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A Literature Review of Effects of Rubric on Student Self-Assessment and Peer Assessment in Higher Education

Wei Tian*† and Yimin Tong†

Dalian University of Technology, Dalian, China

**Corresponding author：Wei Tian*

†*These authors contributed equally to this work*

Abstract

This review synthesizes research on rubric design and implementation in higher education, tracing their evolution from summative to formative tools. Through systematic analysis of international databases and integration of recent studies, the review investigates how rubric design dimensions—including analytic versus holistic formats, point value distribution, and cultural adaptability—affect teaching, learning, and student self-assessment. Key findings show rubrics enhance transparency, reliability, self-regulated learning, evaluative judgement, and performance, especially when combined with co-creation, exemplars, or AI feedback. Nevertheless, effectiveness is moderated by contextual factors, including cultural background, nuanced design features, and linguistic accessibility. It is concluded that rubrics constitute versatile instruments whose application extends beyond individual student assessment to encompass program evaluation and inclusive curriculum design. The review identifies critical gaps, underscoring the necessity for future research to investigate cognitive processing mechanisms, develop culturally adaptive frameworks, and examine rubric integration within broader pedagogical feedback ecosystems.

Keywords

rubrics, higher education, self-assessment, peer assessment

1. Introduction

Within twenty-first-century higher education, assessment has been reconceptualized: it is no longer positioned as a terminal mechanism for measuring learning outcomes but rather as a fundamental driver of learning processes themselves. This shift from “assessment of learning” to “assessment for learning” requires instruments that not only evaluate achievement but also guide students' comprehension, self-monitoring, and reflection. It is within this transformed context that rubrics have emerged as core formative assessment tools, a development substantiated by exponential growth in rubric-related scholarship since the early 2000s [1, 2]. Fundamentally, a rubric articulates assignment expectations through criteria and quality levels [3]. However, its meaning and application have evolved considerably. Early research focused on enhancing scoring reliability, particularly in large-scale assessments [4]. More recently, attention has shifted toward

pedagogical potential—promoting self-regulated learning [5], developing evaluative judgement [6], and fostering deeper engagement [7]. This evolution reflects a broader reconceptualization of assessment's purpose.

This review systematically synthesizes research on rubric design and implementation in higher education, addressing the following core questions: (1) How are rubrics conceptualized, and what are their developmental trajectory and diverse forms? (2) What functions do rubrics serve across across “teaching” and “learning? (3) How do different rubric types differentially affect learning outcomes, including academic performance, evaluative judgement, metacognitive abilities, and motivation? (4) What gaps and controversies exist, and how might future research be deepened? Addressing these questions, this review aims to illuminate optimal rubric design and implementation for enhancing pedagogy and fostering student autonomy and evaluative judgment. To this end, systematic searches were conducted across major international databases—including Web of Science, ERIC, Google Scholar, and Scopus—using keyword combinations such as “rubrics,” “scoring rubrics,” “assessment rubrics,” “higher education,” “self-assessment,” “feedback,” and “learning outcomes.” The resulting synthesis integrates recent meta-analytic evidence, theoretical contributions to rubric design frameworks, empirical studies on student perceptions, and emerging lines of inquiry at the forefront of the field. In doing so, the review offers a systematic integration of current knowledge, providing a holistic yet nuanced representation of the state of the art in rubric scholarship.

2. Literature Review

To address the research questions outlined above, this literature review is organized as follows. Section 2.1 establishes the conceptual foundations by examining how rubrics are defined and designed, directly addressing the first research question. Section 2.2 traces the historical evolution of rubrics to contextualize their current pedagogical roles. Finally, Section 2.3 explores contemporary expansions of rubric theory and practice across multiple dimensions—including technological innovation and cross-cultural adaptation.

2.1 Development and Application of Rubrics

2.1.1 Definition and Conceptualization of Rubrics

As an assessment instrument employed across educational levels, the rubric has become an internationally recognized construct, with its theoretical underpinnings and practical applications having been systematically examined through an expanding body of scholarship over recent decades. This review adopts the definition proposed by Panadero and Romero, wherein rubrics are documents that articulate the expectations of an assignment by listing the criteria for what is particularly important and by describing levels of quality on a scale from excellent to poor. Three essential features characterize such instruments: assessment criteria, which specify the dimensions to be evaluated; a scoring strategy, which prescribes the method by which scores or grades are assigned on the basis of student performance; and quality definitions or standards, which elaborate the specific performance characteristics associated with each level, thereby rendering abstract qualitative descriptors concretely identifiable. This conceptual evolution positions rubrics as dynamic pedagogical tools, a theme explored further in relation to design.

