emphasised the need to consider students' effort, approach to tasks and outcomes holistically, while P2 highlighted the importance of observing students' attitudes and actual participation, particularly during group activities.

> *"We need to look at the student's effort, how the student approaches the task and the outcome in a holistic way."* (P1, Lines 155–164; translated from Bahasa Malaysia)

This finding shows that teachers considered students' effort, attitudes and participation alongside task outcomes when making assessment decisions in RBT.

4.3.3 Professional experience, mentors and colleagues in supporting teachers' understanding

Professional experience, mentoring and collegial discussions supported teachers' understanding of how to determine Performance Levels. P3 described seeking guidance from a mentor and a more experienced co-teacher when uncertain about assigning Performance Levels, while P2 explained that assessment became clearer and more manageable after several years of teaching experience.

> *"I obtain advice from my mentor and discuss it with my co-teacher, who is more experienced. I ask how the Performance Level should be assigned."* (P3, Lines 72–79; translated from Bahasa Malaysia)

Overall, teachers' understanding of how to determine Performance Levels appeared to develop through accumulated teaching experience and professional support from mentors and colleagues.

4.4 ***Theme 3:*** *Challenges in implementing Classroom Assessment in RBT*

4.4.1 Student absenteeism and difficulties in collecting learning evidence

Student absenteeism was identified as a major challenge because it limited teachers' opportunities to collect sufficient learning evidence. P3 explained that students who were absent during important lessons or assessment activities could miss opportunities to demonstrate their learning. P2 similarly noted that absenteeism made it difficult to determine whether students had genuinely achieved higher Performance Levels when the available evidence was limited.

> *"The most challenging issue is obtaining student evidence. Sometimes a student is absent when an important topic is taught. Attendance becomes a problem."* (P3, Lines 103–107; translated from Bahasa Malaysia)

Absenteeism therefore limited teachers' ability to obtain sufficient and direct evidence of students' learning, particularly in practical activities and tasks requiring higher-level performance in RBT.

4.4.2 Difficulties in assessing higher Performance Levels in practical and project-based tasks

The participants found TP5 and TP6 more difficult to assign because these levels required clearer evidence of higher-level performance. P1 explained that TP6 involved analysing projects or products, solving problems, making improvements and sharing knowledge. P2 was reluctant to assign higher Performance Levels unless students clearly demonstrated that they could produce the work and showed additional effort.

> *"Higher levels such as TP5 and TP6 are difficult to assess. I find it hard to assign them unless I am confident that the student can produce the work and demonstrates additional effort."* (P2, Lines 171–174; translated from Bahasa Malaysia)

These accounts suggest that assigning higher Performance Levels involved careful judgements based on evidence of students' work processes, problem-solving abilities, improvements and practical performance.

4.4.3 Inconsistent student engagement affecting Performance Level determination

Student engagement varied across topics and learning activities. P1 described variation in students' participation and performance across different topics, while P2 observed that some students did not consistently complete tasks or participate actively, particularly during group activities. This inconsistency made it difficult for teachers to determine an overall Performance Level based on a single task or isolated observation.

> *"The student is inconsistent… the student is not consistent… there are many different topics."* (P1, Lines 184–190; translated from Bahasa Malaysia)

These accounts suggest that teachers needed to consider evidence gathered across different topics and learning activities when determining students' overall Performance Levels.

4.5 ***Theme 4:*** *Professional support for strengthening Classroom Assessment in RBT*

4.5.1 The need for RBT-specific Classroom Assessment training

The participants expressed a need for training tailored specifically to RBT, rather than general Classroom Assessment briefings alone. P3 emphasised the need for subject-specific training to clarify the distinctions among Performance Levels from TP1 to TP6. P2 noted that formal training and workshops related to Classroom Assessment had become less frequent than during the earlier stages of implementation.

> *"I definitely need a Classroom Assessment course specifically for RBT so that I can understand the differences between TP1 and TP6 more clearly." (P3, Lines 163–166; translated from Bahasa Malaysia)*

These responses highlight a perceived need for more focused and ongoing professional training to support teachers in interpreting Performance Levels within the specific context of RBT.

4.5.2 Professional learning communities, mentoring and subject-panel discussions as professional support

Teachers valued professional learning communities, mentoring and subject-panel discussions as forms of professional support. P2 explained that discussions within the RBT subject panel helped teachers consider how students' Performance Levels should be determined, while P3 described seeking guidance from a mentor and a more experienced co-teacher when uncertain about assessment decisions.

> *"We now discuss it together in the subject panel—how we should determine and assign students' Performance Levels."* (P2, Lines 293–301; translated from Bahasa Malaysia)

Such professional collaboration provided teachers with opportunities to clarify assessment decisions and develop a shared understanding of how to determine Performance Levels.

4.5.3 Teacher autonomy and RBT facilities in strengthening Classroom Assessment

The participants highlighted teacher autonomy and adequate RBT facilities as important forms of support for Classroom Assessment. P1 emphasised that teachers should have professional autonomy in making assessment decisions because they closely observe students' development during teaching and learning. P3 stressed the importance of adequate workshops, materials and equipment in enabling students to carry out RBT projects effectively.

