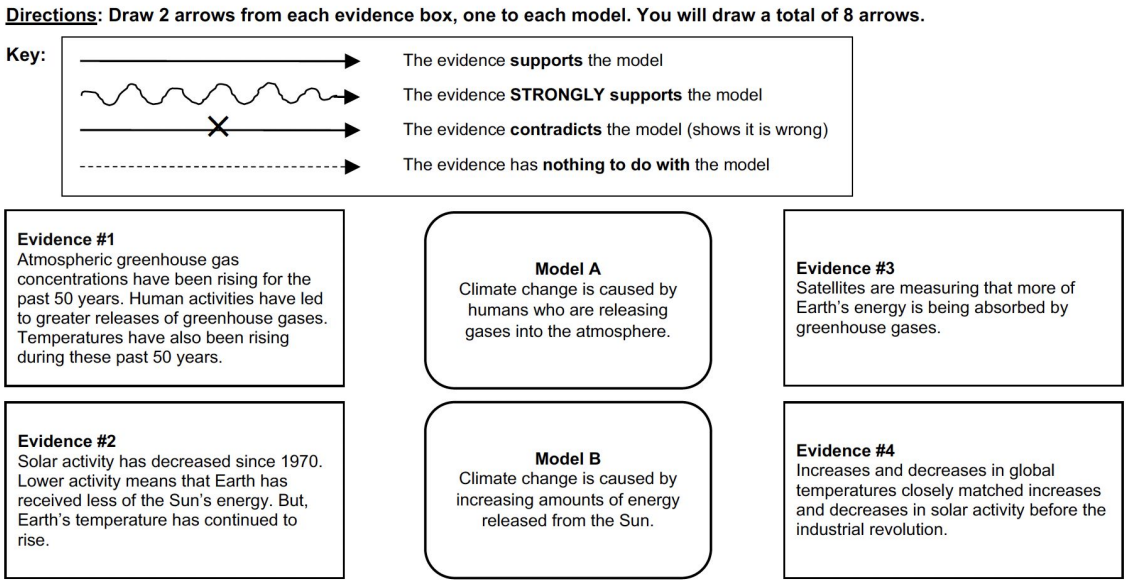
Discourse Strategies

Reasoning within Discourse & the Explanation Task

- Evidence #1 supports Model A because……

- Levels of reasoning:
  - Erroneous
  - Descriptive
  - Relational
  - Critical

- Builds on Talk Moves



Research: Argumentation through Negotiation and Consensus Building

- Scientific argumentation enables students to engage in real word scientific practices by rationalizing claims founded in supporting evidence.
- Student engagement in scientific argumentation activates the negotiation process by which students develop and defend evidence-based claims.

Research Questions:

- *How did students negotiate evaluations of the relationship between lines of scientific evidence and alternative explanatory models of a phenomenon during an argument-based learning activity?*
- *What differences, if any, existed in the negotiations in which students reach consensus and those in which there was no resolution?*

Negotiation within Argumentation
What is NEGOTIATION?

- A subset of argumentation, where students present a position, agree or disagree with each other by offering explanations and counter arguments, and reach conclusions through civil discourse and conversation (Chen & Steenhoek, 2013; Nussbaum, 2021).
- One way to co-construct knowledge via argumentative discourse Baker (2009)
- Social negotiation of scientific evidence and claims allows students to deepen their understanding of scientific knowledge and consensus.
- Allows for the construction of scientific knowledge as a result of collaborative discourse Chen (2011)

Central to engagement in the practice of argumentation.