2.1.2 A Framework for Rubric Design: Beyond the Unitary Concept

While core definitions provide conceptual clarity, rubric design exhibits substantial heterogeneity in practice. Dawson proposed a comprehensive framework comprising 14 design elements for distinguishing among different rubric types. These elements include specificity (task-specific versus generic), secrecy (whether and when rubrics are shared with students), scoring strategy (analytic versus holistic), number and type of quality levels, detail of quality descriptions, and creators (teacher-created versus teacher–student co-creation). Building on this framework, Jonsson and Panadero [8] emphasized that discussions of rubric effectiveness must distinguish whether their design serves summative or formative purposes, as this distinction fundamentally shapes both construction decisions and anticipated outcomes. More recently, attention has been directed toward the linguistic accessibility of rubrics. Beyond these practical design considerations, the conceptualization of rubrics has expanded to encompass their role in developing students' evaluative judgement. Zhu, X argued that rubrics should be understood as “pedagogical instruments for

cultivating quality literacy"—tools designed to facilitate students' capacity to recognize, articulate, and apply quality standards across diverse contexts. This conceptual expansion carries significant implications for rubric design: rather than merely describing expected performances, rubrics should be designed to provoke reflective engagement, stimulate discussion, and promote the internalization of quality criteria.

Furthermore, rubric design extends beyond format and language to include the strategic deployment of scoring elements such as point values. A recent experimental study demonstrated that the point values assigned to different concepts on a scoring rubric significantly influenced students' learning decisions: learners selected high-value concepts for study more frequently than low-value concepts and allocated slightly greater study time to high-value material [9]. This finding reveals that rubric design—specifically the distribution of point values—can serve as a powerful cue for guiding students' self-regulated learning, aligning with theoretical frameworks of value-directed remembering and agenda-based regulation. Thus, rubric design encompasses not only the articulation of criteria and levels but also the strategic weighting of components that shape learners' attentional allocation and effort expenditure.

2.2 Historical Evolution of Rubrics: From Scoring Tool to Pedagogical Instrument

2.2.1 Early Development: The Quest for Reliability

During the twentieth century, rubrics and similar tools emerged with the core objective of enhancing the reliability and validity of qualitative judgments about student performance, primarily serving summative assessment purposes. Hillegas's 1912 work, "A Scale for the Measurement of Quality in English Composition by Young People," represents one of the earliest documented attempts to increase objectivity in teachers' scoring [10]. This effort was subsequently deepened by Diederich and colleagues' 1961 study, which summarized nearly a decade of research on writing ability assessment and identified five key factors: ideas, form, flavor, mechanics, and wording—thereby laying the foundation for what Broad [11] termed the "standard, traditional five-point rubric". During this period, rubric applications remained exploratory: teachers primarily developed rubrics independently based on teaching experience and disciplinary requirements; formats were relatively simple, predominantly paper-based documents with limited usage scope, mainly confined to instructional assessment within individual schools or educational institutions.

2.2.2 The Formative Turn: From the 1970s to the Present

However, beginning in the 1970s, a significant transformation began to unfold as educational priorities shifted and the limitations of purely summative assessment became increasingly apparent. Since 1970, the term "rubric" has appeared with increasing frequency in research, with usage exhibiting exponential growth particularly from the early twenty-first century onward. This significant change is largely attributable to Popham's [12] seminal work on rubrics, which sparked broader attention to and deeper discussion of rubrics in education. Concurrently, the scope of rubric applications in educational practice expanded continuously, covering all educational levels from primary through higher education.

The conceptualization of rubric functions has undergone significant evolution during this period. Early research focus centered almost exclusively on enhancing rater reliability—ensuring that different teachers assign consistent scores to the same student work—primarily to meet the demands of large-scale assessment and high-stakes testing. However, since the early twenty-first century, with the rise of "assessment for learning" (AfL) concepts, researchers have increasingly attended to rubrics' potential for promoting student learning. Panadero and Jonsson's review explicitly noted that when rubrics are used for formative purposes, their core value lies in promoting students' self-regulated learning and metacognitive development by clarifying learning goals and success criteria. Wiggins (1998) also argued from ethical and pedagogical perspectives for using rubrics to increase assessment transparency, thereby supporting student feedback and self-regulation. This body of work collectively demonstrates rubrics' evolution from mere "scoring tools" into comprehensive pedagogical instruments connecting teaching, learning, and assessment. Jonsson and Svingby's review identified only 15 studies focusing on formative rubric use; a decade later, Brookhart [13] found 46 such studies even when limiting her search to higher education contexts alone—powerful evidence, indeed, confirming this transformation. A 2025 classroom-based action research study in an L2 writing context at the University of Balamand further substantiates this evolution, demonstrating that rubrics function as "agents of change" that transcend traditional roles as mere scoring instruments [14]. The study revealed, moreover, that rubrics play a prospective role in the writing process, fostering successful

partnerships between teachers and students in the assessment process and enabling students to take ownership of different phases of their writing.

