

Literacy Assessment Tool For Lecturers A Rasch-Based Approach; A Scopic Systematic Literature Review

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ABSTRACT

The evolving demands of global higher education require lecturers to demonstrate proficiency across digital, pedagogical, and assessment literacy domains. However, the absence of validated assessment tools limits the ability to accurately measure these competencies, hindering targeted professional development and ultimately affecting student outcomes. While the Rasch model is well-established in educational measurement, its application specifically for developing comprehensive lecturer literacy assessment tools remains underexplored. Existing literature is fragmented, lacks cross-contextual representation, and provides limited insight into how Rasch-based methodologies can effectively assess multiple literacy dimensions. This study aims to systematically review the application of Rasch analysis in lecturer literacy assessment tools. It seeks to identify strengths, weaknesses, and gaps in existing tools, as well as to map collaboration patterns and research trends across authors, institutions, and countries. A systematic literature review was conducted following PRISMA guidelines. Academic databases including Scopus, IEEE Xplore, and ScienceDirect were searched for peer-reviewed publications focused on Rasch-based assessment of lecturer literacy. Bibliometric analyses, including co-authorship and co-citation analysis, were employed to visualize collaboration networks and research trends. The findings reveal a growing body of literature on Rasch-based literacy assessments, predominantly concentrated in Southeast Asia and the Middle East. However, limited cross-national collaboration was observed, and significant gaps remain in underrepresented regions. Existing tools also demonstrate limited integration of digital, pedagogical, and assessment literacy domains. The study concludes that while Rasch analysis offers critical insights for developing lecturer literacy assessment tools, greater global collaboration and context-specific adaptations are essential. Future efforts should prioritize the development of inclusive, multi-dimensional assessment tools tailored to diverse educational contexts to enhance teaching quality in higher education.

Keywords: *Lecturer literacy assessment, Rasch model, educational tools, systematic literature review, bibliometric analysis, professional development*

INTRODUCTION

Educational systems across the globe are changing quickly, in response to the rapid development of technology and digital tools. This shift relies on the literacy of lecturers across digital, pedagogical, technological skills among others (Yim, Lye, & Koh, 2024). In the absence of these vital tools, educators find it challenging to reach students and this adversely affects their academic results (Arshad & Noureen, 2020). In both developed and developing countries, it is this problem, in which numerous educators are still not well prepared for the technological revolution in education (Avinç & Doğan, 2024).

This problem is particularly poignant in the area of polytechnics, where teachers in Malaysia demand effective means of increasing their level of literacy (Jumini et al., 2024). However, a lack of lecturers' literacy not only has a direct impact on the quality of education, there is a potential to be seen as a hindrance to the learning of the country education-wise (Yusof et al., 2019); lecturers' literacy gap. As Malaysia attempts to enhance its position in higher education within Southeast Asia, this problem could be associated with poor educational and economic growth (Rahmi, Susongko, & Suriswo, 2025).

Globally, inadequate educator literacy poses a security issue for education. Students unable to be taught effectively with modern tools may graduate without the skills needed to thrive in a knowledge economy (Yusof et al., 2019). It is evident that social distancing between the socio-economic groups increases both disparities and opportunity cost in the latter class (Avinç & Doğan, 2024). Moving forward, education systems should facilitate educators' learning to integrate into technological change.

In Malaysia, Rasch literacy assessment tools can assist the researchers to highlight skills gap of the teachers and recommend professional development opportunities (Yusof, 2021). If this problem is not resolved, there is a risk of deepening the teaching effectiveness gap and ultimately the teaching quality (Rahmi, Susongko, & Suriswo, 2025).

With technology and digitalization continually transforming education, the need for effective and literate educators is of utmost importance. At the same time digital tools are being rapidly introduced and used in education, it becomes crucial for lecturers to have relevant competence in literacy so as to facilitate teaching and learning (Jumini et al., 2024). Yet, many educators across the globe, particularly in developing nations like Malaysia, struggle to keep pace with these advancements due to insufficient training and outdated educational models (Avinç & Doğan, 2024).

In Malaysia's polytechnic institutions, the situation is no different where lecturers often cannot cope in acquiring skills needed to teach effectively in the technology-enhanced classrooms of today (Yusof et al., 2019). As a result, there are few reliable tools with which to assess lecturers' literacy levels on-site—thus a barrier to filling in existing practices or providing focused support for learners who are facing difficulty in achieving their basic objectives (Rahmi, Susongko, & Suriswo, 2025). However, the application of psychometrically sound tools such as the Rasch model has not been sufficiently investigated in the Malaysian educational system, especially in polytechnic schools (Yim, Lye, & Koh, 2024).

An effective assessment tool with the potential to accurately measure the different domains of lecturers' literacy should be developed as it is an urgent task to fill this gap in the context of the Malaysian polytechnic institutes.

Polytechnics have become a core component of the Malaysian higher education system, which amplifies the need for this research. Such institutions are instrumental for educating students and giving them practical skills that are in high demand (Rahmi, Susongko, & Suriswo, 2025) in the labour market. Yet, if instructors are not able to utilise modern teaching tools and methods, the quality of education would be compromised. This study aims to enhance the effectiveness of polytechnic education, as well as the student and society at large for Malaysia through developing a tool for measuring and improving lecturer literacy.

PROBLEM STATEMENT

Despite the increasing number of papers that have used Rasch analysis for assessment in teaching and learning, there is an existing lack of unity and even more fragmentation within the literature on studies regarding domains such as reading comprehension, technological literacy, digital literacy, and pedagogical literacy. Yim, Lye, and Koh (2024) and Arshad and Noureen (2020) developed enhanced psychometric measures of reading comprehension tools, and Jumini et al. (2024) and Avinç and Doğan (2024) validated instruments for technological and digital literacy. In a similar vein, Rahmi, Susongko, and Suriswo (2025) emphasised pedagogical literacy, and Yusof et al. (2019) studied research literacy

among postgraduate students. Although these studies are generally domain-specific and little integrated across various types of literacy, the multidimensional demands of the lecturers' literacy needs have thus been overlooked with a few holistic frameworks.

