



Productive Disciplinary Engagement in a Remote Laboratory Activity With an Eighth-Grade Science Class

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Abstract:

Remote laboratories offer students an opportunity to use analytical laboratory instruments through the Internet, in real time, from their classroom. Although remote laboratory activities offer great potential for engaging students' interest and student learning, little work has been done on using them with middle school students. This study focused on middle school students' engagement during a remote laboratory activity. With the help of facilitators, 18 eighth-grade students worked in six groups of three to remotely operate a Shimadzu TOC/TN Analyzer in a university chemistry laboratory, in real time, to measure the total nitrogen content in their river water samples. We video- and audio-recorded the students' discourse with each other and with facilitators during the activity. Following transcription, discourse was coded for types of engagement as defined by the Productive Disciplinary Engagement framework, which posits three types of engagement: general engagement—students make active contributions; disciplinary engagement—students' contributions are connected to the discipline of science; and productive disciplinary engagement—students make intellectual progress. All six groups

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demonstrated general engagement and disciplinary engagement. Students talked about both the technology, such as the video camera that allowed them to view inside the university laboratory, as well as the science, such as how the machine was actually doing the measuring. Two groups showed evidence of moving towards productive disciplinary engagement when they discussed the meaning of their results. Our results suggest that remote laboratory activities can engage middle school students and can be a site for their learning.

Keywords: remote laboratories; student engagement; discourse; Productive Disciplinary Engagement

Biographical Notes

Tory Anchikoski teaches Adult Basic Education (ABE) science courses at Thompson Rivers University in British Columbia. The abstract here describes the research conducted for her thesis when completing a Master of Education. Her passion for making science engaging and attainable inspired her current project of developing an open educational resource for an ABE chemistry course.

Carol Rees is an associate professor at Thompson Rivers University in British Columbia. Her research interests include supporting student-centred scientific inquiry, teacher-student interactions and co-teaching. She is currently working on a three-year research study entitled "Supporting Learner-Centred Pedagogy and Dialogic Teaching Through Co-Teaching" with Wolff-Michael Roth and Colette Murphy.