Building Consensus through Negotiation

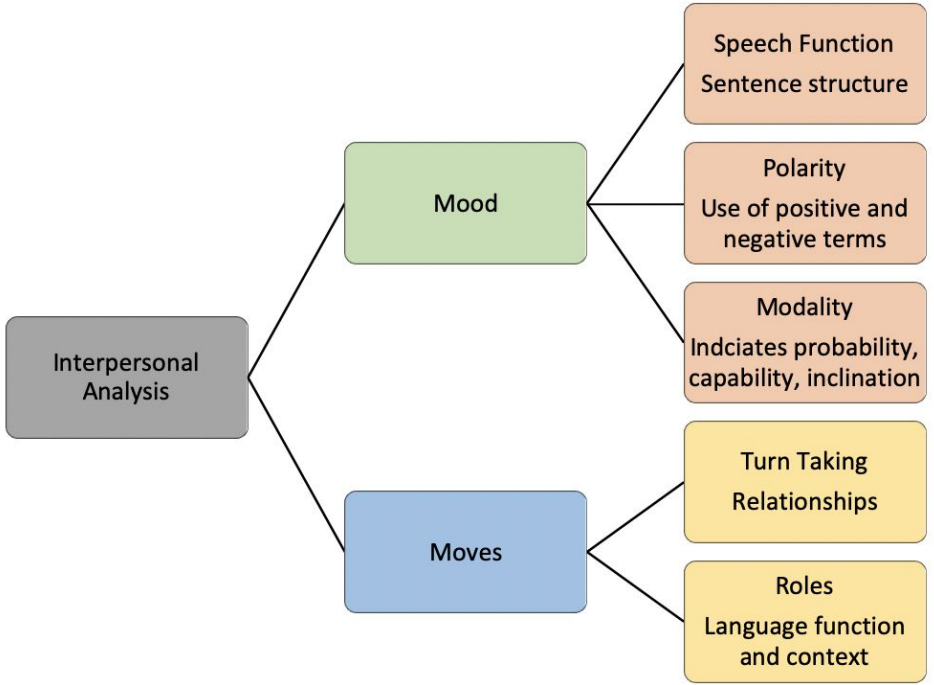
- Important in the co-construction of scientific knowledge
- Desired outcome of scientific argumentation
- Requires collaborative discourse

BUT….what does that look like?

Analyzing Discourse through SFL
(Governor et al., 2021)

Systemic Functional Linguistics:

- multi-layered theory of language
- meaning is expressed through the structure and function of language
- grammatical structures give meaning to language
- lexical choices made in conversation reveal meaning