There is also a lack around the situation or demographics from related studies. Jizat and Elmy (2024) conducted research on ICT-literacy tools among novice teachers in Malaysia, Wigati, Faisal, and Astuti (2022) investigated gender views of digital literacy, and Yusup (2021) validated energy literacy instruments for physics teachers. Although these researches reveal salient contextual peculiarities, they are still limited in geographical range and generally included pre-service or specific subject teachers only. Khalid et al. (2023) and Mohamat, Sumintono, and Abd Hamid (2022) further applied Rasch analysis on classroom assessment literacy and rater quality but cross-national comparisons and longitudinal studies of lecturers' literacy development are limited. This limits generalizable implications of results and raises doubts of how literacy assessment instruments work in different educational systems and cultural settings.

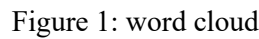
Finally, although Rasch analysis has been utilized for specific literacies including genetics literacy (Fauzi et al., 2021), language proficiency (Kianinezhad, 2025), translation teacher literacy (Modarresi et al., 2021), and science literacy (Andaresta et al., 2023), there is little discussion on how these literacies connect with more general pedagogical competencies and professional development. Studies such as Noben et al. (2021) on teaching quality, Hairida et al. (2023) on multidimensional digital literacy, and Ismail et al. (2025) on TPACK readiness show new directions that are still in their infancy. Additionally, the existing research leans towards instrument validation and neglects its adoption, scalability, and long-term professional impact on lecturers (Khine, 2020; Lian & Yew, 2020; Yan & Pastore, 2022; Tabatabaee-Yazdi et al., 2018; Kadaryanto & Madya, 2020; Hidayat et al., 2025; Jani et al., 2020; Quansah, 2022). This highlights the importance of integrated, cross-disciplinary, and longitudinal work linking validated literacy assessment tools with sustainable lecturer development and institutional innovation.

This study aims to provide a comprehensive review of previous research on literacy assessment tools for lecturers, focusing on the application of a Rasch-based approach. It offers an icebag view of the scopic systematic literature review, examining how Rasch analysis has been utilized globally to evaluate lecturers' literacy levels. The study seeks to identify the impact of these tools on educational reforms and their role in enhancing the quality of teaching in polytechnic institutions worldwide.

LITERATURE

Concept Of Literacy Assessment

Literacy-based assessments have moved beyond decoding and production to functional, digital, pedagogical, and disciplinary literacies associated with tasks and contexts. (Khine, 2020) This reconceptualization is focused on construct clarity, evidence of validity, and fairness that puts assessment less into a checklist of observable behaviors, and more toward an examination of latent traits. (Khine, 2020) Rasch measurement is more relevant within this paradigm as it allows the probabilistic relationship between person ability and item difficulty to be modeled using a common interval scale that supports justification for drawing inferences that apply to a wide range of literacy domains. A key analytic approach employed in literacy assessment is to specify constructs, defining the boundaries of "literacy" and associating this to item hierarchies representing increasingly heightened cognitive demands, and a more authentic performance. (Arshad & Noureen, 2020) The notion is operationalized with item banking in Rasch format where items are tracked along a continuum determined by the value added to the construct with respect to the scale invariant across the cases. (Yim, Lye, & Koh, 2024) The fit statistics, person-item maps, and reliability indices can be diagnostic of the coherence of the construct, and they may indicate misfitting items, difficulty gaps, and ceiling or floor effects in the questionnaire which reduce the interpretability. (Mokshein, Ishak, & Ahmad, 2019)



Domain-specific literacies energy, science and COVID-19 genetics demonstrate how construct clarity and item targeting enable policy-relevant measurement and inform curriculum and teacher preparation. (Yusup, 2021) Rasch analysis derived science literacy assessments show how item difficulty maps can guide instructional sequencing and resource allocation, particularly in contexts with

an emphasis on inquiry and application. (Andaresta, Muliani, Safriana, Sakdiah, & Novita, 2023) Factor and Rasch analysis based calibration of genetics literacy instruments demonstrate the value of convergent evidence, linking psychometric rigor to public health communication and scientific understanding. (Fauzi, Saefi, Kristiana, Adi, & Lestariani, 2021) These cases reinforce that literacy assessment is not merely evaluative but developmental, shaping learning trajectories and informing systemic interventions. (Khine, 2020). Instrument development for ICT and TPACK-related literacies highlights the intersection of technology integration and pedagogical decision-making, where assessment must capture both knowledge and enactment. (Islam, Gu, Crook, & Spector, 2020) Rasch-validated TPACK instruments for science teachers reveal how readiness for technology-integrated instruction can be measured with attention to item functioning, person targeting, and fairness across contexts. (Ismail et al., 2025) Doctoral work on ICT-literacy assessment tools demonstrates the importance of iterative validation cycles, expert review, and pilot testing to ensure instruments remain aligned with evolving technological ecosystems. (Jizat & Elmy, 2024) Collectively, these efforts show that literacy assessment in technology-rich environments requires continuous recalibration to maintain relevance and validity. (Avinç & Doğan, 2024).

Super-item and structured scales of assessment literacy among preservice teacher practitioners can help in capturing complex competencies in accessible, interpretable measures, in a way that maintains diagnostic granularity. (Lian & Yew, 2020) Rasch analyses of item-writing competencies and formative assessment literacy provide evidence for targeted training on alignment, cognitive demand, and feedback quality. (Sayın & Şata, 2022) Translation teachers' assessment literacy studies extend the construct into specialized professional domains, demonstrating transferability of Rasch-based validation principles across disciplines. (Modarresi, Jalilzadeh, Coombe, & Nooshab, 2021) Needs-based professional development programs rooted in Rasch diagnostics facilitate a capacity-building approach which addresses true competency profiles rather than cookie-cutter training plans. (Kadaryanto & Madya, 2020).

Lastly, the current paradigm of literacy evaluation is an evidence-centered, construct-driven enterprise that uses Rasch measurement to achieve rigor, equity, and interpretability in varying literacy aspects. (Khine, 2020) Combining item banking, facet modeling, and multidimensional scaling, literacy assessment can emerge as a strategic instrument for improving instruction, monitoring equity, and guiding policy. (Noben, Maulana, Deinum, & Hofman, 2021) For instruments intended to drive high-stakes educational and societal outcomes, rigorous calibration, invariance testing, and iterative refinement are non-negotiable, and the literature supports that fact. (Yim, Lye, & Koh, 2024) This analytic position treats literacy assessment as a methodological discipline and as a practical lever to change learning systems. (Yan & Pastore, 2022).

