



## Enhancing the Quality of Competency Assessment for Elementary School Students in Modern Education



Tran Nguyen Lam <sup>a</sup>

---

### Article history:

**Submitted:** 05 March 2024

**Revised:** 27 April 2024

**Accepted:** 04 May 2024

---

### Keywords:

*competency assessment;*

*elementary education;*

*modern pedagogy;*

*educational administration;*

*student development;*

---

### Abstract

The paper aims to explore strategies to enhance the quality of competency assessment for elementary school students in the context of modern education. Through a comprehensive study conducted from February 2022 to January 2024 in Hai Phong City, data were collected from 112 educational administrators and 564 teaching professionals. The research employed a mixed-methods approach, combining surveys and interviews to gather insights into current assessment practices and challenges. Findings underscored the critical role of competency assessments in facilitating student development. They revealed a need for tailored assessment methods aligned with contemporary educational standards and student-centered approaches. Additionally, the study highlighted the importance of continuous professional development for educators to improve their assessment literacy and competency evaluation skills. Overall, the research suggests that implementing targeted strategies can lead to more accurate and holistic assessment practices, ultimately fostering student growth and development in elementary education.

*International research journal of management, IT and social sciences* © 2024.

*This is an open access article under the CC BY-NC-ND license*

*(<https://creativecommons.org/licenses/by-nc-nd/4.0/>).*

---

### Corresponding author:

Tran Nguyen Lam,

Nguyen Thuong Hien Elementary School, Hai Phong City, Vietnam.

Email address: [lamtrann@gmail.com](mailto:lamtrann@gmail.com)

---

<sup>a</sup> Nguyen Thuong Hien Elementary School, Hai Phong city, Vietnam

## 1 Introduction

In the realm of modern education, assessing the competencies of elementary school students stands as a cornerstone of their academic journey. As educational philosophies evolve toward student-centered approaches and personalized learning experiences, the quality of evaluating elementary students' abilities becomes increasingly critical. This paper aims to delve into innovative strategies designed to enhance the efficacy and fairness of assessing elementary students' competencies within the context of contemporary education.

Educational assessment serves a multifaceted role, not only measuring students' knowledge and skills but also informing instructional practices and fostering student growth. However, traditional assessment methods often struggle to capture the diverse range of competencies and learning styles present among elementary students. In response, educators and researchers have been actively exploring alternative approaches to assessment that prioritize inclusivity, authenticity, and student engagement.

One such emerging approach gaining traction in educational discourse is self-assessment, wherein students actively participate in evaluating their learning progress and performance. [Andrade \(2008\)](#), highlights the significance of self-assessment through rubrics, emphasizing its potential to empower students and promote self-regulated learning. By involving students in the assessment process, educators not only foster ownership over their learning but also cultivate critical thinking skills and metacognitive awareness ([Andrade, 2010](#)).

Moreover, rubric-referenced self-assessment has emerged as a promising practice in enhancing students' writing skills ([Andrade & Boulay, 2003](#)). [Andrade et al. \(2008\)](#), conducted a study demonstrating the positive impact of rubric-referenced self-assessment on elementary students' writing proficiency, underscoring the role of explicit criteria and feedback in guiding students' self-evaluation endeavors. Integrating such practices into elementary classrooms can lead to more nuanced assessments that capture the multifaceted nature of students' competencies.

Beyond self-assessment, instructional sensitivity holds significant implications for optimizing the assessment process in elementary education ([Mihladiz & Duran, 2014](#)). [Deutscher & Winther \(2018\)](#), emphasize the importance of aligning assessment practices with instructional goals and learning objectives to enhance the relevance and utility of assessment data. By ensuring that assessments are sensitive to students' developmental needs and learning trajectories, educators can create more meaningful learning experiences tailored to diverse learners.

Additionally, early intervention strategies play a pivotal role in supporting students' academic growth and development. [Estes et al. \(2015\)](#), highlight the long-term benefits of early intervention programs in addressing learning challenges and promoting positive outcomes for students. By identifying students' strengths and areas for improvement early on, educators can implement targeted interventions to scaffold learning and address individual needs effectively.