Person	Clause	Clause ID	Move	Subject	Finite	Modality	Mood	Speech Function	Move	Interpretation	Evidence	Summary
T	What about Model A? (Note Model B resolved first.)	i	1	Model	(related)		Wh- Interrogative	Question	Open: Initiate: Information: Ask Opinion	Initiates negotiation by asking a question about E:M relationship	Question - only teacher interaction	Follows resolution of 2B, pretty tight conversation of evidence interpretation and connection to model A. No disagreement, however S1 seems to initially misunderstand the information presented in the evidence text.
S1	But it (evidence) also proves it (Model A).	i	2a	It (evidence)	proves	C - also	Declarative full	Contradiction	Respond: Support: Reply: Answer	Makes initial claim about E:M		
	I *wouldn't* say like...	ii*	2b			O - would (not)	Abanoned			Starts to give reason, initial confidence	Uses modal *would*	
S3	Strongly supports?	i	3	(it evidence)	supports		Polar Elliptical Interrogative	Question	Rejoin: Support: Track: Check	Questions position of S1	Uses question - not statement	
S2	So it strongly or just supports it?	i	4	it (evidence)	supports		Elliptical Polar Interrogative	Question	Rejoin: Support: Track: Check	Asks for clarification of E:M R		3 specific questions about the evidence text
S1	I mean like, this is saying that our activity is what is causing this.	i	5	this	says	Incong - mean	Declarative full	Answer	Sustain: Continue: Append: Elaborate	Continues from interruption by reference evidence text to back position		Moves 2 - 9 are all about interpretation of the evidence text - funny how S2 asks questions to get S1 to see misinterpretation
S2	Is it though?	i	6	it (evidence)	is saying		Polar Elliptical Interrogative	Question	Rejoin: Confront: Challenge: Rebound	Doesn't agree, don't understand S1's position	Points out problem with reasoning using a question	Student 2 is again guiding the conversation through use of questions and suggestions even though S1 dominates conversation
S3	Is it saying that?	i	7	It (evidence)	is saying		Polar Elliptical Interrogative	Question	Rejoin: Confront: Challenge: Rebound	Repeats S2 inquiry		
S1	It's not.	i	8a	it (evidence)	is not (saying)		Elliptical Declarative	Answer	Respond: Support: Reply: Answer	Begins with pretty confident negative appraisal to support position	Doesn't use any modifiers	
	It's not saying that.	ii	8b	it (evidence)	is not (saying)		Elliptical Declarative	Answer	Sustain: Continue: Prolong: Extend	Repeats position		
	You're right you're right! You're right!	i	9	You	are		Exclamatory	Acknowledgement	Respond: Support: Reply: Acknowledge	Realizes that he misunderstood the information	Amplifier *you're right* repeated	
S3	It's saying that it's getting hotter.	i	10a	It (evidence)	is saying		Elliptical Declarative	Contradiction	Rejoin: Support: Response: Resolve	Explains by providing more information about the text to frame the discussion of E:M relationship		
	But it doesn't give us a cause at this point.	ii	10b	it (evidence)	does not		Elliptical Declarative	Contradiction	Sustain: Continue: Prolong: Extend			
S2	Or...yellow (NOTE: Yellow = "nothing to do with")	i	11	(it evidence)	(does not)		Elliptical Declarative	Statement	Respond: Support: Develop: Extend	Offers alternative E:M relatioship		
S1	That's true	i	12	That	is		Declarative full	Acknowledgement	Respond: Support: Engage	Recognizes S2 suggestion		
	Maybe yellow.	ii	13a	(it evidence)	may be	P - maybe	Declarative Elliptical	Contradiction	Respond: Support: Develop: Elaborate	S1 starts to think through suggestion giving low probability	Modal *maybe* used to lower risk	
	Cause like-	iii	13b				Abanoned					
S2	Does It say anything about like humans In the...problems?	i	14	It (evidence)	says		Polar Interrogative	Question	Rejoin: Support: Track: check	Asks question to resolve E:M relationship		
S3	Mmmm...no.	i	15				minor (closure)	Answer	Respond: Support: Engage	Responds, 'no'		
S2	So then it *wouldn't* really relate to model A.	i	16	it (evidence)	not relate	0 - would (not) U - really	Declarative full	Statement	Respond: Support: Develop: Enhance	Based on answer, draws conclusion based on answers to questions about the evidence	Modal *would* used to give higher degree of confidence to conclusion	
S3	Ok	i	17				minor (closure)	Acknowledgement	Respond: Support: Engage	Agrees		
S1	Cool	i	18				minor (closure)	Acknowledgement	Respond: Support: Engage	Agrees		

Mood

Mood	S1		S2		S3		T		Student total		Student + teacher	
Polar interrogative Session 1 and 2 data	2	2	3	1	2	2	1	0	7	5	8	5
Polar interrogative Combined data	4		4		4		1		12		13	
Elliptical polar interrogative Session 1 and 2 data	1	1	3	2	3	0	4	2	7	3	11	5
Elliptical polar interrogative Combined data	2		5		3		6		10		16	
Wh-interrogative Session 1 and 2 data	0	0	1	1	0	3	3	0	1	4	4	4
Wh-interrogative Combined data	0		2		3		3		5		8	
Wh-elliptical interrogative Sessions 1 and 2	0	0	0	0	0	0	0	0	0	0	0	0
Wh-elliptical interrogative Combined data	0		0		0		0		0		0	
Total interrogatives Session 1 and 2 data	3	3	7	4	5	5	8	2	15	12	23	14
Total interrogatives	**6**		**11**		**10**		**10**		**27**		**37**	

Mood

Sentence Structure

- Declarative
- Interrogative
  - Polar (yes/no)
  - Wh-
- Exclamatory
- Imperative