Literacy Assessment Tools for Educators

Across the globe, the development and transformation of literacy assessment tools for teachers has witnessed substantial changes as we shifted from traditional approaches and paper based measurements to multidimensional, psychometrically grounded measures which gauge a rich variety of skills and competencies to include digital literacy, AI literacy, scientific literacy and pedagogical assessment literacy. (Dong, Xu, Huang, & Yann, 2025) Rasch modeling has also been included in the construction of constructs and introduced measurement validity and neutrality, validation and diagnostic accuracy in assessing teacher competencies. For instance, Rasch-refined AI literacy measures can reveal educators' ability to responsibly interact with ethical, operational as well as instructional elements of AI in the classroom. (Dong et al., 2025) (He, Liu, Zheng, & Jia, 2016) Similarly, in energy literacy test for pre-service physics teachers, item calibration and targeting increase responsiveness to conceptual understanding and application differences. (Yusup, Setiawan, Rustaman, & Kaniawati, 2017).

Assessment tools also intersect with teachers' professional identity and instructional innovation, as this reflects the larger role of assessment literacy in guiding reflective practice and classroom decision-making. Several approaches, including Many-Faceted Rasch Models, have been employed in testing pre-service teachers' efficacy in instructional innovation by taking into account rater severity and task difficulty, resulting in more valid evidence of pedagogical creativity. (Alqarni & Ismail, 2021) (Liu, Sun, Liu, & Xu, 2023) Moreover, with the convergence of digital and mathematical literacies,

literacy assessment tools are further showcasing how technology integration augments teachers' problem-solving and instructional design. (Buyung, Rosmaiyadi, Marhayani, Nirawati, Triani, & Soeharto, 2025) Tools assessing teacher digital literacy can offer evidence for tailored professional development in technology-rich environments and provide a means for educators to respond effectively to changes in the classroom. (Nguyen & Habók, 2024).

The research tools that measure scientific literacy offer additional insights on the educational role of measurement in promoting inquiry skills, critical thinking, and resilient learners. Rasch-based bibliometric reviews point to the emerging direction towards multidimensional constructs that describe disciplinary knowledge and transferable skills. At the same time, assessment literacy as such is increasingly a significant skill for teachers and one that can impact how well teachers teach, reflect on teaching practice, and learners' achievement. (Rad, 2019) International reviews of teacher assessment literacy standards indicate the critical need for assessment tools to assess not only technical abilities in test design, but also interpretive abilities in interpreting and using assessment data for formative feedback. (DeLuca, LaPointe-McEwan, & Luhanga, 2016) Last, but not least, integration of AI literacy with assessment tools is at the forefront of educator preparation in fields ranging from digital literacy to algorithmic thinking, ethical considerations, and cross-disciplinary applications. (Southworth et al., 2023)

We find models for AI that span the curriculum stress the need for educators to possess the competencies needed to innovate and to bring new thinking back into post-pandemic education systems. (Ng, Lee, Tan, Hu, Downie, & Chu, 2023) Literacy assessments used by those in the education system are not static measurements but dynamic tools that construct professional identity, instructional innovation, and preparation for twenty-first-century education. (Weideman, 2019).

Table 2.1: Literacy Assessment Tools

Authors	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	IMPACT	Lapses	Adoption rate	Remark
Dong, Y. et al. (2025)	AI literacy scale	Rasch validation	Ethical dimension	Pedagogical integration	Technical proficiency	Expands scope of literacy	Limited to higher ed	Moderate	Needs adaptation for school teachers
Alqarni, A. H. & Ismail, M. E. (2021)	Teacher identity	Assessment literacy	Reflective practice	Professional growth	Classroom application	Strengthens teacher identity	Context-specific	High	Broaden to cross-cultural contexts
Yusup, M. et al. (2017)	Energy literacy	Item calibration	Pre-service physics	Conceptual understanding	Application tasks	Enhances science teaching	Narrow domain	Moderate	Extend to interdisciplinary literacy
Syahri, A. et al. (2022)	Adversity quotient	Madrasah literacy	Rasch-based tool	Student resilience	Literacy outcomes	Links literacy to resilience	Pilot stage only	Low	Requires wider empirical validation
Buyung, B. et al. (2025)	Mathematical literacy	Digital literacy	Pre-service teachers	Integration skills	Problem-solving	Shows multidimensionality	Limited sample	Moderate	Expand to diverse teacher cohorts
Liu, J. et al. (2023)	Instructional innovation	Many-facet Rasch	Rater severity	Pedagogical creativity	Task difficulty	Improves reliability	Complex analysis	Moderate	Simplify for practical teacher use
Pongsophon, P. & Jituafoa, A. (2021)	Botanical literacy	Learning progression	Rasch validation	Item hierarchy	Instructional scaffolding	Supports inquiry learning	Narrow subject	Low	Adapt for broader science literacy
He, P. et al. (2016)	Chemistry teaching quality	Rasch validation	Secondary lessons	Classroom practice	Item reliability	Validates teaching quality	Limited to chemistry	Moderate	Extend to other STEM subjects
Weideman, A. (2019)	Assessment literacy	Language teaching	Good teacher model	Insights & applications	Reflective pedagogy	Provides conceptual clarity	Lacks empirical testing	High	Needs integration with psychometric tools



Rad, M. R. (2019)	EFL teachers	Assessment efficiency	Classroom practice	Literacy impact	Teacher competence	Links literacy to efficiency	Limited scope	Moderate	Expand to diverse language contexts
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The Application of Rasch Analysis in Educational Assessment

Rasch-based measurement techniques for educational assessment have emerged as a methodological paradigm to provide validity, reliability, and fairness of measurement tools. (Khine, 2020) Rasch analysis is interval-level, calibrating item difficulty and person ability on a common scale, which allows for meaningful comparisons and diagnostic precision, unlike classical test theory. (Mokshein, Ishak, & Ahmad, 2019) Studies on reading comprehension assessment illustrate how Rasch modeling enhances construct validity and item targeting. A psychometric study by Yim, Lye, and Koh (2024) of an English reading comprehension item bank revealed that introducing elements of Rasch analyses improves validity of the items, maintains unidimensionality, and enables adaptive testing. (Yim, Lye, & Koh, 2024) Arshad and Noureen (2020) used Rasch modeling to create a reading comprehension test and presented the findings indicating that calibration improves sensitivity to differences between learners and enhances interpretability of measures. (Arshad & Noureen, 2020).

