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Dialogic Assessment in IB MYP Science: A Conceptual Framework for Enhancing Evidence of Students' Learning through Theoretical and Reflective Inquiry

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ABSTRACT

The Middle Years Programme (MYP) science curriculum of the International Baccalaureate (IB) employs inquiry-based learning to promote whole development of students. However, the prevalent emphasis on written products only measures individual aspects of student performance, omitting the changing interpersonal exchanges important for scientific understanding. Given that scientific knowledge is collectively formed and disseminated through discourse, implementing dialogic assessment within MYP science constitutes a needed expansion beyond conventional processes. This investigation presents a conceptual model designed to broaden documentation of student achievement by integrating scholarly dialogue and reflective critique into classroom practice, anchored in the complementary perspectives of Vygotsky's sociocultural constructivism and Bakhtin's theory of dialogism. Grounded in a qualitative conceptual inquiry resulting from the educational literature and the author's own observations from nine years of teaching MYP Science within an IB World School in China, the article considers theory together with real practice on dialogue in authentic MYP science assessment. The results reveal that as compared with conventional written evaluation, dialogic assessment provides greater chances to capture scientific reasoning, conceptual understanding, collaborative meaning-making, metacognitive reflection, and student agency. Rather than appealing to another type of assessment, the proposal is to recognize structured academic dialogue as an additional assessment modality that might support evidence production as applied to the current MYP science criteria. The study contributes to a discussion around authentic assessments in inquiry-based science education practice and proposes a conceptual framework for making dialogic assessment part of MYP Science classroom practice.

1. Introduction

Assessment plays a predominant role in contemporary school science education, providing a mechanism to assess student outcomes and becoming a vehicle for the learning process, reflection, and conceptual development (Black & Wiliam, 1998; Hattie & Timperley, 2007). The International Baccalaureate (IB) Middle Years Programme (MYP) focuses on assessment as the tools to reinforce inquiry-based learning, analytical reasoning, international-mindedness, as well as the building of Approaches to Learning (ATL) skills (International Baccalaureate

Organization [IBO], 2021). Each of the four MYP science Assessment criteria: Knowing and Understanding (Criterion A), Inquiring and Designing (Criterion B), Processing and Evaluating (Criterion C), and Reflecting on the impacts of science (Criterion D) provides a lens through which students demonstrate their scientific knowledge, investigative skills, analytical thinking, and appreciation of science in local and global contexts. The resulting suite of standards across a wide range of strands, criteria and assessment includes a large span. Assessment in science classrooms currently tends to focus on the written product (Heritage, 2010)

MYP science criteria are often not able to do justice to the process of negotiation, renovation and mutual creation which are at the heart of scientific learning. In addition to reproducing knowledge in more mechanical forms, scientific literacy necessitates students to elucidate thoughts, justify thinking and logic, question evidence, make criticism of counter-evidence, interpret and discuss scientific ideas, and communicate scientific concepts effectively through conversation in the face of the day-to-day challenges that science seeks to unravel (Mercer & Littleton, 2007). These dialogic processes are the crucial components of learning that often go unrepresented in conventional assessment practices.

1.1 Background

Dialogic assessment presents a perspective through which dialogue is presented not as pedagogical strategy alone but as an evidence source for learning (Alexander, 2020). This is where it becomes visible that students are engaging in social construction of scientific knowledge through purposeful interaction, questioning, collaborative reasoning, and reflective discussion (Vygotsky, 1978) and making their thinking visible. This method reinforces the inquiry philosophy underlying the IB curriculum and allows to probe cognitive processes that are often omitted from written assessments.

In this paper, dialogic assessment is proposed as a complementary assessment approach for MYP science. Instead of suggesting an alternative or restructuring of the existing assessment criteria, the paper supports dialogic assessment which can enhance evidence accumulation across all four criteria by integrating measures of student scientific reasoning, conceptual understanding, communication skills, collaborative meaning-making, and reflective thinking. Here, the argument in the analysis rests on merging established educational theories under which the significance of dialogue which lies at the heart of learning comes to the fore. The sociocultural constructivism approach of Vygotsky underlies the idea that knowledge is socially constructed through interaction within the Zone of Proximal Development (Vygotsky, 1978).