2.3 Contemporary Expansions: New Frontiers in Rubric Theory and Practice

Beyond these foundational developments, the scope and nature of rubric application have expanded significantly in recent years. These contemporary expansions, as this section will demonstrate, can be understood across three interrelated dimensions: the broadening of application contexts, the deepening of design considerations through cultural and inclusive perspectives, and the transformation through technological integration. By exploring these frontiers, this section reveals how rubrics have evolved from simple classroom tools into versatile instruments capable of addressing complex educational challenges at multiple levels.

2.3.1 Structural Variations and Expanding Scope

The most common rubric representation, as is well known, is a table or matrix. Typically, the leftmost column lists assessment criteria, while remaining columns display different performance levels, which may be ordered from high to low or low to high quality. The first row may contain performance level labels, such as “excellent,” “good,” “satisfactory,” “needs improvement,” and, in “scoring rubrics,” may also include points awarded for each level [1]. Beyond this common format, alternative designs exist—such as concentric circle rubrics—although these remain relatively uncommon. The choice of format is often adapted to the specific assessment context; for instance, in oral assessment, a more intuitive format employing grade labels may be adopted to facilitate students' rapid comprehension of their performance levels in speaking tasks.

Furthermore, rubrics are increasingly being employed to promote educational equity and inclusive design. Xie et al. [15] modified an open-source course quality review rubric (OpenSUNY OSCQR) to incorporate inclusive design practices guided by the Universal Design for Learning (UDL) framework and the inclusive ADDIE model. Through evaluation by 74 faculty members and instructional designers, the study found that both teachers and designers shared consensus on the importance of diversity, equity, and inclusion (DEI) components in the modified rubric—a finding that suggests rubrics can serve as effective tools for fostering inclusive curriculum design in online and blended learning environments. This application extends the use of rubrics beyond assessment of student work to the design and quality assurance of courses themselves, thereby highlighting their versatility in addressing contemporary educational priorities.

2.3.2 Technology-Enhanced Rubrics: Digital Platforms and Artificial Intelligence

Complementing these expansions in scale and depth, the third dimension is perhaps the most transformative: the integration of technology into rubric design and application. Digital platforms and artificial intelligence, as this section will demonstrate, are not merely tools for administering rubrics but are fundamentally reshaping their design, functionality, and pedagogical potential. With the proliferation of digital platforms in education, rubric design and application have undergone significant changes. Digital platforms, on one hand, bring greater flexibility and diversity to rubrics by providing rich templates and tools enabling teachers to customize rubrics according to different teaching objectives and tasks. On the other hand, digital platforms make rubric use more convenient and efficient: students and teachers can access and use rubrics anytime, anywhere; platforms can automatically record and analyze assessment data, providing teachers with timely, detailed feedback to help them better understand student progress and difficulties, thereby adjusting teaching strategies. For example, in Massive Open Online Course (MOOC) environments, rubrics are key tools enabling large-scale peer assessment. Fan et al.'s research on a “Flipped Classroom Instruction” MOOC on a Chinese platform demonstrated that optimizing rubric design significantly improved the reliability and validity of peer scoring. Technology, in short, not only simplifies rubric management and application processes but also opens possibilities for data-driven personalized learning support.

The integration of artificial intelligence with rubric-based assessment represents one of the most significant recent developments in the field. Lo et al. [16] conducted an evaluation of an AI-driven feedback system built on GPT-4 Turbo, designed to provide rubric-based feedback on extended academic writing. The study analyzed 333 feedback instances generated for 37 undergraduate students and employed semi-structured interviews with 13 participants to examine their experiences with the system. The findings

revealed several noteworthy patterns. First, while the majority of AI-generated feedback was rated as accurate, over half of the feedback instances lacked concrete examples, often merely paraphrasing the wording of the rubric descriptors. Second, interview data indicated that students valued the breadth and efficiency of AI feedback but expressed a preference for also receiving instructor feedback, which they perceived as more tailored and relevant to their specific texts. Third, the study identified limitations in the AI system's capacity to provide specific, actionable guidance for revision, suggesting that current AI feedback may serve as a complement to rather than a replacement for instructor feedback. The research highlights both the potential and the current constraints of using large language models to deliver rubric-aligned feedback at scale, pointing to the need for further refinement of AI feedback systems to enhance their specificity and pedagogical value. This work, it is clear, contributes to the emerging understanding of how AI can be integrated into rubric-based assessment practices while acknowledging the continued importance of human instructor input in the feedback process.