> *"Facilities are very important for RBT projects. Sometimes materials are insufficient or equipment is damaged, making it difficult for students to explore the task."* (P3, Lines 176–179; translated from Bahasa Malaysia)

Participants' accounts suggest that teacher autonomy and adequate facilities were viewed as complementary forms of support for meaningful assessment: autonomy enabled teachers to exercise professional judgement, while facilities provided students with opportunities to demonstrate practical learning.

4.6 Summary of Findings

Overall, the findings showed that the participants understood Classroom Assessment as a continuous, standards-based and holistic process. The DSKP and Performance Standards served as key references for determining students' Performance Levels, while teachers also relied on multiple forms of learning evidence, including written work, observation, practical activities, project processes and completed products.

The findings further indicated that teachers' assessment practices were influenced by the availability and quality of learning evidence, students' participation and effort, professional experience, mentoring and collegial discussion. However, teachers encountered challenges in collecting evidence when students were absent or inconsistently engaged, and in assigning higher Performance Levels that required more complex evidence of independence, problem-solving, analysis and improvement.

The participants also identified RBT-specific training, professional learning communities, mentoring, subject-panel discussions, teacher autonomy and adequate practical facilities as important forms of support. Across the four themes, the participants' accounts suggest that understanding the Performance Standards alone may not be sufficient to support consistent decisions about Performance Levels. Teachers also require adequate learning evidence, professional judgement and appropriate professional support.

5. DISCUSSION

5.1 Teachers' Understanding of Classroom Assessment and Performance Levels

The findings indicate that the participants understood Classroom Assessment as a continuous and holistic process extending beyond written examinations. This understanding is consistent with the principles of PBD, which emphasise ongoing assessment of students' development through varied forms of evidence during teaching and learning (KPM, 2019). In RBT, such an approach is particularly relevant because students are expected to demonstrate not only theoretical understanding but also practical skills, problem-solving ability and appropriate attitudes during project-based activities.

The participants also regarded the DSKP and Performance Standards as important references for interpreting students' Performance Levels. This aligns with national guidance requiring teachers to refer to curriculum and performance standards when making assessment decisions (KPM, 2019). From an assessment literacy perspective, however, knowledge of the standards alone is not sufficient; teachers must also be able to select appropriate evidence and interpret it in relation to the expected level of performance. Constructive Alignment Theory further suggests that learning activities and assessment evidence should be aligned with the intended Learning Standards so that decisions about Performance Levels reflect the competencies students are expected to demonstrate.

5.2 Learning Evidence, Student Factors and Professional Judgement

The findings show that teachers' Classroom Assessment practices were influenced by the learning evidence available to them. Participants referred to workbooks, sketches, practical work, projects, oral responses and classroom observations when determining students' Performance Levels. This is consistent with the literature on assessment literacy, which emphasises teachers' ability to select appropriate assessment methods and interpret evidence in relation to intended standards (Brookhart, 2018; KPM, 2019). In RBT, the use of multiple forms of evidence is especially important because students demonstrate learning through both knowledge and practical performance.

Students' effort, attitudes and participation also influenced teachers' judgements, particularly because RBT involves extended practical and project-based processes. However, these factors need to be distinguished from evidence of achievement and considered in relation to the relevant standards so that assigned Performance Levels reflect the intended competencies. The findings further suggest that professional judgement develops through experience, mentoring and collegial interaction. Participants described drawing on accumulated assessment experience and seeking guidance from mentors and colleagues. From an assessment literacy perspective, this suggests that assessment literacy develops not only through knowledge of formal standards but also through repeated engagement with evidence and professional discussion.

5.3 Challenges in Determining Performance Levels in RBT

The findings show that the main challenges in implementing Classroom Assessment were closely related to the adequacy and consistency of learning evidence. Student absenteeism reduced teachers' opportunities to observe learning processes and collect sufficient evidence, while inconsistent engagement made it difficult to determine whether students' performance was representative of their overall mastery. Assessing higher Performance Levels, particularly TP5 and TP6, was also challenging because teachers required clearer evidence of analysis, problem-solving, improvement and higher-level performance. These challenges highlight the relevance of PBD guidance, which emphasises continuous evidence collection to support decisions about Performance Levels (KPM, 2019).

Previous RBT studies have similarly reported difficulties in documenting learning processes, assessing varied project work and managing practical assessment within limited instructional time (Jonathan & How, 2024; Pua & Ibrahim Mukhtar, 2024). From an assessment literacy perspective, these challenges require teachers to judge whether the available evidence is sufficient and appropriate before assigning a Performance Level. Constructive Alignment Theory also highlights the importance of ensuring that practical and project-based activities provide students with genuine opportunities to demonstrate the competencies described in the Performance Standards. Therefore, difficulties in determining TP may arise not only from difficulties in interpreting the standards but also from limitations in the evidence available to support those judgements.