Bakhtin's theory of dialogism also brings to the fore the idea that meaning is mediated through dialogues with other voices and perspectives (Bakhtin, 1981). Alexander's (2020) dialogic pedagogy provides principles that educators can use to facilitate productive educational dialogue leading towards a collaborative inquiry and building cumulative relationships of understanding (Alexander, 2020), while Mortimer and Scott's framework for meaning-making in science education is how dialogic classroom discourse encourages conceptual development and scientific reasoning (Mortimer & Scott, 2003). These perspectives jointly provide a strong theoretical foundation from which to view dialogue as an integral part of assessment in science education.

Aside from the theoretical discussions, this study is also informed by the author's self-reflection arising from nine years of continuous MYP science teaching in an IB World School in China. During this period, MYP 4, (i.e. equivalence of Grade 9) students regularly presented mandatory community projects to peers, teachers, parents, and community stakeholders. Thus, it became evident in these presentations that the dialogic interplay between students in questioning, dialogue, feedback, and co-constructing knowledge forms authentic contexts through which to find depth and breadth in student's learning over and above the conventional means of written assessment work. The practitioner's observations serve the purpose of supporting the theoretical arguments rather than of drawing causal generalisations. The study, firstly, reviews the literature of dialogic learning, sociocultural theory, and dialogic pedagogy in the arena of science education and assessment. Next, the qualitative methodological approach combining theoretical synthesis and reflection of practitioner observation are presented. Thematic findings are then articulated to illustrate how dialogic assessment fosters conceptual understanding, scientific reasoning, student agency, collaborative meaning-giving, and inquiry-based learning processes in the MYP science classroom.

Lastly, the debate reflects on these results for assessment practice, arguing that dialogic assessment should be accepted as an extension to assessment, helping to supplement evidence gathering among the current MYP science assessment criteria. Through combining educational theory and continuing classroom practice, this research adds to the ongoing dialogue on authentic assessment strategies within inquiry-based science education and provides a conceptual lens through which student learning can be enhanced, documented, and valued in the International Baccalaureate Middle Years Programme.

1.2 Problem Statement

At the core of the problem is the disconnect between the MYP science classroom and the dominant use of inquiry-based instruction coupled with product-based assessment. Existing approaches focus largely on writing and adherence to a rubric, rather than real conceptual understanding. This monological perspective in science further erodes the very traits we seek to teach, such as Nature of science (NOS) principles like peer review and scepticism. Students can achieve a high score without being able to verbally defend their logic, let alone adapt their reasoning to new scientific evidence. This surface-level achievement is fundamentally at odds with the IB's mission to provide a deep and whole learning experience (International Baccalaureate, 2014)

1.3 Research questions

With the primary aims of this study in mind, three specific research questions were designed to steer the inquiry toward key issues:

- To what degree does dialogical assessment better represent the Nature of Science, compared to conventional written summative assessments in the MYP structure?

- In what ways can dialogic interactions be incorporated into the MYP science Criteria B, C and D?

- What effects does the transition to a dialogic model have on students' self-efficacy and their capacity to articulate intricate scientific ideas?

1.4 Significance of the study

This research goes beyond making a basic advocacy statement. It contends that dialogical assessment is the missing link of the IB Continuum. Moreover, since other IB programs such as the Primary Years Programme (PYP) has "Reggio Emilia-inspired dialogue" and the Diploma Programme (DP) has "Internal Assessments" (i.e. oral exams in languages) (International Baccalaureate,2014), the MYP tends to dwell somewhere in the middle of the two and stuck with heavy writing and rubrics. The MYP, therefore needs to step back and reclaim its identity as an inquiry-based bridge and to have the conversations as the cornerstone of the grade.

In MYP science, the shift toward dialogical assessment is especially transformative. science education is often accused of being fraught with didactics in which assessment is concerned with remembering facts, rather than making a scientific argument. Using a dialogic lens on the four MYP science criteria, we are able to shift the emphasis from testing what a student knows to testing how and why a student thinks as a scientist.