3. Comparative Analysis of Rubric Types: Holistic Versus Analytic Rubrics

The preceding examination of rubrics' diverse forms and functions across historical and contemporary contexts has established that considerable variation exists in their design and application. A fundamental design choice that significantly shapes a rubric's pedagogical impact concerns the distinction between holistic and analytic approaches. As introduced in Section 2.1.2, this distinction is crucial for understanding their differential effects on assessment and learning. Accordingly, this section provides a focused comparative analysis of holistic and analytic rubrics, examining their respective characteristics, applications, and the empirical evidence concerning their impact on learning outcomes. This analysis directly addresses the third research question regarding the differential effects of rubric types.

3.1 Characteristics and Applications of Holistic Rubrics

Holistic rubrics, characterized by the comprehensive, overall evaluation of student work, represent one end of the design spectrum. Assessors employing holistic rubrics typically assign a single score based on their overall impression of the work relative to predefined performance standards. In specific assessment contexts—such as evaluating in-class performance, assessing group project outcomes, or conducting large-scale examinations that necessitate the rapid screening of numerous student submissions—holistic rubrics offer distinct advantages. Their primary strength lies in facilitating efficient, expedited overall evaluations, thereby enhancing the efficiency of the assessment process.

However, holistic rubrics are also associated with significant limitations. As Sadler [17] observed, when employed to evaluate complex student work, holistic rubrics present challenges related to content validity: the conflation of distinct criteria within a single score can obscure students' actual proficiency levels across different competencies. Furthermore, the connection between holistic assessment and specific instructional objectives may be insufficiently transparent, hindering students' ability to identify precise areas for improvement based on the feedback received. Research by Brookhart and Chen [18] further revealed that the feedback generated by holistic rubrics often lacks the detail and specificity necessary for students to discern their strengths and weaknesses in relation to particular knowledge or skill domains.

3.2 Characteristics and Applications of Analytic Rubrics

In contrast, analytic rubrics decompose a task or assignment into several distinct evaluation criteria, requiring each criterion to be assessed separately before an overall score is derived, typically by summing or averaging the individual criterion scores. A key advantage of this approach is its capacity to articulate clearly the specific knowledge and skills that students are expected to master and apply. For instance, the analytic rubrics developed for the “Flipped Classroom Instruction” MOOC, as studied by Fan et al., explicitly incorporated multiple knowledge points across different criteria, thereby facilitating students' self-evaluation and targeted self-improvement.

Moreover, analytic rubrics are designed to provide detailed, criterion-specific feedback. This structure assists students in accurately identifying their performance across multiple dimensions, clarifying learning goals, and making focused adjustments to their learning strategies. Jonsson, for example, demonstrated that employing analytic rubrics in professional education enhanced students' accuracy in self-assessing specific

skills. Nevertheless, poorly designed analytic rubrics can introduce problems. Fan et al. noted that an excessive number of evaluation criteria can increase the complexity of the assessment task and potentially compromise scoring validity. Furthermore, research by Taylor et al. [19] indicated that ambiguity in rubric language—specifically, a lack of clear, detailed descriptions for performance levels—can impede students' comprehension and effective use of the rubric, which may, in turn, negatively affect their learning motivation and the quality of task completion.

3.3 Differential Effects on Learning and Assessment

The selection of holistic versus analytic rubrics carries significant implications not only for the specificity of feedback provided but also for the validity of assessments derived from their use. The complexity inherent in this distinction was demonstrated in a large-scale empirical study by Ghalib et al. [20], which identified substantial discrepancies between teacher teams' expectations regarding scoring criteria and the outcomes produced by holistic scoring. For instance, while it was anticipated that criteria such as “critical thinking” would carry greater weight in assessments of upper-year students, the results indicated that criteria related to “knowledge and understanding” contributed significantly more to final scores than critical thinking did. This finding suggests that holistic rubrics may obscure implicit weighting patterns that diverge from instructional priorities, thereby posing a threat to construct validity. In contrast, analytic rubrics with explicitly defined weights were found to more accurately reflect pedagogical intentions.