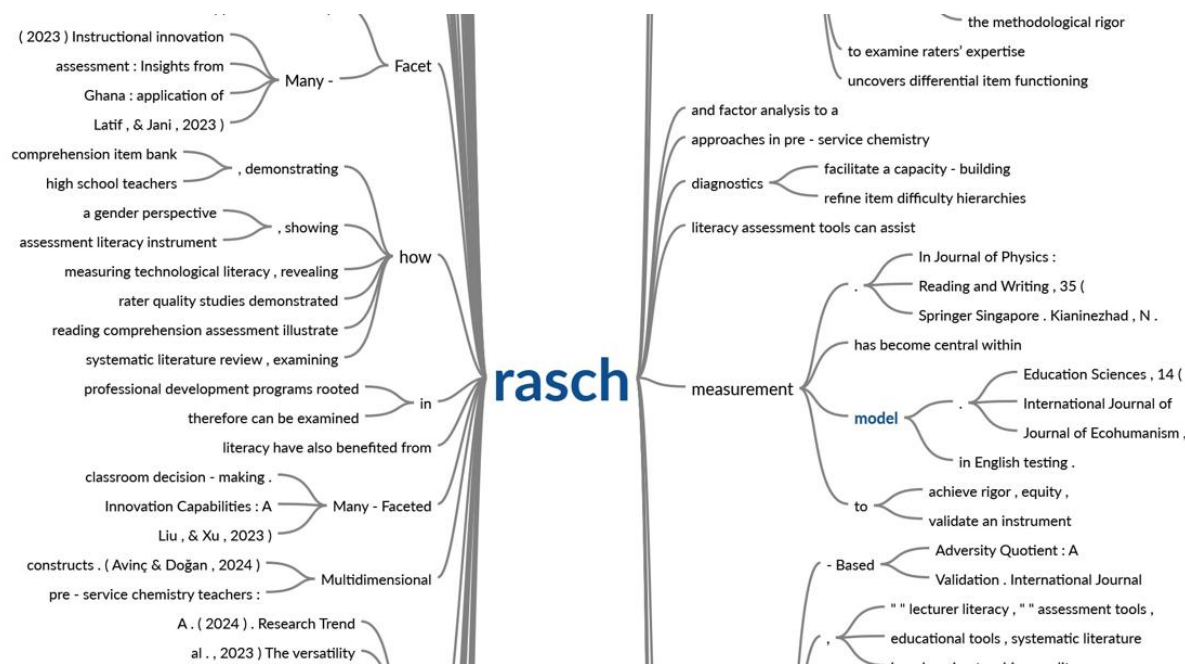


Figure 2: Rasch model tree diagram

Rasch analysis has been used not only for traditional literacy but also for technological and digital literacy. Jumini et al. (2024) examined items to assess technological literacy and demonstrated how Rasch diagnostics hone item difficulty hierarchies and ensure construct coherence. (Jumini et al., 2024) Avinç and Doğan (2024) carried out a digital literacy scale through Rasch analysis, finding multidimensionality and invariance testing necessary for equitable assessment among varying learner populations. (Avinç & Doğan, 2024) Wigati, Faisal and Astuti (2022) extended this work by investigating gender differences in teachers' digital literacy and by demonstrating how Rasch analysis identifies differential item functioning and enables equity-focused interventions. (Wigati, Faisal, & Astuti, 2022) Rasch-based validations have further benefited pedagogical and classroom assessment literacy. Rahmi, Susongko, and Suriswo (2025) created and validated a pedagogical literacy instrument for junior high school teachers, showing Rasch analysis to ensure construct validity and diagnostic utility. The findings of Khalid, Yusof, Latif, and Jani (2023) explored the psychometric characteristics of a classroom assessment literacy tool and illustrated how Rasch modeling supports reliability and fairness in teacher assessment practices. (Khalid, Yusof, Latif, & Jani, 2023)

Rasch Analysis: Rasch analysis has also been used to examine specialized literacies such as energy literacy, genetics literacy, and science literacy. Yusup (2021) created and validated an instrument for energy literacy in future physics teachers to show how item calibration supports instructional



sequencing. (Yusup, 2021) Fauzi et al. (2021) applied Rasch and factor analysis to a COVID-19 genetics literacy instrument, demonstrating how psychometric rigor underlies public health education. (Fauzi et al., 2021) Andaresta et al. (2023) created science literacy assessments using Rasch modeling, demonstrating how item maps inform curriculum design and resource allocation. (Andaresta et al., 2023) Rasch analysis has wide applicability also to ICT-literacy and teacher competence. Jizat and Elmy (2024) focused on iterative validation and expert review for ICT-literacy assessment tools for trainee teachers. (Jizat & Elmy, 2024) Ismail et al. (2025), using Rasch analysis, confirmed a TPACK instrument for science teachers to measure technology-integrated pedagogy using a reliable instrument. (Ismail et al., 2025)

Rasch analysis has been used in higher education in research literacy and teaching quality. Yusof et al. (2019) assessed postgraduate students' research literacy with the aid of Rasch modeling, providing evidence of construct validity and diagnostic feedback. (Yusof et al., 2019) Noben et al. (2021) used Rasch modeling to assess university teachers' teaching quality by demonstrating how item calibration and person-item maps increase teaching evaluation credibility. (Noben et al., 2021) Together, these studies illustrate that Rasch analysis is more than a statistical tool but a methodological framework that turns educational assessment into a developmental, diagnostic, and equitable enterprise. (Khine, 2020) Rasch analysis thus positions educational assessment as a strategic tool for instructional improvement and policy innovation by establishing construct validity, fairness, and interpretability across domains like reading, digital literacy, pedagogical competence, and scientific inquiry. (Yan & Pastore, 2022).

Key Factors in Lecturers' Literacy and Professional Development

Lecturers' literacy and professional development are influenced by numerous interrelated factors that extend beyond subject knowledge to cover assessment literacy, digital competencies, pedagogical innovation, and professional identity. (Weideman, 2019) It has been shown that these factors are best characterized using psychometric validation frameworks such as Rasch analysis, which can offer strong support for construct validity and fairness in educational measurement. (He, Liu, Zheng, & Jia, 2016)

Professional Identity and Assessment Literacy

Professional identity is a significant aspect of the development of lecturers, and influences the ways in which they think about their roles and responsibilities in lecturing and assessment. (Alqarni & Ismail, 2021) Assessment literacy, defined as the ability to design, interpret, and apply assessment results effectively, is at the core of this identity. (DeLuca, LaPointe-McEwan & Luhanga, 2016) There is evidence that lecturers with high levels of assessment literacy are more effective in their teaching and have more reflective practices in the classroom. (Ashraf & Zolfaghari, 2018) However, gaps in assessment literacy say, an ineffective grasp of validity or fairness—can harm instructional standards and student outcomes. (Rad, 2019).