2. Review of literature

The International Baccalaureate Middle Years Programme science curriculum can be enriched by a more communicative model that positions scientific inquiry as a social process of meaning-making, rather than a static demonstration of knowledge (Roth, 2014). Through Vygotsky's sociocultural lens, this initiative places language as a tool for both psychological and cultural understanding, critical for learners to construct meaning collaboratively in social contexts (Belay et al., 2023). Expanding on this, Bakhtin's theory of the dialogic imagination provides the conceptual lens from which to view scientific discourse as a heteroglossia process in which students become fluent by negotiating scientific ideas and concepts through multiple, interconnected voices (Wilmes & Siry, 2021).

This review of literature articulates a conceptual platform for dialogic assessment - making it a dynamic catalyst for theoretical and reflective investigation. Drawing on Lev Vygotsky's socio-cultural account of cognitive development, as well as Mikhail Bakhtin's philosophy of dialogism, this paper considers how assessment can transition from a monologic "audit" of knowledge to a collaborative and in-process location of student and group learning.

2.1 Theoretical Foundations: Vygotsky's socio-cultural theory and the Zone of Proximal Development (ZPD)

If we are to understand assessment as an active process of learning, a positive force rather than a mere post-hoc outcome, we need to situate evaluation within Lev Vygotsky's socio-cultural theory. Vygotsky (1978) maintains that higher mental functions don't emerge from within oneself, but rather come first on the inter-psychological (social) plane before being internalized intra-psychologically (individual) (García-Carrión et al., 2020). Language is the primary psychological and cultural tool that enables this process of internalization (García-Carrión et al., 2020). The Zone of Proximal Development (ZPD) is also an important factor. With traditional science assessments, when a student is not helped, their progress only reflects their actual, retrospective development. However, dialogic assessment targets the ZPD more prospectively. Through the embedding of strategic interactive dialogue into the assessment ecosystem, the teacher and the peers themselves provide scaffolded prompts, counter-arguments, and collaborative checks (Teo, 2016). This exchange between educators and students enables teachers to observe a student's nascent ability in engaging with abstract scientific reasoning, beyond a simple grasp or memorized recall.

2.2 Epistemological Dimensions: Bakhtin's Dialogism, Polyphony and Internally Persuasive Speech

While Vygotsky provides the developmental mechanics relevant to this analysis, it is Mikhail Bakhtin (1981), who brings a key layer of depth and epistemological importance to this inquiry. Central to Bakhtin's theory of dialogism is the principle that meaning is not found within a solitary word or thought (Egglezou, 2016). Each utterance is a linkage in a continuous communication chain of meaning. It responds to what has been stated prior and looks ahead into the future (García-Carrión et al., 2020). In traditional science education, classroom discussion is frequently captured in what Bakhtin terms *monoglossia*. This is when there is a singular voice that can exert authority over everyone else (usually the teacher or textbook) and is demanding of students their compliance (Teo, 2016). Dialogic assessment deliberately challenges such an order by creating a polyphony (multiple, independent, and valid voices) and *heteroglossia* (the co-existence of diverse socio-cultural perspectives and registers) (Egglezou, 2016; Tang et al., 2024). This transition enables students to shift from "authoritative speech", the repetitive articulation of scientific terms devoid of conceptualization without a genuine understanding in relation to "internally persuasive speech," (Egglezou, 2016) within the MYP science setting. Internally persuasive speech is when a student interacts with challenges, and eventually, re-accents scientific principles, integrating them with confidence from within their subjective conceptual environment (Egglezou, 2016).

Mortimer and Scott (2003) present the 'how-to' for implementing the two theories covered above in practice, and particularly in science education. They distinguish interactive from non-inter talk and suggest that interactive talk is when a teacher and a learner work together and have an exchange of idea and consider the non-interactive to be monologues. Mortimer and Scott (2003) argue that to do so successfully, or even to effectively assess, one must walk between them purposefully. To illustrate, how that might be done is to have a scenario in the classroom where at first, a teacher might employ non-interactive dialogic talk to check students' prior knowledge, then shift into interactive authoritative talk in order to guide the class to the established academic concept (Mortimer & Scott, 2003). With this grounding on Vygotsky and Bakhtin theoretical frameworks, the dialogical assessment framework proposed is built on a solid foundation, moving away from a terminal, measurement toward generative, interaction talk. Therefore, the paradigm shift needed for the conceptual framework I am proposing is best illustrated in the comparison of monologic and dialogic assessment practices as listed in **table 1** below:

