

Examining the Positioning of Ideas in the Disciplines



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Enabling Productive Discussion

Productive Discourse is Supported By [1-3]:

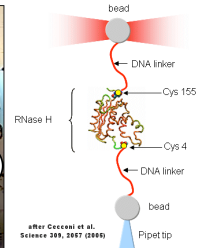
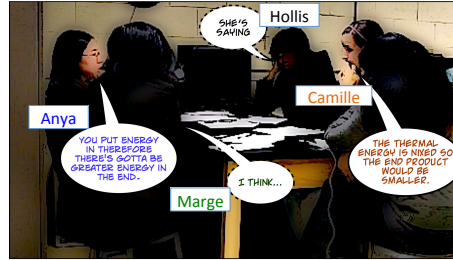
- Genuinely considering individual ideas
- Spending time with weak or incomplete ideas
- Maintaining a shared framing of the activity

How do the interactional moves of 'quiet' students support productive discussion?

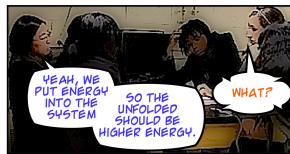
Context

- Anya, Camille, Marge, and Hollis working on a collaborative group problem-solving task
- Enrolled in a reformed Physics for Life Science Majors class [4]
- The course context encourages connections between physics, chemistry, and biology

Question students are discussing: Is the energy of the **unfolded** RNase protein **smaller** or **larger** than the energy of the **folded** RNase protein?



The Discussion

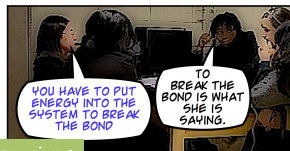
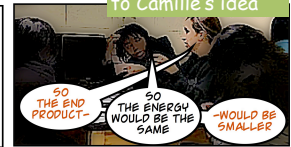


Marge extends Anya's idea

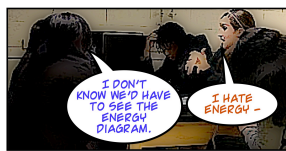


CAMILLE PRESENTS THE IDEA THAT THERMAL ENERGY IS SEPARATE FROM THE SYSTEM, AND THEREFORE DOES NOT COUNT AS ENERGY IN THE SYSTEM.

Hollis attends to Camille's idea



Hollis revoices Anya's idea



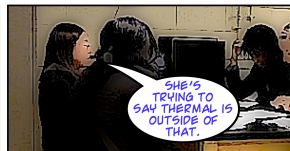
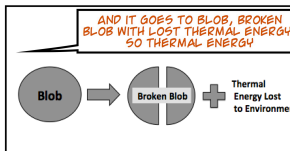
Marge supports Camille's idea



Hollis requests elaboration on Camille's idea



Anya draws on ideas of enthalpy



Anya uses ideas of endothermic reactions



Hollis extends Anya's idea

Conclusion: Positioning Ideas with Value Contributes to Productive Discourse

Marge and Hollis position ideas as having value to the conversation



Anya positions ideas with authority from outside physics



Productive Discourse

- Marge extends the idea of energy input by asking where the input occurs
- Hollis revoices the idea that energy is required to break bonds
- Hollis completes the idea that thermal energy is lost from the system
- Marge refocuses the discussion on the idea that energy is less in the unfolded protein

- Language of delta-H
- Reasoning with 'endothermic'

- Genuinely considering individual ideas
- Spending time with weak or incomplete ideas
- Maintaining a shared framing of the activity

References

- [1] B. Barron, *J. Learn. Sci.* 12, 307 (2003).
- [2] K. Hogan, B.K. Nastasi, and M. Pressley, *Cognition Instruct.* 17, 379 (1999).
- [3] R.E. Scherr, and D. Hammer, *Cognition Instruct.* 27, 147 (2009).
- [4] For more information on the course, see <http://goo.gl/sz84h>

Acknowledgments

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