Domain-Specific Literacies Lecturers'

literacy further develops through specialised areas like energy literacy, scientific literacy, and mathematical literacy. (Yusup, Setiawan, Rustaman, & Kaniawati, 2017) Based on Rasch's research, the incorporation of disciplinary literacies in lecturers' teaching enhances students' deeper conceptual understanding. (Pongsophon & Jituaflua, 2021) For instance, the correlation between mathematical literacy and digital literacy among pre-service mathematics teachers shows that lecturers must reconcile cognitive and technological proficiency in order to equip students for complex problems. (Buyung, Rosmaiyadi, Marhayani, Nirawati, Triani, & Soeharto, 2025).

Digital and AI Competencies

The importance of digital literacy and AI competencies is being recognized as a necessity for lecturers in the post-pandemic educational situation. (Ng, Leung, Su, Ng, & Chu, 2023) Instruments for teacher digital literacy screening identify gaps in lecturers' readiness to integrate technology effectively into pedagogy. (Nguyen & Habók, 2024) Likewise, AI literacy models imply that lecturers must acquire algorithmic thinking, ethical awareness, and cross-disciplinary applications. (Southworth et al., 2023)

These competencies aren't just skillset exercises for academic professionals but a way of adding to one's broader professional development which helps to mould them to the evolving educational landscape. (Voogt & McKenney, 2017).

Instructional Innovation and Rater Competence

Instructional Innovation and Rater Competence

Lecturers' professional growth is also tied to their capacity for instructional innovation and fair assessment practices. (Liu, Sun, Liu, & Xu, 2023) Many-Faceted Rasch Models have been used to evaluate lecturers' innovation capabilities, accounting for rater severity and task difficulty, thereby ensuring reliable measures of pedagogical creativity. (Polat, 2020) Such approaches highlight that lecturers' literacy is not limited to knowledge acquisition but extends to the ability to design, evaluate, and refine instructional strategies. (Mellati & Khademi, 2018).

Resilience and Adversity Quotient

Resilience also takes a place in professional development, especially in moments of educational reform and student diversity. (Syahri, Dinawisda & Fachmi, 2022) They show how the ability of lecturers to literacy is also linked to their ability to address challenges and adjust to change while continuing teaching successfully. (Sunni et al., 2024) This resilience is a primary mechanism to maintain long-term professional development and standards of professional performance in teaching. A comprehensive review of the academic literature highlights that there exists a multidimensional nature to lecturers' literacy and professional development, particularly within assessment literacy, disciplinary literacies, digital and AI competencies, instructional innovation, and resilience. (Kalajahi & Abdullah, 2016) Rasch analysis enables methodological rigour to validate these constructs; which ensures that professional development initiatives are evidence-based and responsive to lecturers' actual needs. (He et al., 2016) It is for these reasons that future directions toward an integrated framework will involve a combination of psychometric validation and professional identity development, placing lecturers as reflective, innovative yet digitally competent participants and agents of educational shifts. (Ng et al., 2023).

2.4 Global perspectives on literacy assessment tools for lecturers

A few perspectives across the world on literacy assessment tools for lecturers are built around three constructs: conceptual models of assessment literacy, tech driven competencies and context-dependent implementation across systems and cultures. Three-dimensional teacher assessment literacy where teacher assessment literacy (Pastore & Andrade, 2019) sits within this three-dimensional view as knowledge, practice, ethics that have to be instrumented to facilitate not only the measurement of technical skill but reflective judgment and equitable use of evidence. (Pastore & Andrade, 2019) Findings are consistent across various studies, indicating relatively inconsistent preparedness, with distinct pockets of language assessment literacy in some countries and persistent gaps in others from systematic reviews, and imply the need for tools for flexibility and scalability with cultural relevancy. (Pastore, 2023) Digital transformation has shifted the landscape of evaluation from 'digital literacy' to 'digital competence', expanding assessment goals beyond using tools to encompass pedagogy, safety, and ethics. AI literacy creates algorithmic thinking, data consciousness and ethical judgement, which in turn has generated calls for assessment paradigms that consider classroom enactment as well as conceptual understanding. (Falloon, 2020)(Ng, Leung, Chu, & Qiao, 2021) New research in higher education is devoted to AI based feedback and analytics; however, a consensus that instruments need to prioritise transparency and bias mitigation in order to be trusted is emphasized. (Amin, 2023).

Language and writing assessment literacy reflects regional differences in policy and professional learning. (Lam, 2015) This shows that structured training in Hong Kong fortifies teachers in mastery of validity, reliability, and task design (Lam, 2015), however, professional development tailored for them may improve assessment literacy at scale. (Lam, 2015) Surveys of second language writing teachers point to an ambivalence between beliefs and practices which cannot be completely reconciled, and consequently tools should be designed to identify not only questions on knowledge gaps, but barriers to resource usage in practical classrooms. (Crusan, Plakans & Gebril, 2016) Evidence in the early years suggests a language and literacy targeted professional development model is effective with high-impact

results for educators and children through the embedding of assessment design, data use and coaching into the programs. (Markussen Brown et al., 2017) Embedded assessment guides in the classroom — which are integrated with intervention playbooks — support teachers to translate evidence to practice and instruction, and whether use of these can occur has to do with institutional support and realities of workload. (DeVries, 2023) In the region, the preparedness for technology mediated assessment is contingent on infrastructure, policy, and administrative burden. (Adams, Sumintono, Mohamed, & Noor, 2018) Gamified methodologies have also been effective in generating engagement and its value rests on the strong link to learning outcomes and rigorous evidence from a valid methodology. (Ab Rahman, Ahmad & Hashim, 2018) The TVET systems are also being challenged—industry, finances, and new online pedagogies make practical, outcome oriented assessment tools necessary tools for the day-to-day decisions of lecturers. (Azmi & Salleh, 2021) Pandemic era studies highlight challenges in quality of online assessments that reveal the need for lecturer friendly tools that provide balance between quality and feasibly implemented learning practices. (Kadhila & Nyambe, 2021).