Assessment Dimension	Traditional Approach	Proposed Framework
Main Objective	To audit and grade a static endpoint of students' individual knowledge acquisition.	To open a "dialogic space" where student understanding is enriched, co-constructed, and evolved (Palmgren-Neuvonen Hirvonen &, 2019).
Discourse Pattern	Controlled largely by the rigid IRE/IRF pattern (Initiation, Response, Evaluation) (Teo, 2016).	Open, reciprocal, cumulative, and supportive sequences of collective reasoning (Alexander, 2018; Teo, 2016).
Teachers' role	The ultimate authoritative arbiter of correct answers and fixed scientific truths (Teo, 2016).	Orchestrators of learning who facilitate spaces for inquiry and probe assumptions (Hirvonen & Palmgren-Neuvonen, 2019).
Type of Knowledge	Static, absolute, and unilaterally transmitted from expert to novice (Teo, 2016).	Dynamic, negotiated, and continuously re-created through collective thought (Alexander, 2018).

2.3 Contextualizing the theories in IB MYP science framework.

IB MYP Science curriculum is built around four key assessment criteria: Criterion A: Knowing and understanding, Criterion B: Inquiring and designing, Criterion C: Processing and evaluating and Criterion D: Reflecting on the impacts of science (International Baccalaureate, 2014).

Dialogic assessment essentially enhances evidence of student learning in all four domains. In Criterion A, the *status quo* are standard tests with multiple-choice tests, long or short-answer questions. The dialogic shift would involve interactive vivas. For example, students conduct a 5-minute technical interview following a written than test. For Criterion B & C: Inquiring, Designing & Processing, the *status quo* are static laboratory reports filed at check marks/submissions immediately after an experiment has ended. The Dialogic element could include Formative Lab Conferences. The assessment is done in the design and processing of data, during the practical lab. The dialogue could be that the teacher avers: "*I noticed your independent variable has a narrow range. What risks does this pose to your trendline*?". The impact of this approach is that the assessment is transformed into the collaborative problem solving that we see in peer reviewing in real world scientific communities. With regards to evaluating Criterion D, a dialogic assessment model could be characterised by peer-to-peer debates or teacher-to-peer dialogue wherein students would be required to defend their stance or perspective (García-Carrión et al., 2020). By recording and studying student language moves during these exchanges such as how they expand and extend a peer's hypothesis, present an alternative argument, or argue to validate an anomalous observation, teachers obtain more depth and specificity of critical and reflective thinking (Teo, 2016).

3. Methodology

Drawing on the rich theoretical literature, this study employs a qualitative interpretivist research design informed by practitioner reflection to explore the potential of dialogic assessment in the International Baccalaureate Middle Years Programme (MYP) science classroom. Instead of seeking causal relationships through experimental methods, the study aims to develop a conceptual understanding of how dialogic assessment can support deeper learning, critical thinking, and student agency within inquiry-based science education. The research adopts a conceptual and reflective approach where well-established and peer-reviewed educational theories are incorporated together with sustained classroom observations accumulated over a period nine years of professional practice in an International Baccalaureate (IB) World School in China. This approach brings theoretical constructs closer to practice in the classrooms and provides insights into assessment practices that might well not be uncovered by quantitative indicators alone.

4. Data Sources.

This study utilises two main sources of evidence. The first source is credible academic literature on dialogic pedagogy, which provides the conceptual structure for exploring the educational impact of dialogic assessment and the educational impact in the IB MYP science curriculum. The second source is the writer ‘s reflective observations drawn upon a solid nine years teaching experience MYP science at an IB World School in China. Special zest is placed on what was observed during students’ annual presentations of Grade 9 community projects to peers, teachers, parents, and community members. Frequently these presentations encompassed questioning, feedback exchanges, collaborative discussion, and reflective dialogue as authentic form of assessment occurs through interaction rather than as a written test. The observational evidence is employed descriptively in order to relate theory to practice, and to illustrate how dialogic assessment might work within authentic IB learning environments.

5. Data Analysis

The research employed a thematic approach, combining literature with practitioner-oriented field notes garnered from occasional observations. Prominent themes such as feedback, student agency and collaborative meaning-making, which were identified in the theoretical literature, were compared against the presentations of students’ community projects. Aiming to identify convergence between educational theory and classroom practice, this form of analysis allows for the advancement of evidence to underpin and inform argument and advocacy regarding the relevance of dialogic assessment in MYP science education.

