

Engaging the Next Generation of Children with Science

By Terrance Burgess, Ph.D.

Introduction

Since prior to the onset of COVID-19, elementary-aged children were receiving approximately 20 minutes of science instruction per day during non-consecutive weeks (National Survey of Science and Mathematics Education [NSSME], 2018). Now, attending to the so-called instructional losses in a post-pandemic world further exacerbates the critical need for science instruction for all elementary learners. In fact, national reports have called for elementary teachers to “seek opportunities to continue to build their expertise in working toward equity and justice in their science and engineering teaching” (National Academies of Science, Engineering, and Medicine [NASEM], 2022, p.8). Additionally, research suggests that engaging children in science during the elementary grades has positive implications for their performance on school/state mandated exams (i.e., mathematics and literacy exams) (McClure et al., 2017). Considering the shift to standards-based instruction, it is critical that curricula be designed in response to—rather than in modification with—the most current science standards.

The *Next Generation Science Standards* (NGSS) (National Research Council, 2012) were developed as a tool to engage *all* students in equitable science learning opportunities. Although over a decade old, these standards remain in their infancy when considering their implementation. Specifically, the NGSS incorporate equitable instructional practices through its promotion of 3-dimensional instruction, where teachers are expected to enact science instruction that engages its “scientific and engineering practices, crosscutting concepts that unify the study of science and engineering through their common application across fields, and core ideas in four major disciplinary areas: physical sciences, life sciences, earth and space sciences, and engineering” (p. 2). By design, this multidimensional instruction begins in the elementary grades with the central ideas building upon one another (i.e., spiraling) each year rather than the traditional science instruction, where scientific concepts are introduced in certain grade levels, often with little contextual basis. As such, these instructional practices would utilize students’ experiences to build their capacities to develop meaningful connections to science, resulting in a preparedness for a society that requires a scientifically literate populace to engage in critical thinking for societal change. Therefore, through the provision of properly aligned materials that engage children in science and its practices, we can begin to advance access to meaningful science for all in pursuit of a more equitable and just society.



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Background

Rather than science instruction being a necessary endeavor to satisfy global demands, science is a child's fundamental right (Tate, 2001). As such, there is no question about *if* a child will receive science; instead, the question becomes *how* teachers will be supported in meeting these demands. To this end, the need for curriculum materials that are scientifically accurate, standards-aligned, and teacher-friendly are required (Kober, 2024). These materials allow children to occupy a more active role within their science instruction, often with their interests at the center. NGSS-aligned teaching and learning enable children to engage in science learning in a more authentic manner, utilizing myriad methods, including rotational stations (Keeley, 2018), which have been shown to support higher-order thinking skills, as they allow teachers to offer more differentiated and experiential instruction (NSTA, 2014).

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The corpus of literature detailing the experiences regarding the science confidence of both in-service elementary (Avraamidou, 2014; Gunning & Mensah, 2011) and pre-service teachers (Chen & Mensah, 2018; Hulings, 2022; Mensah, 2022), coupled with the role of the learning environment(s) (Avraamidou, 2014), suggests the quality of curriculum materials play a rather significant role in ensuring children access to engage in any science learning opportunities. In the classroom, these materials build elementary teachers' confidence with teaching science so that they view themselves as science teachers (Chen & Mensah, 2018) or feel empowered to thread science throughout other disciplines (Arias et al., 2024). This is significant, as it positions both teachers and students as science learners and allows children to experience science in an authentic manner. To this end, curriculum materials must be able to communicate key scientific ideas in ways that are also manageable for the teacher. Elementary teachers are already expected to be experts across myriad disciplines; if there is no incentive for a discipline for which there is no assessment accountability

(i.e., science), the pressures of existing accountability structures (i.e., mathematics and literacy) will continue to take precedence over other disciplines. This does not imply that assessments are (or should be) the *only* accountability measure; rather, this is the current system in which we operate.

Proposed Solution

Taken together, the *Experience Science*™ print and digital resources offer an innovative and relevant approach to elementary science instruction. Through careful design, these materials engage children in science learning that builds from their own wonderings, is phenomena-driven, and supports teachers in meeting the demands of this new 3-dimensional instruction. The phenomena are rooted in everyday wonderings, allowing children to truly immerse themselves in the scientific enterprise. To further support children's learning, the curriculum offers extension activities that engage children beyond the core content covered within the units (i.e., Experiences) and provides teachers with several scaffolded options to support their instruction. Children have an opportunity to explore phenomena through direct observation, videos, readings, and other activities. STEAM activities are also embedded throughout the experiences to further support children's interests.

Conclusion

These innovative materials center children's learning, ensuring that *all* children have relevant science curricula. Moving beyond equity as access (Gunckel et al., 2024) and toward equity as a meaningful endeavor in the pursuit of justice (Burgess & Patterson Williams, 2022), *Experience Science* truly positions children as the next generation of science thinkers, doers, and problem-solvers. While engaging with authentic science materials, research has shown that children develop identities which allow them to view themselves as scientists (Archer et al., 2010; Gonsalves et al., 2021). This realization also enables children to consider the ways science can be used as a catalyst for community change through participatory endeavors (Morales Doyle & Frausto, 2019).

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