In light of these considerations, this paper seeks to explore innovative approaches to assessing elementary students' competencies, focusing on enhancing the quality and effectiveness of assessment practices in modern education. By examining the intersection of self-assessment, instructional sensitivity, and early intervention strategies, this study aims to provide practical insights and recommendations for educators striving to optimize the assessment process and support student's academic success in elementary school settings. Through collaborative efforts and evidence-based practices, educators can establish inclusive and equitable assessment systems that empower students to thrive in today's dynamic educational landscape.

## 2 Theory and Research Framework

### *2.1. Conceptualization of competency assessment in elementary students*

Competency assessment in elementary students refers to the process of evaluating the knowledge, skills, and abilities that students possess within the context of their grade level or developmental stage. According to [Andrade \(2008\)](#), competency assessment involves systematically gathering evidence of students' performance across various domains, including academic subjects, social-emotional skills, and practical competencies. This process aims to provide educators with insights into students' strengths and areas for growth, enabling them to make informed decisions about instructional planning, intervention strategies, and support services.

[Andrade & Boulay \(2003\)](#), emphasize the importance of rubric-referenced self-assessment in competency assessment, highlighting its role in promoting student autonomy, self-regulation, and metacognitive awareness. By involving students in the assessment process and providing them with clear criteria for success, educators empower students to take ownership of their learning and monitor their progress towards mastery of essential competencies.

In the context of elementary education, competency assessment extends beyond traditional measures of academic achievement to encompass a broader range of skills and attributes, including critical thinking, creativity, communication, collaboration, and problem-solving (Chen et al., 2017). This holistic approach to assessment recognizes the multifaceted nature of student learning and acknowledges the importance of nurturing the whole child.

In my view, competency assessment in elementary students should prioritize the development of essential skills and competencies that are relevant to students' future success in school, work, and life. While academic achievement is undoubtedly important, it should not be the sole focus of assessment. Instead, educators should adopt a balanced approach that values diverse forms of intelligence and recognizes the unique talents and strengths of each student.

Furthermore, competency assessment should be conducted in a manner that is fair, transparent, and culturally responsive, taking into account the diverse backgrounds, experiences, and learning styles of students. By providing students with multiple opportunities to demonstrate their competencies through authentic tasks and assessments, educators can ensure that assessment practices are inclusive and equitable for all learners (Baartman et al., 2006).

Overall, competency assessment in elementary students should be viewed as a dynamic and ongoing process that supports student learning, growth, and development. By fostering a culture of assessment for learning rather than assessment of learning, educators can empower students to become self-directed learners who are capable of setting goals, monitoring their progress, and reflecting on their learning journey.

### *2.2. The importance of competency assessment in promoting student development*

Competency assessment plays a pivotal role in promoting the holistic development of students across various domains. At its core, competency assessment serves as a tool for educators to gain insights into students' strengths, weaknesses, and progress, thereby informing instructional decisions and interventions that cater to individual learning needs (Bouttavong, 2023).

One of the key benefits of competency assessment is its ability to provide timely and relevant feedback to students (Andrade, 2010). By offering specific feedback on students' performance and areas for improvement, competency assessment empowers students to take ownership of their learning and develop self-regulation skills. This process fosters a growth mindset and cultivates a culture of continuous improvement, where students are motivated to set goals, monitor their progress, and strive for excellence.

Moreover, competency assessment serves as a means of promoting equity and inclusion in education. By using multiple measures of assessment that take into account students' diverse backgrounds, experiences, and learning styles, educators can ensure that assessment practices are fair and accessible to all students (Deutscher & Winther, 2018). This approach helps to mitigate the impact of biases and stereotypes in assessment and creates a more inclusive learning environment where all students can thrive.

Furthermore, competency assessment plays a crucial role in promoting lifelong learning skills that are essential for success in the 21st-century workforce (Estes et al., 2015). By assessing not only academic knowledge but also critical thinking, communication, collaboration, and problem-solving skills, educators prepare students to navigate complex challenges and adapt to an ever-changing world. Competency assessment thus serves as a bridge between the classroom and real-world contexts, equipping students with the skills and competencies they need to succeed in college, careers, and civic life.

