

“Because it hibernates faster”: 3rd grade English Language Learners making sense of sound



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Introduction

We explore how English Language Learners (ELLs) use familiar language when making sense of, and communicating their ideas about, physical phenomena.

We analyzed a discussion between third-grade ELLs, in which they tried to establish a connection between the physical properties of strings and the characteristics of the sounds produced by them (pitch and volume).

Research Questions

- How do ELLs use *everyday language* in the service of understanding?
- How science activities in *third spaces* mediate discussions?
- How does *everyday language* become formalized?

Theoretical Framework

Third Space: Bridging two originally incompatible spaces, “creating the potential for authentic interaction and learning to occur” (Vygotsky’s Theory of Concept Formation). [1,2]

Everyday Language and science: Using familiar discourse practices and cultural ways of knowing gives ELLs access to content knowledge, promotes construction of knowledge, and language development; all through exteriorizing mechanistic reasoning. [3,4]

Data and Methods

Data
All 14 participants were ELLs from a public school 3rd-grade classroom, representing nine first languages.

We videotaped four 45-minute sessions from the *Sound* unit, and analyzed the third episode (playing with a guitar-like instrument).

Method
Generative coding scheme for identifying academic concepts/terms and everyday concepts/terms used to describe physical phenomena. Codes were then matched to understand how these students were making meaning in physics.

Session 1: flicking rulers



Session 3: plucking strings



Findings

It makes a louder sound, the short one. (plucking the strings) **tick tick, tack tack, tock tock**. (First string goes) **ting ting**, (second string) **tong tong**, (third string) **tohg tohg**. (The first one) is going **ting ting** because it’s shorter (GA, 3-30).

I think I know why this is a **ting, ting ting**. I think because this part is tight, really tight. The **toong toong** is kind of tight. It’s making it **toong toong** because this part is kind of loose. This part is more looser than this. That’s why it makes a lower sound (BR, 206 – 218).

Familiar terms (onomatopoeias) helped students communicate ideas

Activity and language facilitated discussions about ideas and question

MA: This small. This one here is long. This one, and this one.
BR: I think she’s saying that they’re small.
DE: I think she is trying to say that it’s smaller.
BR: I think she’s saying that that is tighter.
GA: She said that this line is connected here. Right, MA? (149 – 189)

BR: The first one goes **ting** because it “hibernates” faster
GA: Hibernates?
BR: Vibernates! Because the smaller ruler made a high pitch noise. (39-45)

I think it’s because of the size. Because when you put the ruler longer, it make, like, “**toooooong**,” and that makes “**toooooong**.” And when you put the ruler shorter, it makes “**tiiiiing**,” and that makes “**tiiiiing**.” (GB, 245)

Working towards formalizing invented terminology

EVERYDAY TERMS

Ting Ting, Tong Tong

Big, Small

Strong, Hard, Loose

Hibernates, Fast

ACADEMIC TERMS

Pitch and/or Volume

Length of string

Tension on strings

Vibration Frequency

Conclusions

Coupling *inquiry* and *argumentation* science activities with *Third Spaces* invites students’ varied cultural and linguistic resources and promotes the processes of language development, and construction of scientific knowledge.

Formalized *everyday language* promoted connection between the guitar and the ruler, which is evidence of students moving towards a generalization.

References

- [1] K. Gutierrez et al., *Language Arts* 74(5), 368-378 (1997)
- [2] V. Otero and M. Nathan, *JRST* 45(4), 497-523 (2008)
- [3] B. Warren et al., *Journal of Research in Science Teaching*, 38(5), 529-552 (2001)
- [4] R. Russ et al., *Science Education* 92, 499-525 (2008)