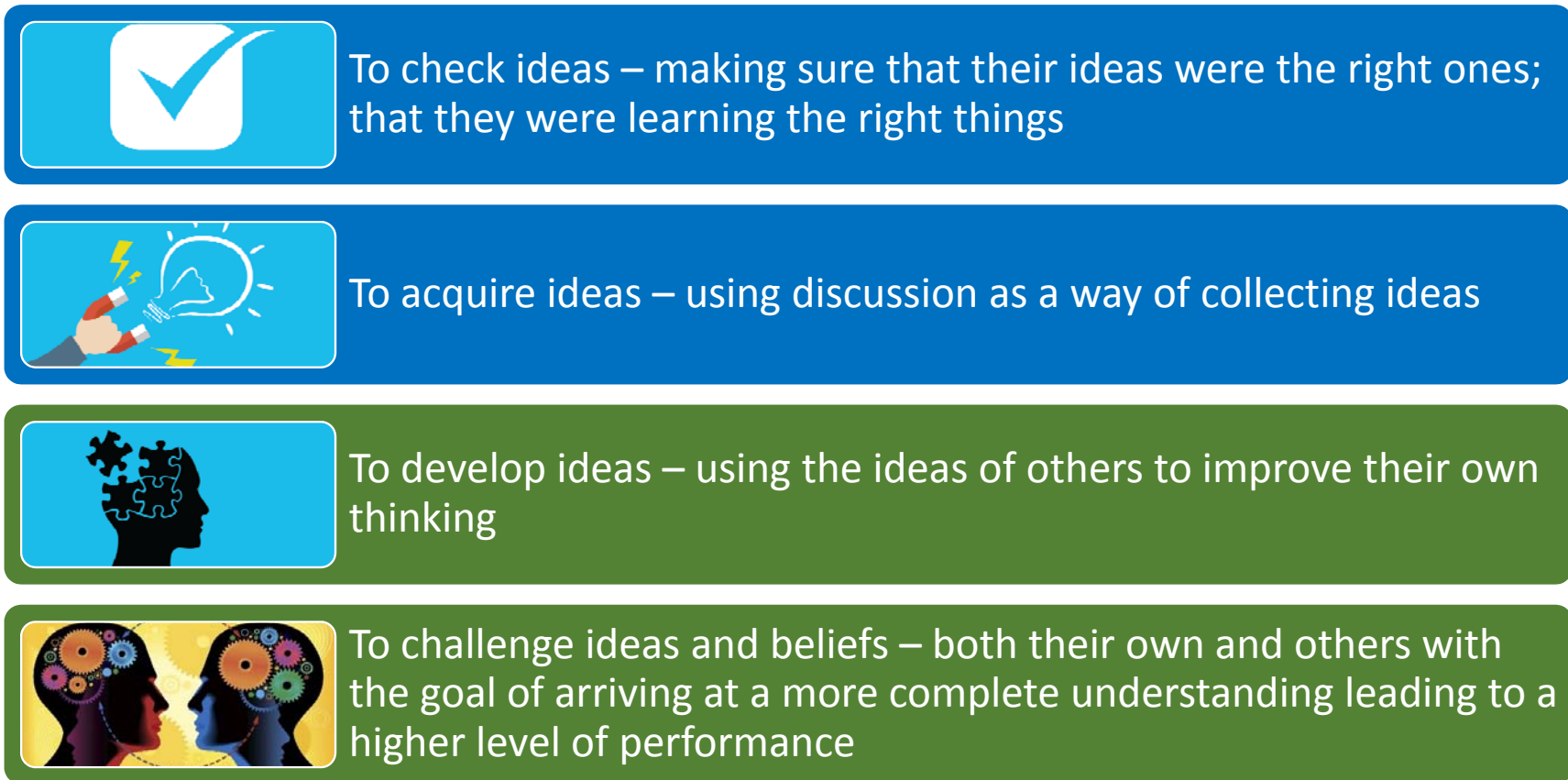


Investigating student learning in online discussion forums through a transactivity framework

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Approaches to learning through discussion



Surface

Deep

Ellis, R. A., Goodyear, P., Prosser, M., and O'Hara, A. (2006)

Transactive discussion is defined as “**reasoning that operates on the reasoning of another.**” [...]

Rather than merely providing consecutive assertions, discussants “operate” on each other's reasoning.

