

Physics as a Mechanism for Including ELLs into Classroom Discussions

Introduction

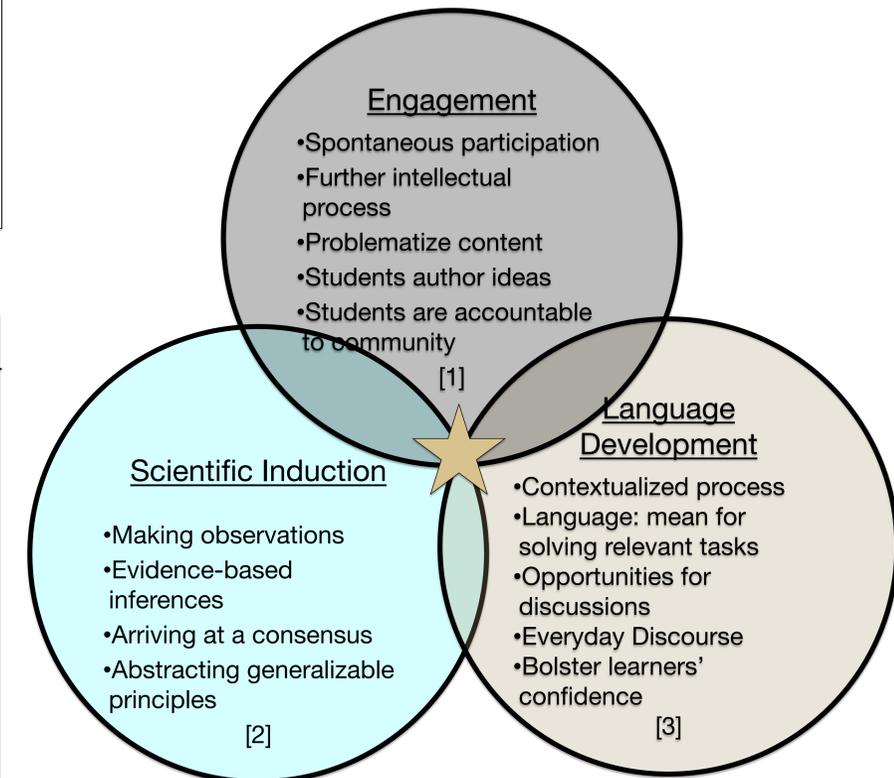
We explore how learning environments based on evidence-based and inductive reasoning engage and include English Language Learners (ELLs) into the learning process.

Students designed, built, and tested boats that could carry a toy mouse across a “river.” We analyzed a student’s (Ellie) explanation for why one of the boats had tipped forward, focusing on the content of her ideas and recruited communication strategies.

Research Questions

- What features of classrooms based on scientific induction foster engagement of ELLs?
- How can this engagement support emerging bilingual students’ conceptual and linguistic development?

Conceptual Framework



Data and Methods

Setting:

All 21 students were ELLs from a public school 1st-grade classroom, representing seven first languages. Ellie, a Chinese student, spoke no English before the beginning of the school year, and usually did not participate in discussions.

Data:

We videotaped five 75-minute sessions from the *Engineering Design* unit, and analyzed the third episode (testing projects).

Method

Generative coding scheme for identifying features of the learning environment and content of students’ ideas. The Case Study explores in greater depth Ellie’s explanations and communication strategies.

Findings

Observations

Ellie: *I think it is two – that here still don't have anything like it. These are here and this look this need 'nother one like that. Because this is two there. If this is there, then it's all good.*



Ellie: *here is a little bit, and don't have big – and don't have it.*

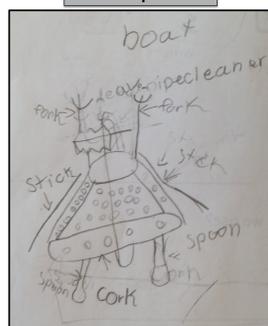
Inferences

- Ellie highlights there are an uneven number of pipe cleaners holding the mast.
- Ellie also points to the fact that the mast is not centered on the surface of the sponge
- Ellie was able to point to the tangible object (boat), which helped her share ideas.



Ellie: *Because you here – this has lots of feathers, so have a little bit – like too heavy and this boat will down here.*

Blueprint



Built Boat



Testing



Conclusions & Implications

- Students problematized their observations and were invested in explaining physical phenomenon
- Shared experience allowed students to talk about concrete data, and not abstract ideas
- Referring to a tangible object helped students communicate ideas
- Hybrid learning environment welcomed and honored everyday language and communication strategies
- Physics is perfect context for including ELLs into classroom discussions and developing language skills.

References

- [1] R. Engle and F. Conant. *Cognition & Instruction*, 20(4), 399-483 (2002)
 [2] C. R. Mann. *The Teaching of Physics for Purposes of General Education*. MacMillan, NY, 1912.
 [3] C. Baker. *Foundations of Bilingual Education and bilingualism*. Clevedon, Philadelphia, PA, 1993.