Dialogic Interaction of Language Learners in a Knowledge Building Community

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Abstract: This study analyzed the engagement of eight English as a New Language (ENL) students in collaborative science inquiry over a school year in Grade 5. The science inquiry integrated knowledge-building discourse in the classroom and online. The data sources included classroom observations, records of face-to-face and online discourse, and interviews with the ENL and regular classroom teachers. Despite the language difficulties that the students encountered, they were able to improve their participation over time, interacting with peers in the knowledge-building discourse with support from the ENL teacher and regular classroom teacher. Collaborative knowledge building provides an authentic, dialogical context that integrates language learning with language use, with rich opportunities and social support for ENL students' to both listen and express their voice in classroom communication.

Keywords: Knowledge Building, Collaborative Learning, Language Learning, Science Education

Introduction

Education reforms in science and other areas highlight the needs to cultivate high-level, collaborative knowledge practices while addressing chasms of opportunities associated with students' social, cultural, and linguistic backgrounds. This research explores the opportunities and support for English as a New Language (ENL) learners to participate in collaborative knowledge practices in the classroom, which operates as a knowledge building community. In a knowledge building community, members identify and solve progressively deeper problems to advance the state of the community's knowledge. They engage in collaborative, knowledge-building dialogues in which participants not only share and examine information but continually build on and improve one another's ideas to create new knowledge and solve increasingly complex problems (Scardamalia & Bereiter, 2014). As research suggests, the context of collaborative knowledge building offers rich opportunities for students to enact high-level literacy, including productive reading, knowledge-transforming writing, dialogues, attentive listening, and multimodal idea representations (Bereiter & Scardamalia, 2005; Palincsar & Ladewski, 2006; Sun, Zhang, & Scardamalia 2010; Zhang & Sun, 2011). However, it remains unclear how ENL students may deal with language barriers to participate in and benefit from such collaborative knowledge building environments.

Thus, this research investigates the engagement of ENL students in collaborative knowledge building in their science curriculum, supported by their regular classroom teacher and ENL teacher. As the literature suggests, dialogic interaction plays an important role in language learners' learning, as "the creation of language involves the active development of the learner in the proximal context of interaction with others." (Tseng & Huh, 2016, p. 43) The knowledge-building discourse is characteristic of non-authoritative, interactive/dialogic communication in which different people contribute voices, hear one another's point of view, and collaborative explore and develop ideas (Mortimer & Scott, 2003). In dialogic communication, the teacher not merely directs and evaluates student's thinking but play non-authoritative roles including shaping ideas, selecting ideas, marking key ideas, sharing ideas, checking student understanding, and reviewing. ENL students may participate in the knowledge-building discourse in which they both experience the new language in a real context and put their new language in productive use.

ENL students may participate in the knowledge-building discourse in which they both experience the new language in a real context and put their new language in productive use. A recent meta-analysis (Estrella, Au, Jaeggi, and Collins, 2018) found that ENL students receiving inquiry instruction tended to obtain higher learning outcomes. At the same time, researchers also reported challenges for ENL learners, who may get confused or overwhelmed about inquiry-based activities (Manavathu & Zhou, 2012), and have difficulties understanding academic vocabularies. Meanwhile, teachers play an important role in helping students to overcome those challenges. Beyond the teacher's general role to promote active knowledge construction through self-guided exploration (Estrella, Au, Jaeggi, & Collins, 2018), specially purposed support might help ENL students become productive learners and contributors.

In this exploratory case study, we traced eight ENL students who participated in yearlong scientific inquiry in a grade 5 community to answer following questions: (a) what type of support do the ENL and mainstream (science) teacher provide the ENL students with? And (b) how do the ENL students participate in knowledge building with the support they received?

Method

Participants and learning context

This study was part of a larger design-based research conducted in a set of grades 5 classrooms that studied science using a knowledge building approach. Students studied three science topics—ecosystems, human body systems, and water--over a school year, with the support of Idea Thread Mapper (ITM), a visual collaboration platform (Zhang, et al., 2018). This study particularly focused on eight ENL students in two fifth-grade science classrooms (four in each) with different background (two from China, four from India, one from Afghanistan, and one from Spain) and level of language proficiency (from low to medium and advanced). In each classroom, there was about 20 students, the majority of whom were native speakers of English. Besides the science teacher, there was an ENL teacher who was supporting them in the science lessons. Both classes were thought by the same science and ENL teacher.

Data sources and analyses

The data collected for this study consisted of audio and video recordings of science lessons, researcher's fieldnotes, and semi-structured interviews with the ENL and science teacher. The interviews with teachers was analyzed using a grounded theory approach (Strauss & Corbin, 1998) to identify patterns teachers' support. We also used sociocultural discourse analysis (Mercer 2004, 2008) for identifying processes of interaction.