Evidence from recent research supports the complementary use of both analytic and holistic rubric types. In the context of translation assessment, Handayani et al. [21] developed and validated two distinct scoring rubrics designed to guide student self- and peer assessment. Their instruments deliberately integrate analytic criteria (such as grammar, style, and vocabulary) with holistic levels of overall performance, thereby acknowledging that a combination of fine-grained analysis and global judgment can enhance the assessment process. This work illustrates how the deliberate integration of analytic and holistic elements can address the respective strengths and limitations of each format, potentially improving both reliability and pedagogical utility. Cross-cultural variation in students’ perceptions of rubrics has also been documented. Nelson et al. [22] examined the use of structured self-evaluation rubrics in an EFL classroom in Ecuador, where students came from diverse cultural backgrounds. Their findings indicated that learners perceived the rubrics as clear and fair, and that the rubrics helped them identify factors influencing their classroom participation. The study underscores the importance of embedding culturally responsive teaching and assessment principles into rubric design, thereby creating equitable learning environments that accommodate diverse cultural orientations. These findings carry important implications for international educational settings, suggesting that rubric design may need to be adapted to align with culturally shaped learning preferences and expectations.

Despite growing interest in the comparative effectiveness of holistic and analytic rubrics, empirical research in this area remains limited. Earlier work by Jonsson and Svingby proposed that holistic rubrics are better suited to large-scale assessments, whereas analytic rubrics are more effective for identifying individual students' strengths and areas for improvement in classroom contexts. In a study focused on physics education, Kocakülah [23] examined the use of both rubric types in assessing students' problem-solving abilities related to Newton's laws of motion, concluding that analytic rubrics offered advantages in delivering detailed feedback and supporting instructional remediation. A meta-analysis by Panadero et al. confirmed that both rubric types positively influence academic achievement; however, their effects on self-regulated learning and self-efficacy were found to differ. These findings collectively underscore the need for continued investigation into how rubric design influences learning outcomes and the accuracy of peer assessments.

4. The Educational Functions of Rubrics in Higher Education

4.1 Enhancing Assessment Reliability and Transparency

As standardized scoring instruments, rubrics serve as a foundational tool for enhancing the quality of assessment. They provide assessors with a unified framework comprising explicit criteria and descriptive quality levels, thereby facilitating consistent evaluation of student performance. This structured approach mitigates subjective scoring variations and improves both scoring consistency and inter-rater reliability [2,

21]. Recent meta-analytic research offers robust statistical support for the reliability of rubrics. In a comprehensive meta-analysis encompassing 21 studies, Panadero et al. identified a moderate positive effect of rubric use on student academic performance (effect size g = 0.45), an effect that remained stable even after accounting for potential publication bias. This finding provides macro-level evidence that rubrics effectively enhance scoring accuracy—that is, they enable scores to more authentically reflect student abilities.

Within higher education contexts, Hafner and Hafner [24] demonstrated that in an undergraduate evolutionary biology course where rubrics were employed for peer assessment, a high degree of consistency was observed between teacher-assigned and student-assigned scores, indicating that rubrics contributed to improved scoring reliability. Similarly, in their assessment of student oral presentations, Dunbar et al. [25] applied rubrics and analyzed the results using Ebel coefficients; inter-rater reliability was found to be as high as 0.96, suggesting that rubrics enhanced the consistency of assessors' interpretations and judgments. From the student perspective, qualitative research also revealed that students perceived rubric transparency in two primary dimensions: first, in clarifying assignment expectations and requirements, and second, in rendering the scoring process more objective and ostensibly fair. However, the study also noted that this perceived transparency is contingent upon the clarity of rubric language and the adequacy of teachers' explanations. Ambiguous rubric language—for instance, where distinctions between descriptors such as “excellent” and “good” are difficult to discern—was found to increase student confusion and erode trust in the fairness of scoring. Consequently, the quality of rubric design directly influences its utility as a tool for promoting transparency. Research by Diab and Balaa [26] further corroborated that when students participate in the development of rubrics and have a voice in determining grade distributions, their recognition of scoring fairness is significantly heightened.

Recent advancements in methodological approaches, particularly the use of eye-tracking and think-aloud protocols, have yielded unprecedented insights into how students process rubric information. A 2025 randomized controlled trial involving 80 undergraduate students, who were assigned to four feedback conditions (no feedback, process-oriented feedback, product-oriented feedback, and rubric-only feedback), analyzed two variables: the order in which performance levels were presented (excellence level first versus last) and the type of feedback provided [27]. Key findings from this study indicated that: (a) students predominantly focused their attention on the highest performance level, particularly when this level was listed first; (b) visual attention directed toward the highest performance level (PL4) significantly predicted task performance, whereas linguistic attention did not; (c) rubric-only feedback increased the frequency with which students visually switched between rubrics and tasks, indicative of more strategic rubric use; and (d) process-oriented feedback yielded the most substantial improvements in performance. This study represents a significant departure from traditional questionnaire-based methodologies, elucidating how nuanced rubric design features—such as level order—and variations in feedback types influence learning outcomes by shaping students' cognitive processing patterns.