5.4 Professional Support for More Consistent Classroom Assessment

The findings indicate that participants regarded professional support as important for strengthening the consistency of Classroom Assessment in RBT. Participants highlighted the need for subject-specific training, professional learning communities, mentoring and subject-panel discussions to support teachers in interpreting Performance Standards and making assessment decisions. This is consistent with previous literature emphasising the role of professional collaboration and school-level support in improving Classroom Assessment practices (Ahmad et al., 2022; KPM, 2019). Such support is particularly important in RBT because teachers must interpret varied forms of evidence, including sketches, practical processes, project work and completed products.

From an assessment literacy perspective, professional learning can strengthen teachers' ability to interpret standards, select appropriate evidence and justify decisions about Performance Levels. Constructive Alignment Theory further suggests that professional support should help teachers align

learning activities, practical tasks and assessment evidence with the intended Learning Standards and Performance Standards. The participants also highlighted teacher autonomy and adequate workshop facilities as important contextual conditions. Therefore, more consistent Classroom Assessment in RBT may depend not only on individual teachers' knowledge but also on collaborative professional support and practical conditions that enable students to demonstrate the intended competencies.

6. CONCLUSION

This study explored secondary school RBT teachers' understanding of Performance Levels in Classroom Assessment. The findings showed that the participating teachers viewed Classroom Assessment as a continuous process conducted during teaching and learning, guided by the DSKP and Performance Standards and involving evidence of students' knowledge, practical skills and attitudes. In RBT, this understanding was reflected in the reported use of workbooks, sketches, observation, questioning, practical activities, project processes and completed products.

Teachers' assessment practices were influenced by the availability and quality of evidence, students' effort and participation, and professional learning gained through experience, mentoring and interaction with colleagues. Although teachers recognised the importance of standards and evidence, they faced difficulties when students were absent, engagement was inconsistent or higher Performance Levels required more complex evidence of independent performance, analysis and improvement. These challenges suggest that understanding the Performance Standards alone may not be sufficient to support consistent decisions about Performance Levels; teachers also require sufficient learning evidence and professional judgement developed across different learning situations.

The findings have practical implications for schools and education authorities. They suggest a need for ongoing subject-specific training for RBT teachers that uses authentic student work, explicit rubrics and examples across TP1 to TP6. Schools should also provide opportunities for subject-panel discussions, professional learning communities and moderation to support more consistent interpretations of Performance Standards. Teacher autonomy should be supported by clear standards, appropriate learning evidence and collegial discussion, while adequate workshop facilities, materials and functioning equipment are necessary to provide students with meaningful opportunities to demonstrate practical competence.

The study was limited to three RBT teachers from one secondary school and relied primarily on interview data. Future studies could involve teachers from multiple schools and incorporate classroom or workshop observations, assessment records and samples of students' work to provide a broader understanding of how Performance Levels are determined. Further research could also examine how RBT-specific rubrics, shared evidence resources or structured moderation influence teachers' assessment practices.

Conceptually, the study offers a context-specific illustration of Assessment Literacy Theory by suggesting that teachers' assessment literacy in RBT involves not only knowledge of Performance Standards but also the ability to identify, interpret and integrate multiple forms of learning evidence through professional judgement. The study also highlights the relevance of Constructive Alignment Theory to the relationship between intended Learning Standards, practical and project-based activities, the evidence generated by those activities, and the Performance Standards used to judge achievement. Together, these perspectives suggest that consistent Classroom Assessment in RBT involves the interaction of assessment knowledge, learning evidence, professional judgement and the conditions that enable students to demonstrate their learning.

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8. CONFLICT OF INTEREST STATEMENT

The authors declare that the research was conducted in the absence of commercial, financial or personal relationships that could be construed as potential conflicts of interest.

9. AUTHORS' CONTRIBUTIONS

Nur Afifah Azhar: Conceptualisation, methodology, investigation, data curation, formal analysis and writing original draft. **Siti Noor Fauziah Abd Rahim:** Conceptualisation, supervision, validation and writing review and editing. Both authors reviewed and approved the final manuscript.

10. DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES

During the preparation of this work, the authors used TurboScribe to support initial interview transcription and ChatGPT (OpenAI) to support preliminary coding suggestions and English language clarity and readability. All AI-assisted outputs were reviewed, verified and revised by the authors. Final coding decisions, interpretation of the findings and manuscript content remained the responsibility of the authors, who take full responsibility for the originality, accuracy and integrity of the publication.

11. DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

The interview data are not publicly available due to participant confidentiality and ethical restrictions. Further information regarding the study may be obtained from the corresponding author on reasonable request.

12. ETHICS STATEMENT

This study involved adult teacher participants. Prior to data collection, the participants were informed about the purpose and procedures of the study, the use of audio recording, confidentiality of the information provided, and their right to withdraw from the study at any time. Written informed consent was obtained from all participants, and participation was entirely voluntary. The identities of the participants and the school were anonymised through participant codes. All audio recordings, interview transcripts and research records were stored securely and used solely for academic purposes.

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