Distributed Interactions During "Hands-On" Labs with Paraeducators

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Abstract: We highlight potential areas of interest surrounding the dynamics of student-paraeducator collaborations, a type of collaboration that has largely been overlooked and could well inform future computer-supported collaborative learning (CSCL) research. We observed that engagement with materials was necessarily distributed and that this made implicit material practices in science activity explicit. We also observed that leadership in the group was emergent and distributed amongst both students and paraeducators.

Introduction

Current and projected shortages of fully credentialed special education teachers nationwide have forced many school districts to turn to paraeducators to provide the personalized support students need. Paraeducators often serve not only as teacher aides, but language interpreters and helping hands in material activity (Daniels & McBride 2001). These circumstances have made student-paraeducator groups a common arrangement, and these collaborations will become more widespread as employment of paraeducators is projected to grow over the next decade (Bureau of Labor Statistics). Group composition has implications on the nature of a group. Broadly, the current focus is designated on understanding student-student, student-teacher, and peer-peer collaboration with little to no research on student-paraeducator groups. CSCL spaces themselves can promote equity by redistributing participation and promoting engagement from underrepresented learners (Ramey & Stevens 2019) and when designing equitable learning spaces, it will be important to better understand student-paraeducator collaboration. This study unpacks student-paraeducator interaction and highlights potential areas of interest within student-paraeducator collaboration, particularly distributed interaction with materials and emergent leadership.

Methods

This study was conducted in a 9th grade biology classroom in a San Francisco Bay Area public high school with a predominantly Black, Latinx, and Asian student body. The focal group being highlighted here is composed of three students on individualized education plans and three paraeducators who worked together during a three week design-based CSCL biology curriculum. During the curriculum, learners used Internet of Things (IoT) enabled hardware and software to design and perform authentic investigations related to photosynthesis and cellular respiration in plants. All activities throughout the curriculum are meant to be collaborative, computer and hardware availability necessitated that learners work in small groups.

We collected video and/or screencast data from ten class periods during the curriculum. Activity within the focal group of three students and three paraeducators was captured via video for 531 minutes and via screencast for 311 minutes. Screencast data was summarized and logged and video data was thematically coded using MAXQDA software. Analysis of emergent leadership was informed by examining the groups problem solving discourse (Li et al. 2007, Sun et al. 2017).

Results: Distributing interactions with materials and leadership

Interactions with materials were necessarily distributed amongst members of the group. Two of the three students in the group were physically disabled in a way that inhibited them from directly interacting with hardware and other physical materials needed to complete investigations, meaning that if one of these students wanted to see a change to tangible components of their experimental setup they needed to communicate and cooperate with a paraeducator. None of the students were able to regularly record answers to the questions in their journals by hand, so students and paraeducators needed to discuss what would be recorded and submitted for credit. Similarly, the paraeducators understood that the investigations were not theirs alone, and they couldn't make large decisions about the experiment or journal answers without assent from students. No one person was able to make all decisions about materials, or was responsible for answers in a journal. This necessary cooperation forced some implicit material practices of science to become explicit.

Analysis of classroom video data revealed that leadership within the group was emergent and distributed amongst three key members, one student and two paraeducators. During the first class period of the curriculum, a discussion-focused day where no IoT equipment was used, paraeducators primarily acted as aides and worked with their individual students. Once lab activities began, associations between paraeducators and specific students dissolved and the group worked together. We found that a student, Bernice, assumed leadership when the group was planning investigations and running an investigation. A paraeducator, Ms. Ana, assumed leadership when the group needed to orient toward their lab handouts and answer questions in order to receive credit for the day. Another paraeducator, Ms. Camilla assumed leadership over materials, ensuring that they were properly set up and delegated tasks toward Harrison, a student who was able to manually interact with materials. Bernice and Ms. Camilla co-lead discussions about biology phenomena, and each represented the group at different times when they were asked questions by the teacher or members of the research team.

One event that exemplifies the group's distributed dynamic occurred while the group was running an investigation to learn how light conditions influence carbon dioxide gas concentration in a sealed container full of spinach. Bernice directed Ms. Camilla on how high to hold a lamp above their lab setup. Bernice watched the stream of data they were being produced, and asked Ms. Camilla to raise or lower the lamp if the light data started to move away from their desired value. Concurrently, Ms. Ana would ask both Bernice and Ms. Camila what was occurring biologically, and what to write down in the lab journal.

Conclusion and implications

The study highlights two potential areas of interest for better understanding student-paraeducator collaborations in CSCL settings. Distributed interactions with materials and necessary cooperation provided ample opportunities for the group to distribute leadership duties and make implicit science practices explicit. Through their interactions with each other, not only did students build knowledge and engage in more authentic science practices, but the paraeducators did as well. Further research on this group composition will allow us to design more equitable learning spaces and better understand the implicit material practices of learners in CSCL settings. Furthermore, we believe that forming a better understanding of this and other collaborations between students and non-credentialed adults may be beneficial for better designing learning spaces within remote and pod learning contexts.

References

Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, Teacher Assistants, at https://www.bls.gov/ooh/education-training-and-library/teacher-assistants.htm (visited *October 16, 2020*).

Daniels, V. I., & McBride, A. (2001). Paraeducators as critical team members: Redefining roles and responsibilities. *Nassp Bulletin*, *85*(623), 66-74.

Li, Y., Anderson, R. C., Nguyen-Jahiel, K., Dong, T., Archodidou, A., Kim, I. H., ... & Miller, B. (2007). Emergent leadership in children's discussion groups. *Cognition and Instruction*, 25(1), 1-2.

Ramey, K. & Stevens, R. (2019). Girls as Experts, Helpers, Organizers, and Leaders: Designing for Equitable Access and Participation in CSCL Environments. In Lund, K., Niccolai, G. P., Lavoué, E., Hmelo-Silver, C., Gweon, G., & Baker, M. (Eds.), *A Wide Lens: Combining Embodied, Enactive, Extended, and Embedded Learning in Collaborative Settings, 13th International Conference on Computer Supported Collaborative Learning (CSCL) 2019*, *Volume 1 (368-375).* Lyon, France: International Society of the Learning Sciences.

Sun, J., Anderson, R. C., Perry, M., & Lin, T. J. (2017). Emergent leadership in children's cooperative problem solving groups. *Cognition and Instruction*, *35*(3), 212-235.

