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I see myself as a Science Person: Insights into Science Identity Development Among Emergent Multilingual Youth

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Abstract: Science identities and competencies are influenced by teacher recognition and student self-perception. Drawing on social positioning theory, this study examines which factors can contribute to science identity development among multilingual students. 46 multilingual middle school students in Northeastern U.S., took the Social Positioning of English Language Learners (SPELL) survey and quantitative correlation analysis revealed a connection between teacher recognition and student perceived competence. Furthermore, self-identified 'science persons' informed their competence and science career interests.

Introduction

Science identity, or one's developing sense of self, remains a multifaceted and fluid construct. Studies demonstrate the importance of students seeing themselves and being recognized for their competence, performance, and interest which are integral to learning and developing positive orientations towards science identities or careers (Aschbacher et al., 2014; Carlone & Johnson, 2007). However, the competencies and identities (e.g., linguistic, cultural, and disciplinary) of multilingual students are often viewed through a deficit or inequitable lens in science education (Harper & Kayumova, 2023). Teachers who uphold an equitable lens by recognizing and valuing linguistic or disciplinary assets as necessary for learning, can positively influence multilingual student's science identity development and self-perceptions of their competencies (Kayumova & Dou, 2022). This study looks to contribute to the research field by examining–(a) Is there a significant relationship between teacher recognition and student perception of their competency? (b) Is there a significant correlation between student's competency and their self-recognition?

Theory and methods

Asset-based social positioning focuses on how learners perceive their developing sense of self and how their competence is perceived (Davies & Harré, 1990). Our theory informs our survey items: teacher recognition (i.e., "my teacher tells me"); student perception of general and domain-specific competence (i.e., "I am"); student perception of science identity (i.e., "I see myself"); and student interest in a science career (i.e., "I want to get a job"). We also computed Cronbach's Alpha for these survey items, which was .678, indicating a satisfactory level of reliability. Participants include 46 Black and Brown multilingual 7th grade students from two non-dominant school districts in Northeastern, U.S. Social Positioning of English Language Learners (SPELL) survey data was collected in 2019 during a two-week longitudinal STEAM summer program, at a local university. The SPELL survey responses were collected using a Likert scale (i.e., 0 = Strongly disagree and 4 = Strongly agree).

Findings

We ran a series of Pearson correlation tests as we analyzed the relationship between the survey items and their correlations, noting any significance. The Pearson correlation test indicated that the association between teacher recognition and student perceived competency was significant at the 0.01 and 0.05 levels (see Table 1).

Table 1
Survey Questions and Their Statistics

Survey Questions	Mean	Std. Deviation	N
My teacher tells me I am good at science	2.57	1.223	46
My teacher tells me I am smart	3.02	1.125	46
I am good at science	2.48	1.150	46
I am smart	3.02	1.043	46
I see myself as a science person	1.48	1.295	46
I want my job related to science	1.70	1.590	46

This suggests that students' perceptions of teacher recognition, are influential in how they view their own competency. Notably, while individual items representing teacher recognition and competence showed separate

significant correlations, their combination yielded a stronger correlation ($r = .526$, $p < .01$). Next, we analyzed the intercorrelation between the survey items (see Table 2).

Table 2

Inter-Item Correlation Matrix

	Teacher tells me I am good at sci.	Teacher tells me I am smart	I am good at sci.	I am smart	I see myself as a science person	I want my job related to sci.
Teacher tells me I am good at sci.	1.000	.411**	.341*	.338*	.190	.159
Teacher tells me I am smart	.411**	1.000	.353**	.435**	.038	.140
I am good at sci.	.341*	.353**	1.000	.362**	.395**	.094
I am smart	.338*	.435**	.362**	1.000	.041	.339*
I see myself as a science person	.190	.038	.395**	.041	1.000	.407**
I want my job related to sci.	.159	.140	.094	.339*	.407**	1.000

**. Correlation is significance at the 0.01 level (1 tailed). *. Correlation is significance at the 0.05 level (1 tailed).

Findings also demonstrated that there was no significant correlation between students' perception of their general competence and science identity. However, perceived science competency did demonstrate a significant relationship with self-recognition of science identity, with a significance value below 0.01. The relationship between student interest in science careers, teacher recognition, competence, and science identity were also explored. The results showed a significant correlation with general competency ($r = .339$, $p < .05$) and self-recognition ($r = .407$, $p < .01$).

Discussion and implications

Findings demonstrate that teacher recognition correlates with student's perceived competence in science (Hazari et al., 2010), but not science identity. The emergent positive correlations, underscore the impact of asset-based teacher recognition informing student perception. Moreover, students' self-perceptions of their science competency significantly correlated with their science identities. Findings also reveal that students' perceptions about their competence and recognition influenced their career interests (Tan et al., 2013). Further research should examine which factors, beyond asset-based teacher recognition and students' perceptions, are necessary to equitably support the science identity development and educational trajectories of multilingual students.

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