6. Researcher Positionality

The practitioner-researcher approach takes its stance from an 'insider-oriented' perspective. Continuous observation is that of a practitioner, in the setting of the IB MYP. While this perspective offers a reflexive familiarity that might enrich the findings, it is also important to acknowledge the need to be reflexive of one's own presumptions and interpretations. Therefore, information garnered from the observations related to the practitioner’s familiarity with the classroom, are understood to reflect his individual interpretations, rather than objective measurements. Hence, theoretical literature is used for triangulation and as a basis for critical interpretation.

7. Findings

A synthesis of educational theory and data derived from reflective observations over nine years, combined with input from MYP 4 students and teachers (i.e. supervisors who guide students in research) , resulted in the findings which are presented as five interrelated themes. The themes have relevance for how we might better enable learners to develop understanding, thinking and reflection skills, as well as the ability to assess those skills in a more authentic way.

Overall, these findings offer a dialogue between learning theory and everyday practice, which is hoped to be of help both to those learning through engagement with the MYP science curriculum and those teaching the curriculum. The findings suggest ways by which MYP coordinators, teachers and students can contribute to assessment practices that make a difference to student learning.

Theme 1: Dialogue as a function of evidence of scientific understanding

It was often clear that students demonstrated understanding when they presented their thoughts through dialogue as part of a community project at a big school event compared to written assessments. Also, aspects of the assessment that involved some social interaction such as questioning, explanation and clarification - and especially peer discussion - actually reveal students' misconceptions and revealed how scientific reasoning and understanding could grow from discussion. These insights concur with Vygotsky and Bakhtin's ideas about the central role played by social interaction and dialogue in learning and concept development. Social interaction and dialogue, therefore, can be seen as legitimate evidence of students' mental processes just like written tasks.

Theme 2: Meaning-making happens through collaborative scientific discussions.

Students’ presentations were not a one-way communication of knowledge but collaboration between presenters, peers, teachers and audience members. Questions led the students to explain, claims and somehow their assumptions could be questioned and clarified in the same way that in the Mortimer and Scott's dialogic meaning-making model

scientific concepts and discourse are negotiated and discussed rather than transmitted. The implication of this is that assessment should value the process of knowledge construction occurring during scientific dialogue rather than focusing exclusively on final answers.

Theme 3: Dialogic assessment promotes student agency and metacognition
Students who engaged in sustained questioning and reflective discussion during classroom engagements and led to a big school event demonstrated greater ownership of their learning. They frequently revised their thinking after receiving audience feedback and articulated new understandings during presentations. This implies that dialogic assessment develops important IB's Approaches to Learning (ATL) skills, including communication, collaboration, reflection, and critical thinking (International Baccalaureate, 2814)/

Theme 4: Dialogic Assessment aligns with Inquiry-Based Science
The inquiry cycle embedded within the MYP encourages questioning, investigation, explanation, and reflection. Student presentations during community projects demonstrated that dialogue was already an integral component of scientific inquiry.

Rather than existing separately from assessment, dialogue functioned as a mechanism through which evidence of inquiry skills became visible. This implies that dialogic assessment supports the IB philosophy of inquiry and international-mindedness by encouraging collaborative knowledge construction and multiple perspectives.

Theme 5: Dialogic Assessment Enhances the Four MYP Science Assessment Criteria
Evidence indicates that dialogic assessment can enhance all four established assessment criteria without supplanting them.

- Criterion A: Knowledge and Understanding: Engaging in structured scientific dialogue allow students to articulate concepts, support scientific assertions, and address misconceptions, thereby providing further evidence of their conceptual grasp.

- Criterion B: Inquiring and Designing: Through collaborative discussions, students can justify their research questions, elucidate their investigative choices, and defend their methodological selections using scientific reasoning.

- **Criterion C**: Processing and Evaluation focuses on students' ability to express analytical ideas through speech as they interpret results, address problems, offer evidence, present counterarguments and discuss.

- **Criterion D:** Reflection on the impact of science uses exchange-style talks to improve ethical reasoning with a global perspective, critical reflection and awareness of the societal impacts of developments in science and technology through real conversation.