Insights into roles of participants w/in context

Modality

Language used to temper assertions

- Judgement
- Uncertainty
- Variation

Facilitate negotiation

- Politeness by skewing words +/- direction

Discourse Moves

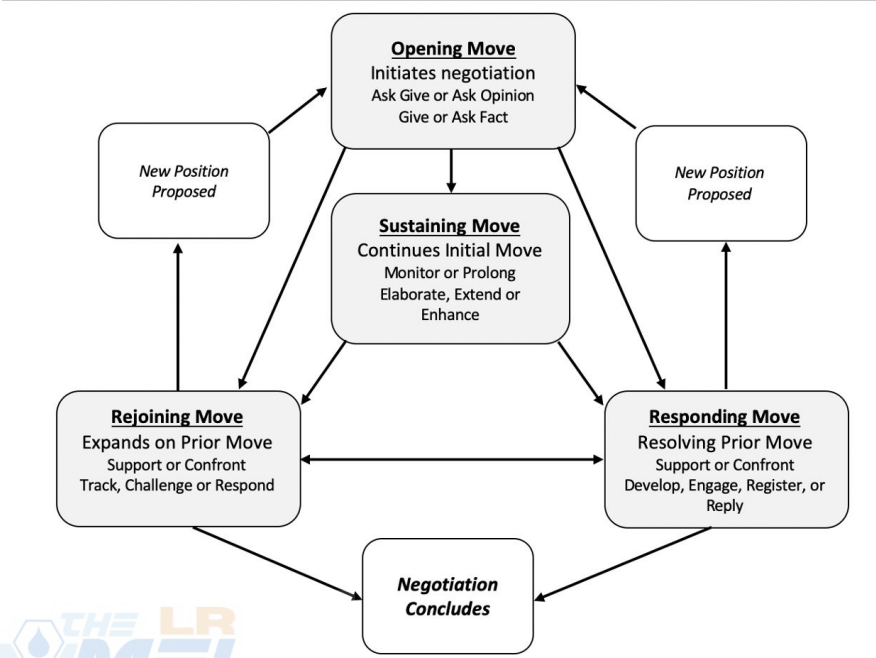


TABLE 8 Student moves as a percentage of total student moves

	Student 1 (%)		Student 2 (%)		Student 3 (%)	
Student moves Sessions 1 and 2	34	24	34	39	32	37
Average moves combined	29		36		35	
Consensus negotiations	29		36		35	
Nonconsensus negotiation	30		40		30	

TABLE 9 Use of student rejoin/react-confront moves by negotiation

Negotiation	Outcome	Number of moves	Number of rejoin/ respond - confront moves	Percent of rejoin/ respond - confront moves (%)
Session 1				
1A	Consensus	23	1	4
1B	No resolution	24	5	21
2A	Consensus	18	2	11
2B	Consensus	14	0	0
Session 2				
1A	Consensus	8	1	13
1B	Consensus	49	4	8
2A	Consensus	8	1	13
2B	Consensus	13	1	8

Findings

Students softened negotiations by:

1. Modality used most often to soften assertions through terms such as: *could*, *kind of*, *maybe*, *I think*, *I feel for Inclination*.
2. As a negotiation progressed, modal terms moved from tentative to greater certainty (would, should, probably) - indicates more confidence
3. Successful negotiations used more questions (>20%) compared to unsuccessful (5%)
4. Using polar interrogatives - questions with yes/no responses serves to soften negotiation - successful negotiations used more
5. Unsuccessful negotiations involved strategies that shut down collaboration: interruptions, dominance, double polarity, confrontational moves to force early closure

