Understanding Linguistically Diverse Students' Development of Vocabulary During Science Learning Using Semantic Network Analysis

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Background and Purpose

- Engaging linguistically diverse students in **developing**, revising, and explaining scientific models in pairs can promote their understanding of unobservable scientific phenomena through discourserich practices.
- Exploring linguistically diverse students' conversations may reveal patterns of their **vocabulary development** during scientific modeling practices.
- Previous work showed that **Semantic Network Analysis (SNA)** has the potential to visualize the structure and relationships among the use of vocabulary.
- Given the limited research in applying SNA on pairs' discourse during scientific modeling practices, the study explored the following research questions (RQs):

RQ1: What's the structure of linguistically diverse students' vocabulary and the relationships among the words?

RQ2: How does students' vocabulary development change over time?

		Analysis I	Methods			
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 This SURF project used collected and analyzed a This resulted in 5649 tal 	16 transcr as part of the lk turns of p	ipts from the vie e larger NSF pro airs.	deo files that voject.	were		
	Divisi	ons of Model	ing Activitie	es		
• Students' talk turns were	e divided inf	to six divisions	based on the f	ollowing:		
Working on models			Working on explanations			
D1	D2	D3	D4	D5	D6	
Rec 1st	eiving the feedback	Half point of model revisions		Receiving the 1 st feedback	Half point of explanation revisions	
Building and revising models Writing and revising explanations					ons	
	Sema	ntic Network	Analysis (S	SNA)		
• Data was cleaned up by	y removing	stop words (e.g.	, the, a) and le	emmatization.		
changes, changed, changing —						
• Any words that were u	sed more the	an three times w	vere included	in a word list.		
• Building on the existin the analysis to revise the second secon	g list from t ne Three Tie	he larger project r Model (Beck e	t, this SURF pet al., 2002) th	project added addi prough iterative pr	tional words from rocesses.	
Tier 1: Basic Words	Tier 2: General Academic Word			Tier 3: Specific Content Words		
e.g., ice, water	e.g., describe, exp		olain	e.g., water m	e.g., water molecule, state	
• The project used KBDeX, R, and Gephi to visualize the semantic networks.						







Results

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- With SNA, the study explored the structure and development of students' discussions as they gradually centralized around several key scientific concepts. Students made stronger connections of academic and content-specific words through discourse-rich collaborative
- modeling practices. SNA can be more widely used in the future to understand the vocabulary development of students in different collaboration
- settings or in other disciplines.