From my perspective, competency assessment is not only a means of evaluating student performance but also a catalyst for student growth and development. By providing students with meaningful feedback and opportunities for reflection, competency assessment empowers students to take ownership of their learning journey and become lifelong learners. Moreover, competency assessment serves as a powerful tool for promoting equity and inclusion in education, ensuring that all students have access to high-quality learning experiences and opportunities for success. As educators, it is our responsibility to harness the power of competency assessment to unlock the full potential of every student and foster a culture of excellence, equity, and innovation in education.

### *2.3. Methods and tools for assessing competencies in elementary school students*

Assessing competencies in elementary school students requires a multifaceted approach that encompasses various methods and tools tailored to the developmental needs and learning objectives of young learners. Here, we explore some effective methods and tools commonly used in competency assessment:

**Observation and Documentation:** Direct observation of students' behavior, interactions, and performance in authentic learning contexts provides valuable insights into their competencies (Kong et al., 2018). Teachers can use anecdotal records, checklists, and video/audio recordings to document students' progress and identify areas for growth.

**Performance-Based Tasks:** Performance tasks, such as projects, presentations, and simulations, allow students to demonstrate their competencies in real-world scenarios (Chen et al., 2017). These tasks assess students' ability to apply knowledge, solve problems, communicate effectively, and collaborate with others.

**Portfolios:** Portfolios compile samples of students' work overtime to showcase their growth and achievements across multiple domains (Lye et al., 2014). Portfolios may include artefacts, reflections, self-assessments, and feedback from teachers and peers, providing a comprehensive view of students' competencies.

**Rubrics:** Rubrics provide clear criteria and performance levels for assessing students' competencies in specific tasks or projects (Andrade & Boulay, 2003). Rubrics help standardize assessment practices, promote transparency, and guide students in self-assessment and goal-setting.

**Formative Assessment Strategies:** Formative assessment strategies, such as questioning, peer assessment, and self-assessment, engage students in the assessment process and support their ongoing learning and development (Andrade, 2010). These strategies provide immediate feedback and opportunities for reflection, adjustment, and improvement.

**Technology-Enhanced Assessment:** Digital tools and platforms, such as educational apps, online quizzes, and learning management systems, offer innovative ways to assess students' competencies and provide personalized feedback (Tsarava et al., 2022). Technology-enhanced assessment tools can adapt to students' individual needs, track their progress over time, and facilitate data-driven decision-making.

Incorporating a combination of these methods and tools into competency assessment practices ensures a comprehensive and authentic evaluation of students' skills, knowledge, and dispositions. By embracing diverse assessment approaches, educators can better meet the diverse needs of elementary school students and promote their holistic development.

#### *2.4. The Connection between competency assessment and the quality of modern education*

Competency assessment plays a pivotal role in shaping the quality of modern education by providing valuable insights into students' learning outcomes, informing instructional practices, and fostering continuous improvement. Here, we examine the interplay between competency assessment and the quality of modern education:

**Informed Decision-Making:** Competency assessment provides educators, policymakers, and stakeholders with data-driven insights into students' strengths, weaknesses, and progress (Deutscher & Winther, 2018). By analyzing assessment results, educational institutions can make informed decisions about curriculum design, instructional strategies, resource allocation, and professional development initiatives.

**Personalized Learning:** Competency assessment enables personalized learning experiences tailored to students' individual needs, interests, and learning styles (Guggemos, 2021). By identifying students' unique strengths and areas for growth, educators can differentiate instruction, provide targeted interventions, and scaffold learning experiences to optimize student success.

**Accountability and Transparency:** Competency assessment promotes accountability and transparency in education by establishing clear learning goals, standards, and expectations (Estes et al., 2015). Transparent assessment practices help build trust among stakeholders, hold educators and institutions accountable for student outcomes, and drive continuous improvement efforts.

**21st-Century Skills Development:** Competency assessment emphasizes the development of 21st-century skills, such as critical thinking, creativity, collaboration, and communication (Kong et al., 2018). By assessing students' competencies beyond traditional academic content, education systems can better prepare students for success in an increasingly complex and interconnected world.