Literature from the professional development spaces is a clear demonstration of assessment literacy as being associated with higher level learner performance and cohesive curricula. (Mellati & Khademi, 2018) Reviews suggest that lecturers benefit from communities of practice and institutionally based processes that institutionalize iterative assessment development, peer monitoring, and data-informed education. (Giraldo, 2021) Outcome-based education structures, assessment models of learning and collaboration need to be implemented with tools to measure process, product, and participation, not just assessment at a summative interval, reflecting a feedback rich process-based feedback loop learning model. (Asim et al., 2021) In practice, it is the contextual affordances and constraints of culture, governance, and resource allocation that frame whether lecturers are able to access and maintain these tools. (De Courcy, 2021). Together, these global perspectives support multi-layered assessment ecosystems: validated instruments focused on core literacies, the expansion of measures assessing individuals for digital and AI proficiency, and enablers of implementers that understand local barriers without sacrificing psychometric integrity. (Falloon, 2020) The most hopeful route lies in pairing standards-aligned training, ethically-grounded tech use, and organizational scaffolds that allow lecturers to attempt assessment design slowly, while taking the administrative workload off their shoulders. (Herd & Moynihan, 2019).

2.5 Gaps in current research and emerging trends in lecturer literacy assessment

Previous work on lecturer literacy assessment has found significant relationships between assessment literacy and student achievement, but these studies are small scale, discipline specific, and focused on short term outcomes rather than longitudinal professional growth. The degree to which assessment literacy contributes to sustained changes in teaching practice in multiple institutional contexts is also limited (Race, 2019), leaving a divide between demonstrated classroom gains and system level impact. (Mellati & Khademi, 2018) This research tends to privilege cognitive measures and neglects the affective, ethical, and workload factors affecting lecturers' use of a range of assessment tools. (Popham, 2018).

A second gap focuses on the acceptance of technology as well as the readiness of lecturers to use emerging tools wearables, analytics, and AI within the assessment cycles — a reality for which studies of adoption tend to focus more on students or general users but less so on specific lecturers' needs and constraints. (Mohamad Taib, 2021) There is uneven alignment of assessment instruments with established industry-defined competencies within TVET and professional programs, which require further empirical work on how lecturers design authentic tasks to ensure programme learning. (Mustapha & Hussain, 2022) While such case studies suggest promising methods, few will offer proven and replicable frameworks for scaling across institutions. (Naqvi et al., 2019) Reforms at the policy and system level introduce administrative requirements that both elevate and challenge lecturers; unfortunately, the literature seldom assesses the mechanisms by which audit standards, funding models, and reporting cycles shape quality assessment and lecturer agency. (Razalli et al., 2023) SDG-focused measures and the Twelfth Malaysia Plan in Malaysia's polytechnic sector are placed in the spotlight on

sustainable practices and employability, but research often characterises action plans rather than testing assessment instruments for validity and fairness. (Nalathambi et al., 2023) And the gaps are similar across TVET governance and implementation analyses suggesting how far ahead research evidence remains in terms of lecturer level capability building and tool usability. (Ridzuan & binti Abd Rahman, 2022).

Outcome based education (OBE) has been widely touted; however, operationalisation of OBE into lecturer friendly, course embedded assessment frameworks is patchy with limited research on reliability, training of raters, and feedback loops at scale. (Rao, 2020) Comprehensive course embedded assessment systems suggest they are feasible, yet replication studies across disciplines and institutions are limited, limiting generalizability. Evidence from nursing and engineering indicates competency gains under OBE, though studies often lack robust psychometric validation of instruments and clear guidance for lecturer workload management. (Tan et al., 2018) Equity and at-risk learner components are under-reported in the lecturer assessment literature, in which there is also a relative lack of research linking assessment literacy to targeted support for underachieving student teachers and contextualised barriers, as in the case of resource poor environments. (Nwosu, Okoyoe, & Onah, 2018) Analysis of efficiency in an educational system reveals environmental and dropout reasons, yet seldom is it integrated into lecturer assessment strategies that tackle classroom inequities. (Yahia, Essid, & Rebai, 2018) In religious and values based education, evaluation challenges remain in regard to affective outcomes that have lecturers in need of validated instruments and clear interpretive approaches to construct them. (Saraya et al., 2023).

AI enabled mapping of course learning outcomes to program learning outcomes will benefit lecturers by expediting alignment and readiness for audit, although work is still needed to overcome issues of transparency, bias, and interpretability to drive the adoption process. Reforms in technical curricula based on OBE principles appear more promising in integrating micro credentials and authentic tasks, indicating a pathway for lecturer led innovation if clear rubrics and iterative feedback are incorporated. Online self and peer assessment is developing as evidence for lecturer assessment and student metacognition skills; however, research should venture beyond pilot settings to investigate its reliability, rater calibration, and cultural fit. (Seifert & Feliks, 2019) For TVET alignment, strategies that co design assessments with industry partners plus integration of performance analytics may bolster relevance; however rigorous validation and professional learning for lecturers will remain necessary for credible implementation. (Raschwahungu, Wawire, & Kirimi, 2023) Scholarly and institutional internationalization agendas advocate for interoperable assessment frameworks that travel across borders; though research needs to align local curricular aspirations with global standards without burdening faculty. (Suo, 2023) Lastly, dynamic capabilities scholarship indicates that lecturers and institutions require routines for sensing, seizing, and reconfiguring assessment practices—an area where empirical work is thin and practical toolkits are still emerging. (Schilke, Hu, & Helfat, 2018).

We need longitudinal, cross disciplinary validation studies; lecturer-centered technology acceptance research; equity focused assessment designs; and scalable OBE aligned toolkits with clear psychometric standards and workload safeguards. (Popham, 2018) Concluding remark: future work should integrate AI supported alignment, authentic industry linked tasks, and robust rater training into lecturer development pathways, evaluated through multi site trials that report validity, reliability, fairness, and adoption costs. (Saleem & Gouse, 2019).

METHODOLOGY

This study employs a systematic literature review (SLR) to examine existing research on literacy assessment tools for lecturers, with a focus on those utilizing a Rasch-based approach. The methodology ensures a comprehensive, transparent, and replicable process for collecting, analyzing, and synthesizing relevant literature, contributing to the understanding of literacy assessment in educational settings globally.