4.2 Promoting Student Learning and Development

Rubrics exert a significant influence on learning outcomes across multiple dimensions, with the meta-analysis conducted by Panadero et al. providing the most comprehensive quantitative synthesis available to date. This section synthesizes the evidence concerning the effects of rubrics on key learning outcomes.

4.2.1 Fostering Self-Regulated Learning and Metacognition

Rubrics promote students' self-regulated learning by providing a clear goal framework that contains detailed criteria, thereby enabling students to establish appropriate learning objectives. Throughout the learning process, students can refer to rubrics to monitor their progress, identify gaps between current performance and desired goals, and adjust their learning strategies to facilitate continuous improvement. Meta-analytic findings indicate that rubrics have a small positive effect on self-regulated learning; although modest, this effect remains meaningful. Research by Fraile et al. [28] further elucidated that this effect may manifest in deeper cognitive processes. Through the use of think-aloud protocols, they discovered that while self-report questionnaires failed to capture significant differences, students who participated in co-creating rubrics exhibited more frequent self-regulation-related thinking during task execution—for example, comparing their performance with expert models and identifying both successes and errors. This finding

suggests that rubrics, and particularly the co-creation process, may subtly optimize students' learning strategies, often without their conscious awareness. Similarly, Jonsson's research found that in professional education contexts, students used rubrics to plan, monitor, and evaluate their task performance, thereby directly supporting their self-regulated learning.

A experimental study provided direct evidence of how rubrics guide self-regulated learning through the strategic assignment of point values. In this study, participants learned about five concepts related to mineral formation under three rubric conditions: varying point values (12, 8, or 4 points assigned to different concepts), uniform point values (all concepts worth 8 points), or no point value information. The results demonstrated that learners selected high-value concepts for study significantly more often than low-value concepts and allocated slightly more study time to high-value material. These findings align with theories of value-directed remembering and agenda-based regulation, demonstrating that rubrics not only communicate what constitutes quality but also actively shape learners' decisions about what to study and for how long—a form of metacognitive guidance that underpins effective self-regulated learning. Building on this understanding of rubrics' role in supporting self-regulation, researchers have recently developed specialized rubrics designed to measure self-regulated learning processes themselves. Radovic and Seidel [29] introduced the SRL-S Rubric, a theory-driven instrument for evaluating the extent to which innovative higher education technologies support students' self-regulated learning. Grounded in Zimmerman's cyclical model of SRL (comprising forethought, performance, and self-reflection phases), this rubric defines three performance levels (limited, moderate, and advanced) across multiple criteria and demonstrates high inter-rater reliability, rendering it a robust tool for both researchers and practitioners to assess and enhance SRL support in technology-enhanced learning environments. This development constitutes a significant methodological advance, enabling systematic evaluation of how well learning environments—including those that incorporate rubrics—foster students' self-regulatory capabilities.

Research also indicates that metacognition is considered an important outcome of rubric-based self-assessment. Rubrics enable students to self-assess against established criteria, prompting reflection on and evaluation of their own learning. Panadero et al. found that university students using rubrics for peer assessment were able to view their work more objectively and adjust their learning strategies, thereby improving self-regulation. In education courses, research by Andrade and Du [30] showed that students using rubrics performed better in planning tasks, monitoring progress, and reflecting on and improving based on assessment results, thereby demonstrating the role of rubrics in cultivating autonomous learning abilities. When students use rubrics for learning and evaluation, their abilities to understand task requirements, plan learning processes, and reflect on learning outcomes are enhanced, which in turn promotes the development of cognitive and metacognitive skills. The recent development of the SRL-S Rubric and the learning analytics rubric for SRL provides tools for more precisely measuring these metacognitive outcomes, enabling researchers to capture not only students' self-reported perceptions but also their actual self-regulatory behaviors as reflected in learning management system data. De Barba [31] developed and validated a learning analytics rubric that maps validated SRL scales to learning management system (LMS) indicators, thereby enabling scalable, consistent, and interpretable measurement of students' SRL processes. Their study found that five of seven indicators accurately reflected students' SRL skills—specifically, reviewing content, integrating multiple sources of information, following a study plan, pacing learning, and reading assessment instructions—and demonstrated high agreement between student self-assessments and system-generated scores. This innovative approach opens new possibilities for unobtrusive, continuous assessment of how rubrics and other instructional tools support SRL over time.