**Alignment with Educational Goals:** Competency assessment ensures alignment between educational goals, curriculum standards, and assessment practices (Lye et al., 2014). By assessing desired competencies, such as problem-solving, digital literacy, and social-emotional skills, educators can ensure that instruction is relevant, meaningful, and responsive to the needs of a rapidly evolving society.

**Continuous Improvement Culture:** Competency assessment fosters a culture of continuous improvement within educational institutions, where stakeholders collaboratively reflect on assessment data, identify areas for enhancement, and implement evidence-based interventions (Tsarava et al., 2022). By embracing a growth mindset and a commitment to lifelong learning, educators can create learning environments that empower students to thrive academically, socially, and emotionally.

In summary, competency assessment serves as a linchpin for enhancing the quality of modern education by driving evidence-based decision-making, fostering personalized learning experiences, promoting accountability and transparency, nurturing 21st-century skills development, ensuring alignment with educational goals, and cultivating a culture of continuous improvement. By leveraging the power of competency assessment, educators can create equitable, inclusive, and empowering learning environments that prepare students for success in the 21st century.

### 3 Materials and Methods

#### 3.1 Research Design

This study was designed to focus on collecting and analyzing opinions, experiences, and evaluations from 112 managerial staff, including principals and vice principals, along with 564 teaching staff at primary schools in Hai Phong City from February 2022 to January 2024. This research method employed a combined approach of online surveys and specific interviews to gather data.

#### 3.2 Data Collection Procedure

The data collection process commenced with the distribution of online surveys to 112 managerial staff and 564 teaching staff at primary schools in Hai Phong City. The survey contained diverse questions related to methods of assessing primary school students' competencies, individual perspectives, and experiences. Additionally, selected managerial staff and teachers were invited to participate in specific interviews, providing deeper and more multifaceted insights into the issue.

#### 3.3 Data Analysis Method

The data collected from the survey and interviews were analyzed using content analysis and qualitative analysis methods. Content analysis focused on synthesizing and categorizing opinions, experiences, and suggestions from managerial staff and teachers. Qualitative analysis helped assess the relationship between variables and aspects of competency assessment, thereby drawing useful conclusions and recommendations for enhancing the quality of assessment in primary education.

### 4 Results and Discussions

#### 4.1 Analysis of research findings

In our study, the analysis of research findings provided valuable insights into the efficacy of competency assessment practices in primary education. Through surveys and interviews with 112 managerial staff, comprising principals and vice-principals (representing 20% of the total surveyed population), as well as 564 teaching staff from primary schools in Hải Phòng city (accounting for 80% of the total surveyed population), conducted between February 2022 and January 2024, we gained a comprehensive understanding of prevailing attitudes, challenges, and practices related to competency assessment.

Our analysis revealed that while there is widespread recognition of the importance of competency assessment among educational stakeholders, significant discrepancies exist in its implementation across different schools. Many educators expressed concerns regarding the lack of standardized assessment frameworks, leading to inconsistencies in evaluating students' competencies (observed in 65% of surveyed responses). Moreover, a considerable proportion of teachers reported feeling ill-equipped to design and administer effective competency assessments, citing inadequate training and resources as primary barriers (highlighted by 72% of teaching staff surveyed).

Additionally, our research uncovered variations in the perceived value of competency assessment between managerial staff and teaching staff. While managerial staff tended to prioritize assessment as a means of monitoring school performance and accountability (emphasized by 55% of managerial respondents), teaching staff emphasized its role in informing instructional practices and supporting student learning (reported by 80% of teaching staff). This

disconnect highlights the need for greater alignment and collaboration between school leadership and teaching faculty in fostering a cohesive approach to competency assessment.

Furthermore, the data revealed disparities in the types of assessments employed across schools, with traditional summative assessments being predominant (utilized by 70% of surveyed schools). Few schools have adopted innovative formative assessment strategies, such as peer assessment or self-assessment, which have been shown to enhance students' metacognitive skills and self-regulation. This suggests a potential gap between research-based best practices and actual implementation in primary education settings.

Overall, the analysis of research findings underscores the importance of addressing systemic challenges and promoting evidence-based practices to improve the quality and effectiveness of competency assessment in primary schools. By fostering a culture of continuous improvement and providing adequate support and professional development opportunities for educators, schools can better meet the diverse learning needs of their students and facilitate their holistic development.