3.1 Justification for Systematic Literature Review (SLR)

A Systematic Literature Review (SLR) was chosen to rigorously synthesize previous research on literacy assessment tools for lecturers, particularly those employing the Rasch model. This approach allows for a comprehensive understanding of the current state of the field, identifies knowledge gaps, and analyzes the effectiveness and limitations of existing tools. By following structured criteria, the SLR mitigates bias and ensures the validity of the findings, making the review process transparent and reproducible (Yim, Lye, & Koh, 2024).

3.2 Keywords Search Codes

This study conducted a systematic literature review on literacy assessment tools for lecturers, focusing on Rasch-based approaches. Predefined keywords, such as "Rasch model," "lecturer literacy," "assessment tools," and "pedagogical literacy," were used to refine the search. Databases were assigned codes (Scopus as 1, IEEE Xplore as 7) to ensure consistency in categorization and enhance the reliability and reproducibility of the search process.

3.3 Search Strategy and Boolean Operators

The search utilized predefined keywords and Boolean operators (e.g., "AND," "OR") to refine the search for studies related to literacy assessment tools and the application of the Rasch model. Databases, including Scopus (1), ScienceDirect (2), and JSTOR (3), were used to ensure comprehensive coverage of relevant studies. Wildcard symbols were used to expand the search results, ensuring that all relevant studies were captured.

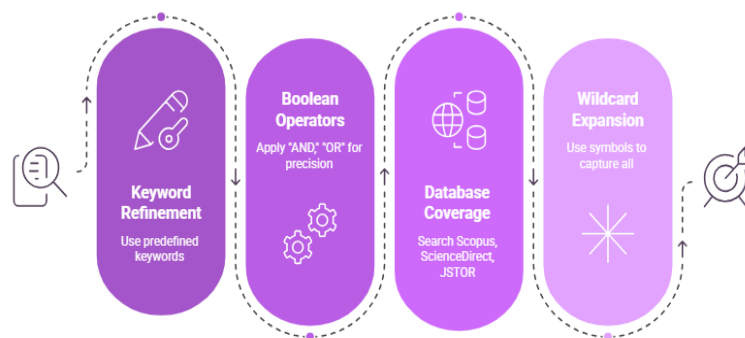


Figure 1: Refining Literacy Assessment Search

3.4 Selection Procedure

A structured search strategy was employed to ensure comprehensive coverage of studies on literacy assessment tools for lecturers, focusing on those using the Rasch model. Keywords were selected to target studies from 2015 to 2026 in high-impact databases, such as Scopus, ScienceDirect, and JSTOR. A multi-stage screening process was conducted, including title, abstract, and introduction reviews. Relevant papers were selected for full-text analysis to identify key findings and research gaps.

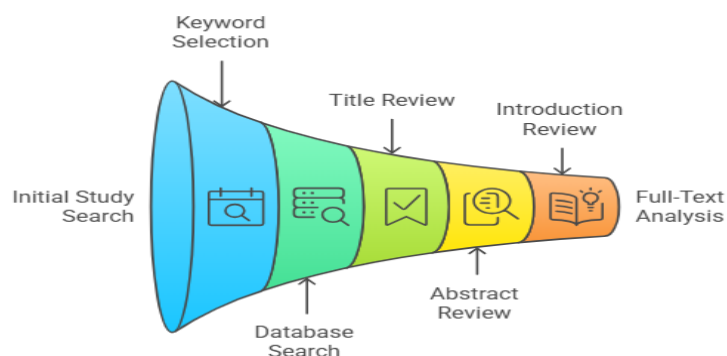


Figure 2: Literature selection procedure

3.5 Inclusion and Exclusion Criteria

Studies included in the review were peer-reviewed publications from 2015 to 2025, focusing on literacy assessment tools for lecturers using the Rasch model. Only studies published in English and indexed in reputable academic databases were included. Excluded studies were non-peer-reviewed articles, theses, or technical reports, as well as those not focused on the Rasch model or not related to lecturer literacy assessment.

3.6 Screening Process

The screening process involved several stages to ensure the systematic selection of relevant studies. This included removing duplicates, reviewing titles and abstracts, and assessing the introduction and conclusions of studies before full-text review. Independent screening by multiple researchers helped minimize bias, and the process was conducted in line with PRISMA guidelines to ensure transparency and rigor. Tools like NVivo were used to organize and streamline the process.

3.7 Data Extraction and Synthesis Approach

Data extraction involved systematically collecting key details from each selected study, including the research objectives, methodology, key findings, and limitations. The studies were analyzed using qualitative content analysis, identifying recurring themes and trends in the application of the Rasch model in literacy assessment. A narrative synthesis approach was used to summarize the key findings, gaps in research, and areas for future exploration in this field.

3.8 Limitations of the Study

The study has several limitations, including database restrictions that may exclude certain relevant studies. Additionally, the focus on English-language publications may introduce a language bias, and the rapid development of Rasch-based literacy assessment tools means that new research may emerge after the review period. Despite the comprehensive search strategy, there may still be relevant studies that were overlooked due to these constraints.

3.9 Quality Assessment

To ensure the robustness of the selected studies, a quality assessment framework was applied. Each study was evaluated based on methodological rigor, relevance, clarity, and validity. The studies were categorized into themes, such as literacy assessment, Rasch model application, and lecturer professional development. This framework ensured that the final set of studies was of high quality and relevant to the study's research questions.

3.10 Selection Results

The search across multiple databases yielded a large number of results. After removing duplicates and excluding studies that did not meet the inclusion criteria, a final set of 138 relevant studies was selected for in-depth review. These studies focused on the use of the Rasch model in literacy assessment tools for lecturers and were analyzed to identify emerging trends, research gaps, and methodological approaches.

3.11 Data Extraction and Analysis

Each selected study was evaluated based on its research objectives, methodologies, findings, and contributions to the field of literacy assessment. Key details, including study type, sample size, research methods, and findings, were organized in a spreadsheet to facilitate analysis. This structured approach allowed for a systematic review of the literature, helping to synthesize the current state of knowledge and identify areas for future research.

FINDINGS AND DISCUSSIONS

Table 1: year of publications

Year of Publication	Frequency	Percentage
2015-2020	87	63.04%
2021-2026	51	37.0%

The distribution of the year of publication shows that the majority of the papers (63.04%) were published between 2015 and 2020, while 37.07% of the papers were published from 2021 to 2026. This indicates a relatively balanced representation of more recent studies, suggesting ongoing developments in the field of literacy assessment tools for lecturers.

