

Early Elementary Integration Across Three Domains: Inquiry Science, Mathematics, and Language Development

Problem of Practice: Science education in elementary schools is too often under prioritized to make room for district required, national standards-based curricula in literacy and mathematics. If science is even taught, it is in one- or two-week surface level units that do not attempt to connect to student prior knowledge or extend learning into students' worlds beyond the classroom.

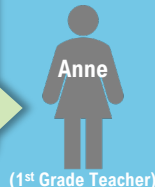
"...we don't teach science... I have all these awesome ideas... We just don't, it's not in the schedule, and been discouraged from doing science. [By your administration?] Yeah. [Because they care more about...] Literacy, and then math."



"Our science standards, our science kits that come... it feels like they stand alone or maybe we just aren't able to incorporate them in the way that they could be... So, being able to integrate, being able to connect that with the things we're doing and finding ways to be creative myself with science... build up my toolbox for presenting that knowledge and helping kids find joy in it which is what I want for all their learning."



"...the measurement component of the puddle activity... we kind of talked about the idea of hot gluing unifix cubes on a ruler, and then they could do it that way. I mean, we have only a centimeter of change in our puddle today. And you wouldn't see that at all... actually, we could do, we could hot glue, ones from like a base 10 block set, so that could work."



"and really brought into vocabulary, the pictures allowed for— if I, if I was an EL student, the pictures would have allowed me to understand what some of that vocabulary was and make connections to that vocabulary with a picture."

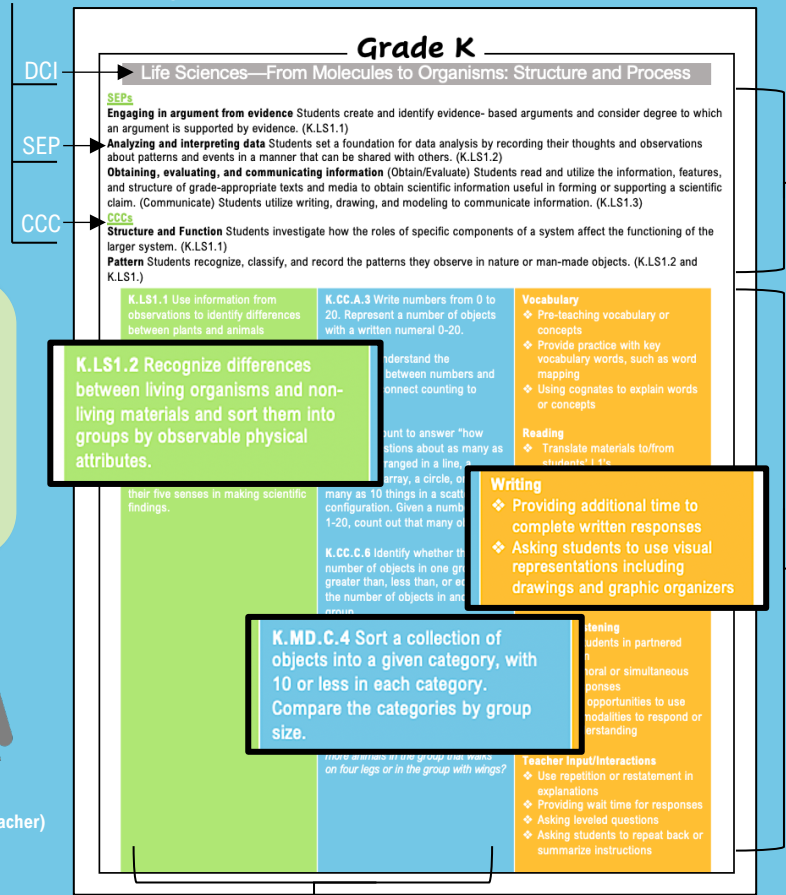


To view the design:



Suggested SEPs and CCCs from TN Science Standards Reference

3 Dimensions of Science Learning



TN Academic Standards for Science AND TN Math Standards

Categories of Literacy Skills for Science/Math Proficiency

Research Question: How can early elementary science and mathematics standards and practices be integrated with language development strategies to increase time spent on science instruction and students' conceptual understanding?

Initial Impacts of NCLB on Science Education

- ❖ Roughly **50% of the teachers** involved in a study by Griffith & Scharmann (2008) **cut time for science [instruction] by 31-60 minutes per week**, with another nearly 20% cutting between 61-90 minutes per week.
- ❖ In a comprehensive examination of all 50 states post NCLB, **more than 71% of school districts reduced elementary school instructional time in at least one subject** to have more time for reading and mathematics (Judson, 2013).

Math and Science Integration

- ❖ **Planning and carrying out investigations** in science has the potential to address **mathematical standards and practices**.
- ❖ Both science and math standards emphasize student construction of **conceptual understanding in relation to real-world practices**. (Mayes & Koballa, 2012)

Language Development and Content Integration

- ❖ **Decontextualized forms of instruction** leave English language learners in a world of **meaningless words** because it lacks an **authentic context for language use** (Stoddart et. al., 2012).
- ❖ Strategies for use with ELs would increase the number and diversity of strategies that teachers used, would lead teachers to add new strategies to their pedagogical repertoires, and would **increase the quality of the instructional strategies' teachers used to support ELLs in science** (Cervetti et. al., 2015).