4.2.2 Cultivating Evaluative Judgement

The development of evaluative judgement—defined as the capability to make decisions about the quality of one's own and others' work—has emerged as a key outcome of rubric-based assessment. This concept has gained prominence as higher education institutions recognize that graduates require not only disciplinary knowledge but also the ability to monitor and improve their own performance throughout their professional lives. Rubrics provide transparent and clearly articulated assessment criteria, thereby establishing a solid and reliable foundation for student self-assessment and peer assessment—both of which are central to the development of evaluative judgement. Research by Andrade and Du demonstrated that when approaching assignments, students treated rubrics as essential tools, analogous to maps, using them to carefully plan their work processes. This finding clearly illustrates that rubrics help students clarify the direction of learning

activities, enabling them to execute tasks systematically. A study by Reynolds-Keefer [32] further confirmed this, revealing that students consistently relied on rubrics as important references throughout the assignment process and progressed according to the guidance provided by the rubric. The transparency afforded by rubrics enables students to thoroughly understand assessment expectations and requirements, thereby further motivating their active participation in self-assessment and peer assessment activities.

Involving students in the creation of rubrics—a process known as co-creation—promotes deeper understanding and internalization of assessment criteria. Research by Fraile et al. found that, compared with students who merely used teacher-provided rubrics, those who participated in rubric co-creation demonstrated higher levels of self-regulation strategies in think-aloud protocols and had fewer questions about rubric criteria, indicating better internalization of assessment standards. The co-creation process itself thus becomes a metacognitive activity, compelling students to consider "what constitutes high-quality work" and thereby enhancing their self-assessment capabilities. Kocakülah's research also showed that involving students in rubric construction and application not only improved their problem-solving abilities but also enabled them to conduct peer assessments with accuracy comparable to that of teachers. A study examining rubric use in peer evaluation of oral presentations among first-year dental students (N=86) compared scoring differences and perceptions between experienced students (ES) and non-experienced students (NES) [33]. Key findings included: (a) no significant differences between ES and NES scores, indicating that newly designed rubrics are user-friendly for first-time users; (b) teacher scores were, however, significantly lower than student scores, suggesting systematic leniency in student scoring; and (c) both student groups perceived the rubric as complete, easy to use, and useful, and reported that it helped enhance their confidence in assessment and performance. This study reveals the potential of rubrics to promote fairness in peer assessment—as evidenced by the absence of experience-related differences—while also highlighting the persistent issue of discrepancies between student and teacher scoring.

A systematic review by Zhou and Li, synthesizing evidence from 42 studies, revealed that rubrics promote evaluative judgement through three mechanisms: (a) explicit quality standards—rubrics make visible the otherwise tacit criteria that experts use to judge quality, thereby providing students with a vocabulary and framework for discussing quality; (b) shared reference framework—rubrics create a common language that enables productive discussions about quality among students, peers, and teachers; and (c) feedback scaffolding—rubrics support feedback cycles by helping students interpret feedback, identify gaps between current and desired performance, and plan improvement strategies. However, the review also found that simply providing rubrics is insufficient; the development of evaluative judgement requires active student engagement with rubrics through activities such as interpreting criteria, discussing exemplars, applying rubrics to peer work, and reflecting on feedback. They subsequently proposed a framework for evaluative judgement-oriented rubric design, emphasizing that rubrics should be designed to provoke reflection and discussion rather than merely to communicate expectations. In the context of large-scale MOOC peer assessment, rubrics play a particularly critical role. Research by Fan et al. demonstrated that well-designed rubrics, particularly analytic rubrics incorporating detailed level descriptions or true-false judgment formats, significantly improved the reliability and validity of student scoring, bringing it closer to that of teacher scoring. This finding underscores the irreplaceability of rubrics in guiding non-expert assessors—namely, students—to conduct accurate and reliable evaluations.

4.2.3 Improving Academic Performance and Deep Learning

Rubrics have been shown to positively impact both academic achievement and deep learning. In their meta-analysis, Panadero et al. found that rubric use has a moderate positive effect on academic performance ($g = 0.45$). This effect remained robust after controlling for factors such as research design, student age, and gender. Notably, an interaction effect was observed between intervention duration and effect size: for younger students (K-12), longer interventions were necessary to demonstrate significant effects, whereas for higher education students, even short-term interventions often produced positive impacts. This finding aligns with Jonsson's observation that, in higher education, simply providing students with rubrics and exemplars can significantly improve their performance on complex tasks. Within specific disciplines, Greenberg [34] found that students using rubrics demonstrated enhanced scientific writing skills. Similarly, Diab and Balaa applied analytic rubrics in English critical writing instruction and observed that students improved their writing based on dimensional criteria, achieving significant score improvements. The AI-enhanced rubric study also conducted provided further evidence of rubrics' impact on deep learning, demonstrating that

students receiving AI-plus-rubric feedback engaged in more frequent deep revision strategies and produced higher-quality writing. The combination of AI feedback and rubrics appears to scaffold the cognitive processes underlying deep learning by helping students understand how abstract criteria apply to their specific work and by providing personalized guidance for improvement. This synergy between technological innovation and pedagogical design suggests promising directions for future rubric-based interventions aimed at fostering deep learning outcomes.

