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Perspectives of Middle School Students on their Engagement and Relevance in Science

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Perspectives of Middle School Students on their Engagement and Relevance in Science



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Introduction

Research shows that in urban classrooms, middle school students often feel disengaged and alienated from science (Emdin et al., 2021; Fredricks et al., 2018). Yet, few studies have examined youths' perspectives directly. In this mixed methods study, we surveyed middle school students on their engagement (e.g., social, agentic, Patell et al., 2019; Wang et al., 2016), funds of knowledge (FoK, e.g., interests, cultural resources, Moll et al., 1992), and participation in science discourse (Murphy et al., 2018), and conducted focus group interviews about their learning experiences.

Research Questions

1. What are the profiles of **student engagement**, relevance (**FoK**), and participation in **science discourse**? (quant)
2. How are students conceptualizing and experiencing **engagement in science discourse**? (qual)
3. How relevant do students find science to their lives? (qual)
4. What are the opportunities students notice for talking about science and what improvements do they suggest? (qual)

Methodology

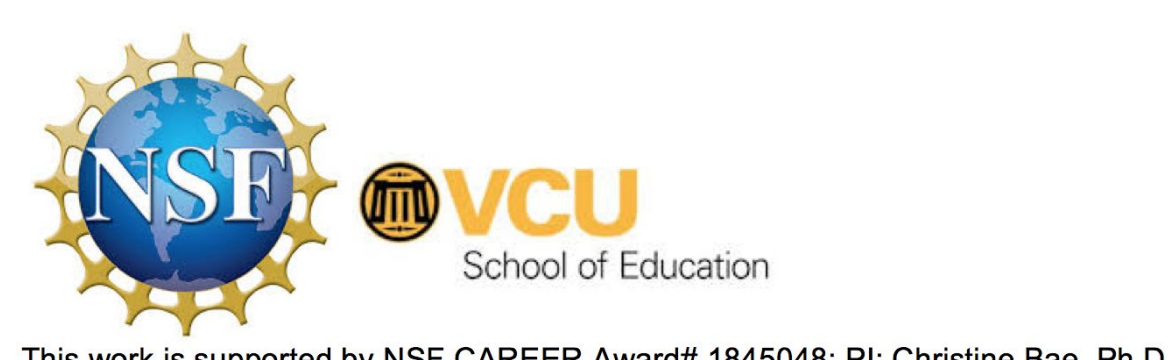
Participants were middle school students ($N = 135$) from the Mid-Atlantic region of the U.S.. Following a science lesson that teachers co-planned with the research team, students completed a Likert-scale questionnaire about their 1) science engagement (Wang et al., 2016, $\alpha = .68$), 2) funds of knowledge (Dickson et al., 2016, $\alpha = .71$), and 3) science discourse (Windschitl et al., 2018). Researchers also conducted focus group interviews with groups of 4 to 5 students. Descriptive statistics and latent profile analyses were conducted. Morin et al.'s (2016) criteria was used to determine the profile solution. The focus group interviews ($n = 19$) were transcribed and coded for themes using apriori codes from a prior study (Bae et al. 2022).

Results

Quantitative Results. Descriptive statistics showed that behavioral engagement ($M = 3.96$) and sense of belonging were most highly endorsed ($M = 3.27$). For the discourse items, students reported high participation in evidence, questioning, and peer talk (72-82% answering yes). Based on the AIC (644.86) and BIC (685.53) values, a **3 profile solution was identified**: students who were 1) engaged, saw relevance, and talkative in science ($n = 82$), 2) talked in science but were not engaged or found science relevant ($n = 26$), and 3) students who talked in science with average engagement and relevance ($n = 27$).