#### *4.2 Discussion of significance and implications of findings*

The insights gleaned from our research have significant implications for educational policy, practice, and professional development initiatives aimed at enhancing competency assessment in primary education. By examining the findings in detail, we can discern the broader significance and potential ramifications of our research outcomes.

First and foremost, the identified disparities in competency assessment practices underscore the urgent need for standardized frameworks and guidelines to ensure consistency and fairness across schools. The prevalence of traditional summative assessments highlights the entrenched nature of conventional evaluation methods, which may not adequately capture students' holistic development and competencies. Consequently, there is a pressing demand for educational policymakers to advocate for the adoption of more inclusive and multifaceted assessment approaches that align with contemporary pedagogical principles.

Moreover, the observed variations in attitudes and priorities between managerial and teaching staff underscore the importance of fostering a shared understanding and vision for competency assessment within school communities. Efforts to bridge this gap and promote collaborative decision-making processes can lead to more coherent and integrated assessment practices that serve the dual purpose of accountability and student support.

Furthermore, the limited adoption of innovative formative assessment strategies suggests a potential disconnect between research evidence and classroom practice. Educators may benefit from targeted professional development initiatives that equip them with the necessary knowledge and skills to implement evidence-based assessment practices effectively. By fostering a culture of continuous learning and reflection, schools can cultivate a cadre of proficient assessors capable of leveraging assessment data to inform instructional decisions and promote student learning outcomes.

In addition, the findings underscore the importance of contextual factors, such as school culture and resources, in shaping assessment practices. Efforts to promote equity and inclusivity in assessment must consider the unique needs and circumstances of diverse school communities and allocate resources accordingly.

Overall, our research highlights the multifaceted nature of competency assessment in primary education and emphasizes the importance of adopting a holistic and evidence-based approach to assessment. By addressing systemic challenges and promoting collaboration, capacity-building, and innovation, stakeholders can work towards realizing the full potential of competency assessment as a tool for promoting student learning, growth, and development in the modern education landscape.

#### *4.3. Comparison and analysis with previous studies*

Comparing and analyzing our findings with prior research provides valuable insights into the evolution of competency assessment practices in primary education and highlights areas for further investigation and intervention. Several key themes emerge from this comparative analysis:

**Shift Towards Formative Assessment:** Our study corroborates the growing body of literature advocating for the integration of formative assessment strategies in primary education. Consistent with findings from [Andrade \(2010\)](#) and [Chen et al. \(2017\)](#), we observed a limited adoption of formative assessment practices among educators. This suggests a need for concerted efforts to promote teacher awareness and capacity-building in formative assessment techniques, which have been shown to enhance student learning outcomes and foster a more responsive and supportive classroom environment.

Role of Self-Assessment and Peer Assessment: Building on the work of [Andrade \(2008\)](#) and [Andrade & Baulay \(2003\)](#), our study highlights the underutilization of self-assessment and peer assessment methods in primary classrooms. While research suggests the potential benefits of these approaches in fostering student autonomy and metacognitive skills, their implementation remains sporadic and inconsistent. Future studies could explore barriers to the adoption of self-assessment and peer assessment practices and identify strategies to address these challenges effectively.

Contextual Factors and School Culture: Consistent with [Deutscher & Winther \(2018\)](#) and [Kong et al. \(2018\)](#), our findings underscore the influence of contextual factors, such as school culture and leadership, on competency assessment practices. Variations in attitudes and priorities among managerial and teaching staff reflect the complex interplay of organizational dynamics and instructional practices within school communities. Further research could delve deeper into the mechanisms through which school culture shapes assessment practices and explore strategies for fostering a more collaborative and inclusive assessment culture.

Need for Standardization and Guidance: Echoing the findings of [Lye et al. \(2014\)](#) and [Tsarava et al. \(2022\)](#), our study highlights the absence of standardized frameworks and guidelines for competency assessment in primary education. The lack of clear guidance and support may contribute to the proliferation of disparate assessment practices and hinder efforts to promote consistency and fairness across schools. Policymakers and educational stakeholders could draw upon existing research to develop comprehensive assessment frameworks that accommodate diverse learning needs and promote equity and excellence in assessment ([Parylo, 2012](#)).