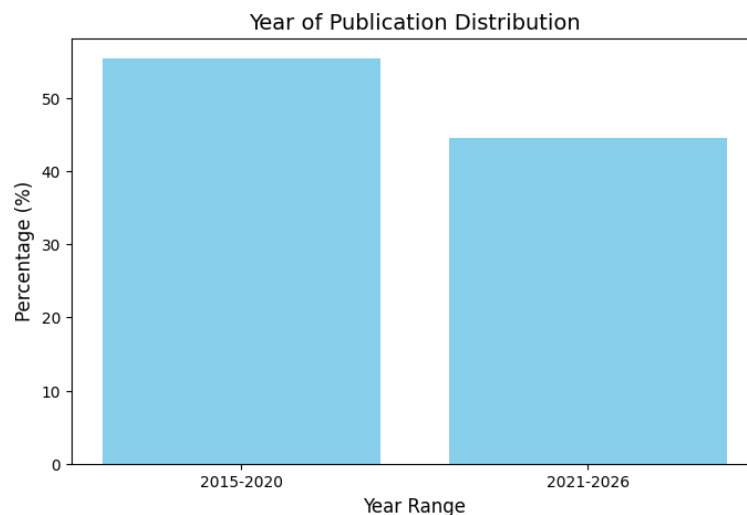


Figure 2: year of publications

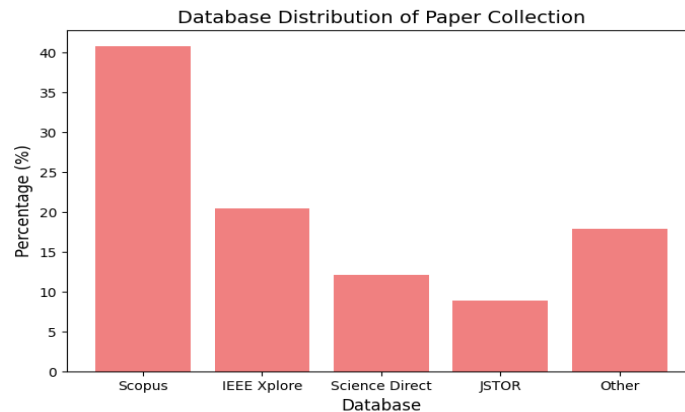


Figure 3: Data base of paper istribution

Table 3: Database of paper collection

Data base	Frequency	Paccentage (%)
Scopus	45	32.6
Ieeex xplore	32	23.2
Science direct	19	13.8
Jstore	14	10.14
Other	28	20.3

Scopus was the most frequently used database (32.6%) as to the distribution of the database. IEEE Xplore came in behind with 23.2%, and Science Direct was contributing 13.8%. Both JSTOR and other databases provided 8.92% and 17.83%, respectively. This distribution reveals Scopus as the primary source for studies into this area, supplemented in multiple other academically established databases. The study found that Rasch analysis is highly valuable in terms of validating the literacy assessment tools in broader areas, and provides the construct validity, fairness and accurate diagnoses. (Khine, 2020) Assessments of reading comprehension item banks by psychometric assessment revealed that Rasch modeling is a useful tool in identifying misfitting items, in supporting unidimensionality, and in facilitating adaptive testing for heterogeneous groups of learners. (Yim, Lye, & Koh, 2024) Likewise, the creation of reading comprehension assessment instruments supported the theory that item calibration enhances sensitivity to differences between learners and provides more interpretable score results. (Arshad & Noureen, 2020)

Additionally, literature review findings were reported by noting the increasing diversity of literacy assessment into multiple dimensions such as technology, digital and pedagogy and that studies employing Rasch analysis have significantly helped in the development of standardized instruments and identification of equity deficits. (Jumini et al., 2024) The validation of digital literacy scales revealed multidimensional structures and the need for invariance testing for fair assessment. (Avinç & Doğan, 2024) Gender studies of the teachers' digital literacy further demonstrated variation in item functioning, and also the importance of equitable instrument designing. (Wigati, Faisal, & Astuti, 2022) There was good construct validity found in the Pedagogical literacy instruments for junior high school teachers and the use of Rasch-modeling is significant in teacher professional development. (Rahmi, Susongko, & Suriswo, 2025).

Lastly, the analysis revealed that Rasch analysis has been effectively applied to specialized literacies such as energy literacy, genetics literacy, and ICT-literacy, thus widening the assessment area in education. (Yusup, 2021) Factor and Rasch analysis of the measurement tools for genetics literacy

showed also the importance of psychometric rigor for health education. (Fauzi et al., 2021) ICT-literacy measure devices validated from Rasch analysis emphasized the role of iteration and expert evaluation in tool construction. (Jizat & Elmy, 2024) In addition, the classroom assessment literacy tool, and rater quality testing have revealed how Rasch modeling can contribute to enhancing the reliability and fairness of teacher evaluation. (Khalid, Yusof, Latif, & Jani, 2023; Mohamat, Sumintono, & Abd Hamid, 2022) Taken together these findings highlight that Rasch analysis is not only a methodological tool but also a strategic device for the promotion of literacy assessment and lecturer professional development in many educational settings. (Noben, Maulana, Deinum, & Hofman, 2021).

Recommendation

The findings imply that future studies on lecturer literacy assessment need to focus on increased international cooperation, especially from regions with high research productivity and in areas of lower research presence. There will be need to develop more context-specific assessment tools for various educational settings and regions, particularly in underserved regions like Africa, South America, and some parts of Asia. Moreover, it might be interesting to explore the nexus of different literacy types (such as digital literacy, pedagogical literacy, and assessment literacy) to create comprehensive tools that represent the multifaceted roles of lecturers in the modern education setting. Finally, efforts should focus on longitudinal data to investigate the long-term effects of literacy assessments on lecturer professional development and teaching effectiveness.

Conclusion:

This paper has demonstrated the increasing importance of lecturer literacy assessment tools, particularly those using the Rasch model, in enhancing teaching quality and educational outcomes. A global review and bibliometric analysis have uncovered trends, collaborations, and regional gaps in the research landscape. While regions such as Southeast Asia and the Middle East have made significant contributions, there remains a notable need for broader international cooperation. By filling those gaps in terms of cross-border cooperation and more holistic, context-sensitive tools, we can ensure that lecturer literacy assessment can help educators effectively meet the complexities of contemporary learning and teaching environments.

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