Implications

LISTEN to student discourse

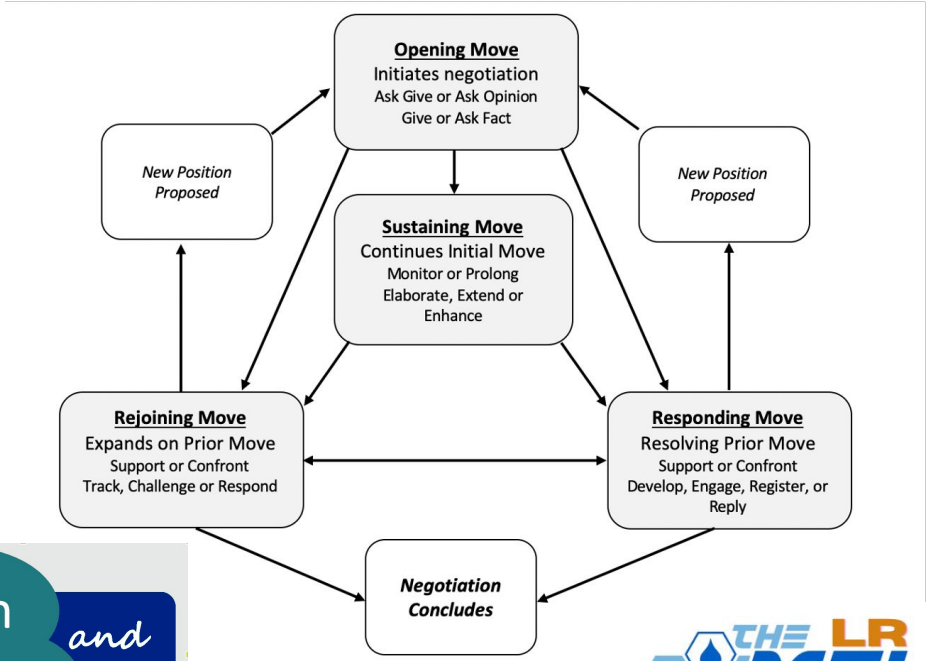
- Constructive patterns - asking questions (especially polar interrogatives), turn taking, progressing modulation (degrees of certainty)
- Destructive patterns - dominance, interruptions, cutting off, few questions, early closure, off topic, double polarity (negatives), dismissing claims

TEACH constructive discourse

- Turn taking - balanced interaction
- Asking questions (esp. polar interrogatives)
- Making moves that encourage elaboration or extend ideas
- Present claims, offer rebuttals, present qualifiers
- Modeling

Theory Into Practice: Negotiation Moves

- How can we use what we learned to guide instruction?
- What moves would you expect students to engage in?
- How would you expect a negotiation to unfold?
- How can we help students have more productive negotiations?



