

Reframing Classroom Discourse through the Lens of Benefit to Cost Ratios

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Basic questions related to student discourse:

1. Do students have the skill set to engage in argumentative discourse?

- Yes - Mercier & Sperber (2011), Cavagnetto & Kurtz (2016)
- What counts of evidence may not be sophisticated –but that is learned through discussion

2. Do students choose to cooperate given the educational setting?

- Cognitive, socio-cultural, emotional resources that students rely on
- What are the Costs and Benefits of participation?

Costs and Benefits are how a student's actions influence the student in the immediate and long-term future.

What does Cost & Benefit mean for education?

Is it a worthwhile construct to look at?

Yes, well documented in studies related to cooperation and participation (sociology, psychology, economics, anthropology, biology)

Can it apply to education?

What we been looking at...

- Empirically
 - Factors that may be influencing one's decision to cooperate (prosocial disposition)
- Theoretical elements – what is the fundamental sense of literacy? what do these environments contain?
 - rich dialogue
 - conceptual frameworks
 - authorship/ownership
 - power and agency

Factors influencing prosocial dispositions

Primary grades 3-6 (ages 8-11)

- n = 659
- Self report measure CCEM-E
- Outcome Measure = Prosocial Disposition
- Factors
 - Valuation of Others
 - Social concern
 - Classroom Rules & Routines
 - Monitoring of Rules

University biology course (ages 17+)

- n = 1719
- Self report measure CCEM
- Outcome Measure = Prosocial Disposition
- Factors
 - Valuation of Others
 - Social Concern
 - Cooperative Norms
 - Reciprocity

Regression analysis of the factors to determine predictors of prosocial dispositions.

Factors influencing cooperation

- Prosocial Disposition –willingness to cooperate with others. Willingness to engage with someone even though you incur a cost.
- **Valuation of Others** –Benefit of working with others & Benefit of classmates' ideas (immediate benefits) (Kurzban et al, 2015; Nowak, 2006)
- **Reciprocity** –If I help my classmate he will help me back (long term benefit). (Kurzban et al., 2015; Trivers, 1971)
- **Classroom Routines and Rules** –Awareness of expectations for participation in the group. (Wilson, Ostrom & Cox, 2013)
- **Monitoring of Rules** -Potential consequences for rule breaking. (Englemann, 2013; Wilson, Ostrom, & Cox, 2013)
- **Social/Reputational concern** - Others' perceptions of me. (Englemann et al., 2013)

Primary Grades 3-6 (Ages 8-11)

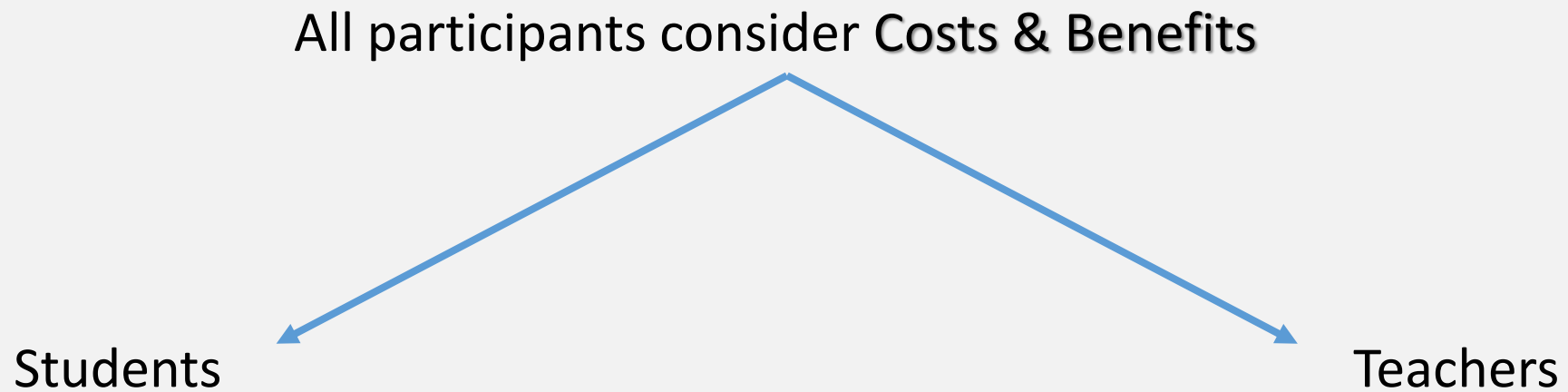
Term	Estimate	Std Error	Prob> t	Std Beta
Intercept	2.1726	0.2399	<.0001*	0
Value Others	0.2700	0.0362	<.0001*	0.2966
Routines/Rules	0.1424	0.0512	0.0056*	0.1180
Monitor Rules	0.1242	0.0381	0.0012*	0.1226
Social Concern	0.1893	0.0307	<.0001*	0.2355
Gender[1]	-0.0897	0.0359	0.0127*	-0.0772

University Students (Ages 17+)

Term	Estimate	Std Error	Prob> t	Std Beta
Intercept	1.4046	0.0880	<.0001*	0
Value Others	0.1943	0.0174	<.0001*	0.2555
Coop. Norms	0.3005	0.0226	<.0001*	0.3134
Reciprocity	0.0649	0.0153	<.0001*	0.0924
Social Concern	0.0650	0.0139	<.0001*	0.1033
Gender[1]	-0.0431	0.0368	0.2411	-0.0416
Gender[2]	-0.0298	0.0361	0.4091	-0.0294

Models accounts for 38% and 34% of variance in prosocial dispositions respectively.

What does this mean for learning environments:



Applying to Science Classrooms

- We have been using the Science Writing Heuristic (SWH) approach
- Focused on building knowledge through the use of science argumentative and language practices
- Is knowledge generation - requiring students to have to be immersed in science practices as the “live” the argumentative and language practices

Students adapting to the new demands (costs)

- SWH approach demands much of students in terms of discourse
- We frame this around *we negotiate ideas not people*
- An interesting outcome is that to obtain the benefits in having to negotiate and critique ideas – students become much more formal in their language use
- By becoming more formal they separate the personal (costs) from the understanding (benefit) and hence dialogue becomes richer and more beneficial

Benefit to costs – research outcomes

- Greater understanding of the science concepts
- Greater development of critical thinking growth
- Able to increase success in mathematics and language

References

- Cavagnetto, A. R., & Kurtz, K. J. (2016). Promoting Students' Attention to Argumentative Reasoning Patterns. *Science Education*, 100(4), 625-644. <https://doi.org/10.1002/sce.21220>
- Engelmann, J. M., Over, H., Herrmann, E., & Tomasello, M. (2013). Young children care more about their reputation with ingroup members and potential reciprocators. *Developmental Science*, 16(6), 952-958.
- Kurzban, R., Burton-Chellew, M. N., & West, S. A. (2015). The evolution of altruism in humans. *Annual Review of Psychology*, 66, 575-599.
- Mercier, H., & Sperber, D. (2011). Why do humans reason? Arguments for an argumentative theory. *Behavioural and Brain Sciences*, 34(11), 57-111.
- Nowak, M. A. (2006). Five rules for the evolution of cooperation. *Science*, 314(5805), 1560-1563.
- Trivers R. 1971. The evolution of reciprocal altruism. *Q. Rev. Biol.* 46, 35–57.
- Wilson, D. S., Ostrom, E., & Cox, M. E. (2013). Generalizing the core design principles for the efficacy of groups. *Journal of Economic Behaviour & Organization*, 90, Supplement, S21–S32. doi:10.1016/j.jebo.2012.12.010

Thank you

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