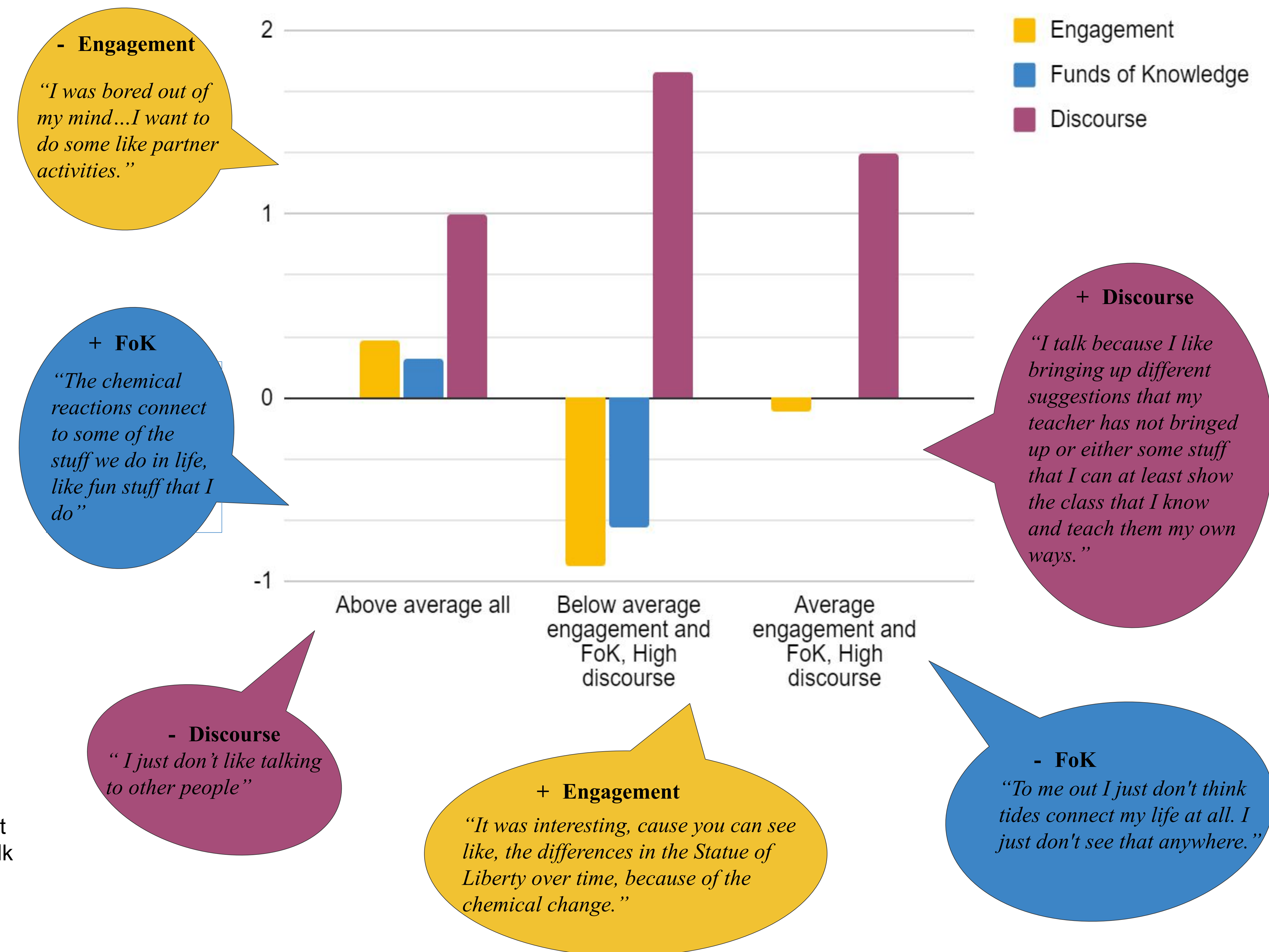
Qualitative Themes

- Students felt some lessons could connect more easily to their FoK (e.g. weather) than others
- Students in all classrooms **avored group work**, particularly in hands on activities. Some students expressed that their peers helped them learn in ways their teacher could not
- Students in classes without **hands-on activities** for their lesson wanted the opportunity to engage in such activities.
- **Note-taking and writing** activities were among the **least favorite** activities of most groups
- Some students felt that engagement didn't necessarily mean participation through speaking, they felt engaged through listening
- **Audiovisual** lesson aids were highly endorsed
- Enjoyment of the material, belief that they could make unique contributions, and comfort with people in the class all contributed to engagement and participation in discourse



References available on request:
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Joint Display of Student Profiles and Representative Quotes



Discussion

By centering students' voices on their own engagement, how their FoK are brought into the classroom, and their place in classroom discourse, we identified instructional and practical factors that play into how students' experience science learning. For example, regular reminders to collect data in order to successfully complete an in-class activity was an important factor in their engagement and participation in discourse. Findings also indicate that a notable amount of what influences students to engage and find science relevant are prior experiences before even coming to class, which has implications for ongoing and sustained opportunities across the K-12 curriculum. Our data indicate that the students in our sample generally felt they belonged in science class and that they could talk in science class the way they do at home, but that their outside interests weren't always reflected in their science classes. However, the ability to bring what students are interested in into lessons may depend on the subject matter, and responses from students likely vary depending on their own individual interests. Overall, our data indicate that the majority of students feel they participate in science discourse, but that steps can still be taken to make science classes more engaging and inclusive spaces.