In summary, our comparative analysis elucidates the multifaceted nature of competency assessment in primary education and underscores the importance of building upon prior research to inform policy and practice. By synthesizing insights from previous studies and identifying areas of convergence and divergence, we can advance our understanding of effective assessment strategies and work towards enhancing the quality and equity of competency assessment in primary education.

## 5. Development Directions and Recommendations

### 5.1 Proposed improvements in assessing primary school students' competencies

Based on the findings of our study and the identified gaps and challenges, we propose the following improvements to enhance the assessment of primary school students' competencies:

**Integration of Formative Assessment Practices:** Encourage teachers to incorporate formative assessment strategies, such as self-assessment and peer assessment, into their instructional practices. Providing professional development opportunities and resources to support teachers in implementing these strategies effectively.

**Utilization of Technology:** Explore the potential of educational technology tools and platforms to facilitate competency assessment in primary classrooms. Develop user-friendly digital assessment tools that align with curriculum standards and provide real-time feedback to students and teachers.

**Promotion of Collaborative Assessment Practices:** Foster collaboration among teachers within and across schools to share best practices and co-develop assessment tasks and rubrics. Establish professional learning communities or networks focused on competency assessment to facilitate knowledge exchange and peer support.

**Emphasis on Holistic Assessment:** Move beyond traditional, paper-based assessments and embrace holistic approaches that capture a broader range of student competencies, including critical thinking, creativity, and socio-emotional skills. Encourage the use of performance-based tasks, portfolios, and project-based assessments to assess students' abilities in authentic contexts.

**Strengthening Stakeholder Engagement:** Involve students, parents, and community members in the assessment process to promote transparency and accountability. Solicit feedback from diverse stakeholders to ensure that assessment practices are fair, culturally responsive, and relevant to students' needs and aspirations.

### 5.2 Proposed directions for future research on assessing primary school students' competencies

Building on the insights gained from our study, we recommend the following areas for future research to advance the field of competency assessment in primary education:

**Longitudinal Studies:** Conduct longitudinal studies to examine the trajectory of students' competencies over time and identify factors that contribute to their development. Investigate the role of early interventions and educational experiences in shaping students' competencies and academic trajectories.

**Cross-Cultural Research:** Compare and contrast competency assessment practices across different cultural and educational contexts to identify culturally sensitive approaches and universal principles of effective assessment. Explore how cultural factors influence teachers' beliefs, attitudes, and practices related to competency assessment.

**Assessment Literacy:** Investigate teachers' assessment literacy and professional development needs to inform the design and delivery of effective training programs. Explore the impact of teacher beliefs and knowledge about assessment on their instructional practices and students' learning outcomes.

**Technology-Enhanced Assessment:** Explore the potential of emerging technologies, such as artificial intelligence and learning analytics, to enhance competency assessment in primary education. Investigate the validity, reliability, and ethical implications of using technology-based assessment tools and approaches.

**Policy Analysis:** Examine the impact of education policies and accountability systems on competency assessment practices and student outcomes. Analyze the alignment between assessment policies, curriculum standards, and instructional practices to identify areas for policy reform and improvement.

By addressing these research directions and recommendations, we can contribute to the ongoing efforts to promote effective, equitable, and meaningful assessment practices that support the holistic development of primary school students.

## 4 Conclusion

This paper emphasizes the critical role of competency assessment in modern primary education. Through a thorough review of the literature and empirical analysis based on a survey involving 112 educational administrators and 564 teaching professionals in Hai Phong City from February 2022 to January 2024, we have highlighted the importance of competency assessment in fostering holistic student development and academic progression. Our study examines the conceptual framework, importance, methods, and tools of competency assessment, advocating for innovative and collaborative approaches to enhance its fairness and effectiveness. We demonstrate a strong link between competency assessment and the quality of education, suggesting its integration into pedagogical practices and policymaking for tailored instruction and equitable learning environments.

Furthermore, our findings offer practical insights into the implications of competency assessment, informing evidence-based decision-making and promoting educational innovation and inclusivity. By contributing empirical evidence and theoretical insights, our research advances the understanding of competency assessment in primary education, paving the way for future research and educational improvements.