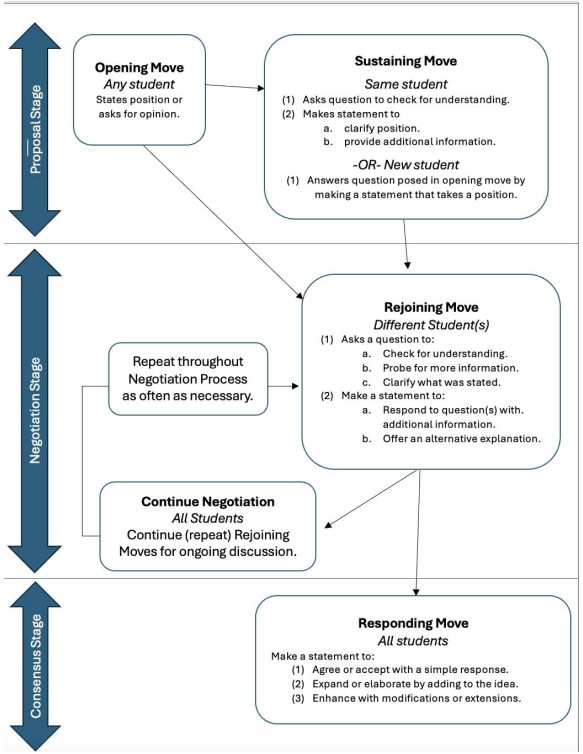
Elaborating on the Moves

Type of Move & Purpose	Appropriate Mood	Sample Student Negotiation Discourse
Opening Move *Initiates negotiation*	Initial idea(s) are proposed or invited to establish the context of the negotiation	
Ask for a Fact or Opinion	Ask a Question (Interrogative) • Polar (yes/no?) • Wh- (where, when, where, how…)	*How do you think that Evidence 3 relates to Model B? (Wh-)*
State a Fact or Opinion	Make a Statement (Declarative) • Take a position	*I think that Evidence 2 supports Model A because….*
Sustaining Move *Same speaker builds on initial move OR new speaker responds to opening question*	Prolongs or extends the proposal through elaboration and/or questioning OR Allows another student to present initial proposal	
Check for understanding	Ask a Question (Interrogative) • Polar (yes/no?)	*Do you understand what I'm suggesting?*
Elaborate, Enhance, or Expand	Make a Statement (Declarative) Same Student: • Clarify position • Provide additional information on your position Different Student: • State a position to answer question posed in Opening Move	*Evidence 1 provides data that shows a relationship to support my position…* *So, I think that Evidence 1 contradicts Model 2 because….*

React - Rejoining Moves *ALL speaker(s)* *Expands negotiation*	Responds to proposed idea(s) by asking for clarification or additional information, OR offers alternative ideas	
Confirm or clarify what was stated	Ask a Question (Interrogative) • Polar (yes/no?)	*Do you mean to say that….*
Probe for more information	Ask a Question (Interrogative) • Wh- (where, when, where, how…)	*Where did you find that information?*
Countering what was stated	Make a Statement (Declarative) • Offer alternative explanation(s)	*Another possibility is that…*
React - Responding Move *Final Speaker(s)* *Resolves negotiation*	Completes negotiation by moving toward a decision	
Support with Simple Agreement	Make a Statement (Declarative) • Accept, agree, acknowledge or affirm	*I accept that explanation.*
Support by Extending or Elaborating	Make a Statement (Declarative) • Adds more information	*I agree that Evidence 2 contradicts Model B because the graph shows a clear correlation.*
Support by Enhancing	Make a Statement (Declarative) • Agree with modifications or qualifications	*I can accept that Evidence 4 supports Model A however, I don't think it is a strongly supported relationship.*

THE LR MEL PROJECT

Creating an Instructional Scaffold



Analyzing Discourse Transcripts (handout)

In groups…..

- Does student discourse follow this flow?
- Where is it strongest?
- Where is it weakest?
- Where do students need guidance?

How would you teach?

Teaching by Modeling - Freshwater baMEL

Teaching by Modeling - Freshwater baMEL

Model A: Earth's freshwater is abundant and will remain so even in the face of global climate change.

Earth is a closed system. This means that there is no net water loss globally. Even with future impacts of climate change, the amount of freshwater will not change.

Model B: Earth's freshwater challenges will be solved by engineering solutions.

Although the future may bring challenges to maintaining an adequate freshwater supply, technology is rapidly changing. Future engineering solutions will meet any future freshwater challenges.

Model C: Earth has a shortage of freshwater, which will worsen as our world's population increases.

Increasing population will limit the availability of freshwater supplies. Almost all human activities require freshwater. Climate change will further stress availability

MODELS

Teaching by Modeling - Freshwater

Model A
Earth's freshwater is abundant and will remain so even in the face of global climate change.

LET'S MODEL THIS!

Evidence #1: Land use changes have generated large pressures on freshwater resources. These changes are affecting both water quality and availability.
Farming, mining, and forestry require large amounts of water. Almost half of our land is used for farming. As populations continue to grow, there will be less water available to use for crops. In countries where climate change has affected weather patterns, there will be even less available water. Such countries include the Philippines, Pakistan, Vietnam, and Australia. As land use is changed, the water cycle is altered at local and regional levels. Figure 1.1 shows that increasing the amount of solid surfaces leads to greater runoff. Houses, roads, and other structures block some water from going into the ground. When this happens, more water runs off into local bodies of water. The water that runs into the local bodies of water includes anything that it can carry along the way. This can decrease water quality.