Proposed Dialogic Assessment Dimension.
A synthesis of theoretical frameworks and observations derived from community project presentations suggests that the current four MYP science criteria could be enhanced by incorporating a dialogic assessment component in each of them. This additional dimension would evaluate students' proficiency in:

i. Articulating scientific reasoning through conversation;
ii. Approaching inquiries with critical thought;
iii. Collaboratively building scientific knowledge with peers;
iv. Supporting claims with empirical evidence;
v. Reflecting on and adjusting their thinking during discussions; and
vi. Clearly conveying scientific concepts to various audiences.

The proposed dimension would not supplant the existing, well-established MYP assessment criteria; instead, it would offer more significant indicators of student development through data that closely aligns with constructivist learning theory, dialogic pedagogy, and the inquiry-based educational philosophy of the IB.

8. Challenges Limitations and opportunities for further research

A shift toward a dialogical assessment may also bring about several administrative and structural challenges. These issues, along with their associated effects on IB schools, are outlined and summarized in **Table 2** below:

Challenges	Impact on IB schools
Time Allocation	Dialogical assessments, such as one-on-one discussions or peer-led panels, demand more interaction time compared to simply grading a collection of written assignments.
Standardization:	Achieving consistent reliability may prove difficult when the assessment is characterized by unique and dynamic conversations
Teacher Training	Educators will require professional development to effectively facilitate advanced academic discussions without inadvertently guiding students to the correct answers
Moderation	There might be difficulties regarding how schools submit dialogue for International Baccalaureate moderation.

The challenges in the foregoing table can be countered by scheduling strategically together, developing standardised assessment rubrics and moderation protocols, developing targeted professional development programmes that will increase teachers' facilitation skills and integrating digital platforms where audio or video evidence could be recorded and submitted as efficiently as possible for IB moderation. Synthesis of existing theory, data and community projects presentations findings show that there is a unique dialogic element of assessment missing in the four MYP science criteria, which would provide an extra part against which students could be measured for competence.

One notable limitation emanating from this study is that this conceptual study is constrained by a theoretical analytic approach and a practitioner perspective conducted in just one educational setting, which limits the statistical generalisability of conclusions across IB schools worldwide. Therefore, the results of this work should be considered as a basis for further empirical research rather than definitive evidence of practice. Future work thus needs to make use of systematic classroom observations, teacher and student interviews, longitudinal case studies and mixed-methods research in various IB settings to support and refine the proposed dialogic assessment framework. Moreover, dialogic assessment offers substantial opportunities to improve evidence of student learning; yet its adoption may involve issues concerning the time provision, standardisation, teacher expertise and moderation procedures as indicated in **table 2**.

9. Conclusion

This paper has sought to investigate the possibility of dialogic assessment to enhance assessment in the International Baccalaureate Middle Years Programme (MYP) Science framework in the context of the theoretical perspectives of Vygotsky's sociocultural theory and Bakhtin's dialogism. By critically examining the literature, it has been observed that learning is socially mediated, meaning is constructed through dialogue, interaction and reflection. These are tenets that closely resonate with the inquiry-based philosophy of the MYP and the Nature of Science (NOS). From the theories explored, dialogic assessment has been depicted not as a substitute for the traditional assessment practices which are used in MYP, but as a form of assessment that serves to enhance evidence around student learning as it gives greater clarity to the science-based reasoning, conceptual understanding and collective meaning-making which are at work in students' learning.

In the conceptual arguments proposed in this paper, two interrelated sources of evidence informed the author's approach: The academic literature on dialogic pedagogy and sociocultural learning and the author's continuous professional observations over nine years of repeated presentations of MYP Year 4 Community Project in a Chinese international school. Repeated observations of multiple cohorts of students engaging in formal presentations and dialogue with teachers, students, parents and community members consistently indicated that many students articulated sophisticated reasoning, were able to justify decisions, critically reflect on what they had learned, and demonstrated conceptual understanding through oral interaction more effectively than through written products alone.