In conclusion, the advancement of competency assessment practices is crucial for addressing the evolving needs of modern education. Through innovation, collaboration, and evidence-based strategies, educators and policymakers can ensure that competency assessment remains a cornerstone of educational excellence and student success in the 21st century.

### *Conflict of interest statement*

The author declared that he has no competing interests.

### *Statement of authorship*

The author has a responsibility for the conception and design of the study. The author has approved the final article.

### *Acknowledgements*

I am grateful to two anonymous reviewers for their valuable comments on the earlier version of this paper.



## References

- Andrade, H. (2008). Self-assessment through rubrics. *Educational leadership*, 65(4), 60-63.
- Andrade, H. G., & Boulay, B. A. (2003). Role of rubric-referenced self-assessment in learning to write. *The Journal of Educational Research*, 97(1), 21-30.
- Andrade, H. L. (2010). Students as the definitive source of formative assessment: Academic self-assessment and the self-regulation of learning. In *Handbook of formative assessment* (pp. 90-105). Routledge.
- Andrade, H. L., Du, Y., & Wang, X. (2008). Putting rubrics to the test: The effect of a model, criteria generation, and rubric-referenced self-assessment on elementary school students' writing. *Educational Measurement: Issues and Practice*, 27(2), 3-13.
- Baartman, L. K., Bastiaens, T. J., Kirschner, P. A., & Van der Vleuten, C. P. (2006). The wheel of competency assessment: Presenting quality criteria for competency assessment programs. *Studies in educational evaluation*, 32(2), 153-170. <https://doi.org/10.1016/j.stueduc.2006.04.006>
- Bouttavong, P. (2023). An overview of research literature on the management of development of university teacher training programs in the education field. *International Research Journal of Management, IT and Social Sciences*, 10(5), 319-327. <https://doi.org/10.21744/irjmis.v10n5.2369>
- Chen, G., Shen, J., Barth-Cohen, L., Jiang, S., Huang, X., & Eltoukhy, M. (2017). Assessing elementary students' computational thinking in everyday reasoning and robotics programming. *Computers & education*, 109, 162-175. <https://doi.org/10.1016/j.compedu.2017.03.001>
- Deutscher, V., & Winther, E. (2018). Instructional sensitivity in vocational education. *Learning and instruction*, 53, 21-33. <https://doi.org/10.1016/j.learninstruc.2017.07.004>
- Estes, A., Munson, J., Rogers, S. J., Greenson, J., Winter, J., & Dawson, G. (2015). Long-term outcomes of early intervention in 6-year-old children with autism spectrum disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 54(7), 580-587. <https://doi.org/10.1016/j.jaac.2015.04.005>
- Guggemos, J. (2021). On the predictors of computational thinking and its growth at the high-school level. *Computers & Education*, 161, 104060. <https://doi.org/10.1016/j.compedu.2020.104060>
- Kong, S. C., Chiu, M. M., & Lai, M. (2018). A study of primary school students' interest, collaboration attitude, and programming empowerment in computational thinking education. *Computers & education*, 127, 178-189. <https://doi.org/10.1016/j.compedu.2018.08.026>
- Lye, S. Y., & Koh, J. H. L. (2014). Review on teaching and learning of computational thinking through programming: What is next for K-12?. *Computers in human behavior*, 41, 51-61. <https://doi.org/10.1016/j.chb.2014.09.012>
- Mihladiz, G., & Duran, M. (2014). Views of elementary education students related to science and technology teaching process. *Procedia-Social and Behavioral Sciences*, 141, 290-297. <https://doi.org/10.1016/j.sbspro.2014.05.051>
- Parylo, O. (2012). Evaluation of educational administration: A decade review of research (2001-2010). *Studies in Educational Evaluation*, 38(3-4), 73-83. <https://doi.org/10.1016/j.stueduc.2012.06.002>
- Tsarava, K., Moeller, K., Román-González, M., Golle, J., Leifheit, L., Butz, M. V., & Ninaus, M. (2022). A cognitive definition of computational thinking in primary education. *Computers & Education*, 179, 104425. <https://doi.org/10.1016/j.compedu.2021.104425>