Results

The type of support each teacher referred to in their interview are presented in Table 1. As can be seen in this table, helping with writing and finding resources are common supports among all language proficiency level students. Also, beginner/low proficiency level students are the one who are receiving more support from teachers. Many of the supports mentioned by the teachers are non-authoritative and dialogic in nature, such as to trace student understanding, shape ideas, and review and reflect.

Table 1: Types of support provided to ENL students by ENL and mainstream (science) teacher

Proficiency level	Support type by ENL teacher	Support type by mainstream teacher
Beginner	- Helping with finding resources - Visualizing the information - Helping them to take notes and formulating sentences - Speaking support (word level help with pronunciation and meaning) - Reading support - Showing them how to use google translate to find meaning of new words	- Check on their understanding of text - Helping them put the info into their own words - Helping them become independent - Helping them with finding resources
Intermediate	- Support with their speaking - Writing support - Helping with finding resources	- Helping them with finding resources - Helping them put the info into their own words (support on writing)
Advanced	- Writing support - Asking them questions to help them proceed to next step - Helping with finding resources	- Helping them with finding resources

The analysis of the audio and video records of classroom activities identified major patterns of the teachers' interaction with the students. For example, in his interaction with low proficiency language learners, the ENL teacher began with a *recap* in the form of a summary of what he had worked on with them the previous session. Then he usually went through the previous notes on the student's notebook to review what they had learned, and then continued from where they had left off. He asked the students questions, with the interaction often unfolding as Initiation-Response-Follow up Feedback (IRF) exchanges (Mortimer & Scott, 2003). He also used different techniques to elicit their knowledge and responded to their ideas. For example, he used direct and cued elicitations, confirmation, repetition, elaboration, and reformulation (Mercer 2004). Due to limitation of

student speaking skills, the teachers' communication with the beginner level students was more "authoritative" than his communication with more advance learners. The teachers presented the scientific knowledge to the student with limited input from the student. At the same time, the teachers tried to engage the students in series of questions and answers even though the answers provided by the beginner level students were short. In contrast, the interaction of the teachers with intermediate and advanced students was more interactive/dialogic. These students expressed their thoughts and tentative guesses to the best level they could reach, with increased confidence to express themselves in speaking and writing. They then received support from the teacher, which helped them to revise or refine their understandings

We further observed and traced the ENL students' participation in the knowledge building community over the school year to see how they learned and contributed with the support from the teachers. As a typical pattern, the ENL teacher provided individual support to ENL students especially low proficiency level ones when they were working on their own research through reading and note taking. But when the students worked in groups with other students to create posters and do experiments, the ENL teacher would step aside and let them collaborate with peers and share their knowledge. The ENL students participated in the group-based activities and contributed what they have learned. For example, Yan was one of the students who engaged actively in different classroom activities despite difficulties with the language. She was studying eyes in the human body inquiry. The ENL teacher helped her find resources about eyes and assisted her to take notes, post some notes on ITM, and prepare a small poster. And then when she collaborated with a few peers to make another poster about eyes, she actively contributed to the group discourse and taught her peers what she had already learned, explaining what she knew about eyes. She became an active contributor in the human body inquiry as well as further improved in the subsequent units. Below is an excerpt from the mainstream (science) teacher's interview commenting on her work with peers:

> I was amazed at some of the research ENL Students were able to do.… the day that I watched Yan teach photosynthesis just reminded me why I teach because it was amazing and I was so proud of her that she stood in front of a group of kids and taught them how photosynthesis work, that was amazing.

Over time, Yan engaged more actively in dialogic communications with her peers with support from the teachers especially the ENL teacher. She started to become more independent and confident to share her knowledge with peers, express her thoughts, and engage in discussions. We saw similar improvement in the intermediate and advanced language learners over time, but the improvement was bolder for beginner level students (such as Yan) who were not active participants in the classroom at first and needed more support. With intermediate and advanced learners, the teachers were mostly helping them with writing and finding resources. The supports helped students get more organized in their communications with peers and not get distracted from the main focus of the inquiry.

Discussion

This study analyzed the engagement of eight ENL students in collaborative knowledge-building discourse over time with teacher support. The results elaborated patterns of teacher interaction with the ENL students of different proficiency levels, which supported their engagement and improvement in collaborative knowledge building. Despite the language difficulties that the students encountered, they were able to work on collaborative science inquiry and improve their participation over time, interacting with peers in the knowledge-building discourse with support from the ENL teacher and regular classroom teacher. Collaborative knowledge building provides an authentic, dialogical context that integrates language learning with language use, with rich opportunities and social support for ENL students' to both listen and express their voice in classroom communication. We are conducting further data collection and analysis that will provide a more detailed account of ENL students' interaction with their teachers and peers over time and look into the interplay between their language learning/use and scientific knowledge building. The findings will shed light on opportunities and designs to create inclusive knowledge building communities that support culturally and linguistically diverse learners.

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