Given these longitudinal professional observations, alongside the theoretical perspectives advanced by Vygotsky and Bakhtin, the argument is made for investigating how such structured dialogic interactions can further enhance the implementation of MYP Science assessment criteria while also ensuring the reliability and standardization desired by the International Baccalaureate. Lastly, this paper proposed that structuring dialogue in existing MYP science assessment might reinforce student agency through increasing self-efficacy, metacognitive awareness, and articulation of more sophisticated scientific concepts. Teachers can provide enriched and more authentic evidence of learning that can enhance written assessments by inviting learners to articulate, defend, revise, and reflect on their scientific thinking through deliberate discourse. These theoretical propositions necessitate testing through empirical classroom research, but a synthesis of sociocultural theory, dialogic philosophy, evidence from the literature, and nine years of continuous professional observation leads to an emerging conceptual approach to dialogic assessment to be seen as an augmentation of, rather than a replacement for, the existing MYP Science assessment framework.

References

Alexander, R. (2018). Developing dialogic teaching: genesis, process, trial. *Research Papers in Education, 33*(5), 561–598. https://doi.org/10.1080/02671522.2018.1481140

Alexander, R. J. (2020). *A dialogic teaching companion*. Routledge.

Bakhtin, M. M. (1981). *The dialogic imagination: Four essays* (M. Holquist, Ed.; C. Emerson & M. Holquist, Trans.). University of Texas Press.

Belay, E. B., Alemu, M., & Tadesse, M. (2023). The effect of dialogic-practical work on secondary school students' mechanics achievement. Momentum: Physics Education Journal, 7(2), 207-219. https://doi.org/10.21067/mpej.v7i2.7686

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice, 5*(1), 7–74.

Egglezou, F. (2016). Bakhtin's Influence: A Dialogic Approach to Teaching of Argumentation / Bahtin'in Etkisi: Argümantasyon Öğretiminde Diyalog Temelli Bir Yaklaşım. *Ana Dili Eğitimi Dergisi*, *4*(1), 1–15. https://doi.org/10.16916/aded.03040

García-Carrión, R., López de Aguileta, G., Padrós, M., & Ramis-Salas, M. (2020). Implications for Social Impact of Dialogic Teaching and Learning. *Frontiers in Psychology*, *11*, Article 140. https://doi.org/10.3389/fpsyg.2020.00140

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, *77*(1), 81–112.

Heritage, M. (2010). *Formative assessment: Making it happen in the classroom*. Corwin Press.

Hetherington, L. (2024). Material-dialogic space as a framework for understanding material and embodied interaction science education. *Research in Science & Technological Education*, *42*(1), 202–218. https://doi.org/10.1080/02635143.2024.2328766

International Baccalaureate (IB). (2014). Middle Years Programme: Framework for the Middle Years Programme. https://www.ibo.org

International Baccalaureate Organization. (2021). *MYP: From principles into practice*. International Baccalaureate Organization. https://www.ibo.org

Mercer, N., & Littleton, K. (2007). *Dialogue and the development of children's thinking*. Routledge.

Mortimer, E. F., & Scott, P. H. (2003). *Meaning making in secondary science classrooms*. Open University Press.

Palmgren-Neuvonen L, Littleton K, Hirvonen N (2021), "Dialogic spaces in divergent and convergent collaborative learning tasks". *Information and Learning Sciences*, Vol. 122 No. 5-6 pp. 409–431, doi: https://doi.org/10.1108/ILS-02-2020-0043

Roth, W.-M. and Jornet, A. (2014), Toward a Theory of Experience. Sci. Ed., 98: 106-126. https://doi.org/10.1002/sce.21085

Tang, K.-S., Cooper, G., Rappa, N., Cooper, M., Sims, C., & Nonis, K. (2024). A dialogic approach to transform teaching, learning & assessment with generative AI in secondary education: a proof of concept. *Pedagogies: An International Journal*, *19*(4), 493–503. https://doi.org/10.1080/1554480x.2024.2379774

Teo, P. (2016). Exploring the dialogic space in teaching: A study of teacher talk in the pre-university classroom in Singapore. *Teaching and Teacher Education*, *56*, 47–60. https://doi.org/10.1016/j.tate.2016.01.019

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wilmes, Sara ED, and Christina Siry. 2021. “Multimodal Interaction Analysis: A Powerful Tool for Examining Plurilingual Students’ Engagement in Science Practices: Proposed Contribution to RISE Special Issue: Analysing Science Classroom Discourse.” Research in Science Education 51 (1):71–91.