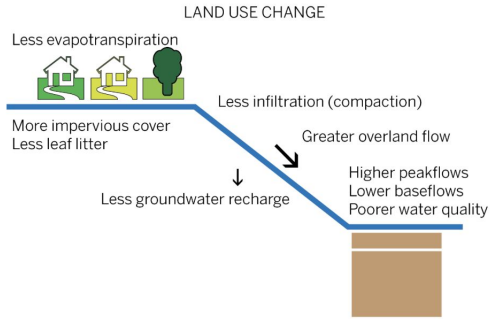


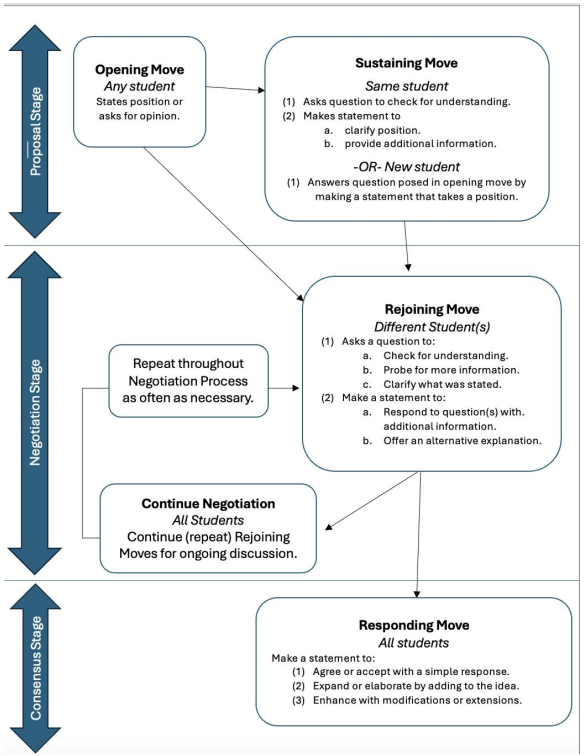
Figure 1.1. Changes in the movement of water when land use changes. Wright Seneres.

The evidence **supports** the model
The evidence **STRONGLY supports** the model
The evidence **contradicts** the model (shows its wrong)
The evidence has **nothing to do with** the model

NEED A VOLUNTEER!

Let's model using the Negotiation Framework Flowchart handout!

Your Turn! Let's Practice!



Working in groups:

- Freshwater baMEL
- Handouts for Evidence (randomly distributed)
- Follow flowchart and negotiate your line of evidence to one model using the flow chart to guide your discourse.
- Reverse roles!

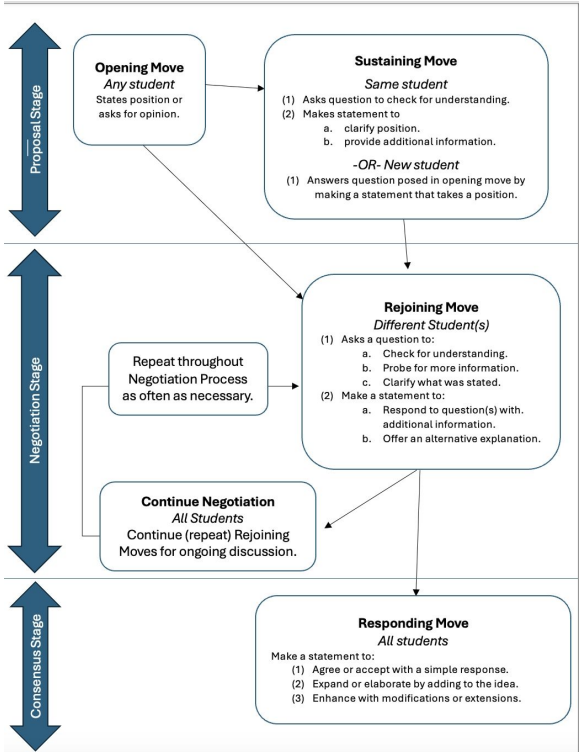
Time: 10 minutes

Model A
Earth's freshwater is abundant and will remain so even in the face of global climate change.

Model B
Earth has a shortage of freshwater that can be met by engineering solutions.

Model C
Earth has a shortage of freshwater, which will worsen as our world's population increases.

Debriefing



- What worked?
- What didn't?
- How would you apply in your classroom?
- How can it be improved and/or better implemented?

Please share any instructional insights!

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