4.2.4 Influencing Motivation and Self-Efficacy

Student learning motivation and self-efficacy have been shown to be positively influenced by the use of rubrics. Taylor et al. demonstrated that the explicit communication of rubric criteria facilitates students' task comprehension, thereby enhancing their confidence and promoting autonomous learning engagement. Similarly, Reddy and Andrade [35] found that rubrics contribute to improvements in learners' self-efficacy, albeit to a limited extent. Despite this positive trend, the overall effect remains modest (effect size $g = 0.18$) and inconsistent across studies. In a recent meta-analysis, Panadero et al. observed that while transparent assessment criteria are theoretically expected to bolster student confidence, the existing empirical evidence is insufficient to draw definitive conclusions. One potential explanation is that self-efficacy is shaped by multiple interacting variables, including feedback quality and prior academic experiences. Moreover, Andrade et al. (2009) [36] identified gender-based differences in the motivational impact of rubrics, with more pronounced effects observed among female students. This finding underscores the necessity for future research to examine individual differences in greater depth.

5. Conclusion and Future Directions

5.1 Summary of Key Findings

This review confirms that, when thoughtfully designed, rubrics function as multifaceted instruments that extend beyond their original purpose of ensuring scoring reliability. The synthesis of extant literature demonstrates their positive impact in three primary areas: (1) fostering self-regulated learning and metacognitive skills, (2) cultivating evaluative judgement, particularly through processes of co-creation and peer assessment, and (3) enhancing academic performance, especially when integrated with complementary pedagogical interventions such as AI-generated feedback. Comparative analysis reveals that while analytic rubrics generally provide richer formative feedback, the selection between holistic and analytic formats should be determined contextually, with careful consideration of assessment objectives and cultural factors. Furthermore, the scope of rubric applications has expanded considerably from individual student assessment to encompass program evaluation, course design quality assurance, and institutional assessment of contributions to global initiatives, thereby demonstrating the versatility and broad applicability of rubrics within contemporary educational contexts.

5.2 Limitations and Future Research Directions

Despite significant progress, several critical gaps remain. To advance the field, future research should be oriented around three interconnected lines of inquiry. First, a more granular understanding of design mechanisms and their cognitive impact is required. Existing research frequently treats the “rubric” as a monolithic variable, obscuring the specific effects of its constituent design elements [1]. Future investigations should therefore employ rigorously controlled experiments that systematically manipulate features such as point value distribution, level order, and linguistic complexity. Such studies are essential to isolate the specific effects of these elements on learning processes. This endeavor should be complemented by process-oriented methodologies—including eye-tracking, think-aloud protocols, and learning analytics—to examine how students cognitively engage with and internalize criteria, moving beyond self-reported data to capture micro-level usage processes.

Second, the integration of rubrics within broader pedagogical and cultural ecosystems warrants further exploration. The interaction between rubrics and other feedback forms (e.g., teacher feedback, peer assessment, exemplars, and AI-generated feedback) remains underexplored; future research should employ longitudinal and mixed-methods designs to examine their synergistic effects. Concurrently, the cultural dimensions of rubric design and use demand systematic investigation. Given preliminary evidence of

significant cross-cultural variation, future studies should examine how cultural factors (e.g., power distance, individualism-collectivism) moderate the effectiveness of specific design features and implementation strategies, with the goal of developing culturally adaptive frameworks. Third, longitudinal and inclusive outcome studies are needed to establish the long-term and equitable impact of rubric-based practices. A significant gap exists in longitudinal research tracking students' development over time. Future studies should trace the developmental trajectories of autonomous learning, evaluative judgement, and self-assessment accuracy throughout students' academic careers, potentially utilizing unobtrusive methods such as learning analytics rubrics. Furthermore, research should explicitly explore how rubric design and implementation can be optimized to promote inclusive and equitable education. This includes investigating methods to reduce achievement gaps, support diverse learners (including second language learners), embed principles of Universal Design for Learning, and address issues of cultural relevance and linguistic accessibility to ensure rubrics serve as tools for equity rather than barriers to understanding.

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