(Berkowitz and Gibbs, 1983)

Concept of Transactivity

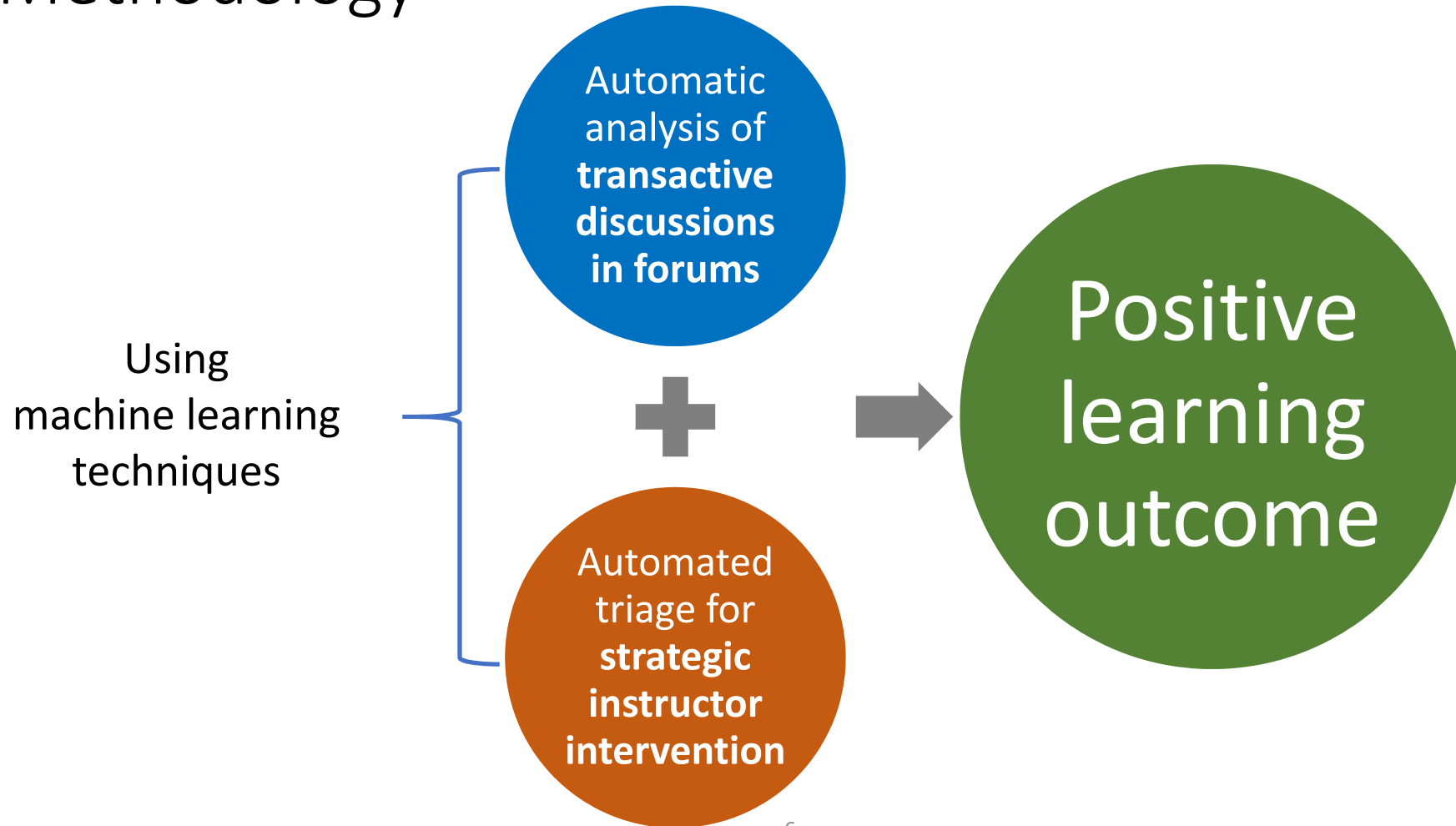
- Build reasoning together
 - Articulate new ideas
 - Develop on an idea expressed
 - Be open to others' perspectives (peers and instructors)
 - Arrive at a shared understanding
- Require scaffolding (provided by peers and instructors)
- DNA of effective collaborative learning

Coding Interventions: Transactivity framework

CLARIFICATION REQUEST	COMPLETION	EXTENSION	FEEDBACK REQUEST	INTEGRATION
JUSTIFICATION REQUEST	JUXTAPOSITION	PARAPHRASE	REASONING CRITIQUE	REFINEMENT
DISAGREEMENT	AGREEMENT	APPRECIATION	ANSWER	OTHER

Proposed by the team from a framework based on “Measuring the development of features of moral discussion” by M. W. Berkowitz and J. C. Gibbs, 1983, Merrill -Palmer Quarterly, 29, pp. 399-410, further refined by Teasley, 1999.

Methodology

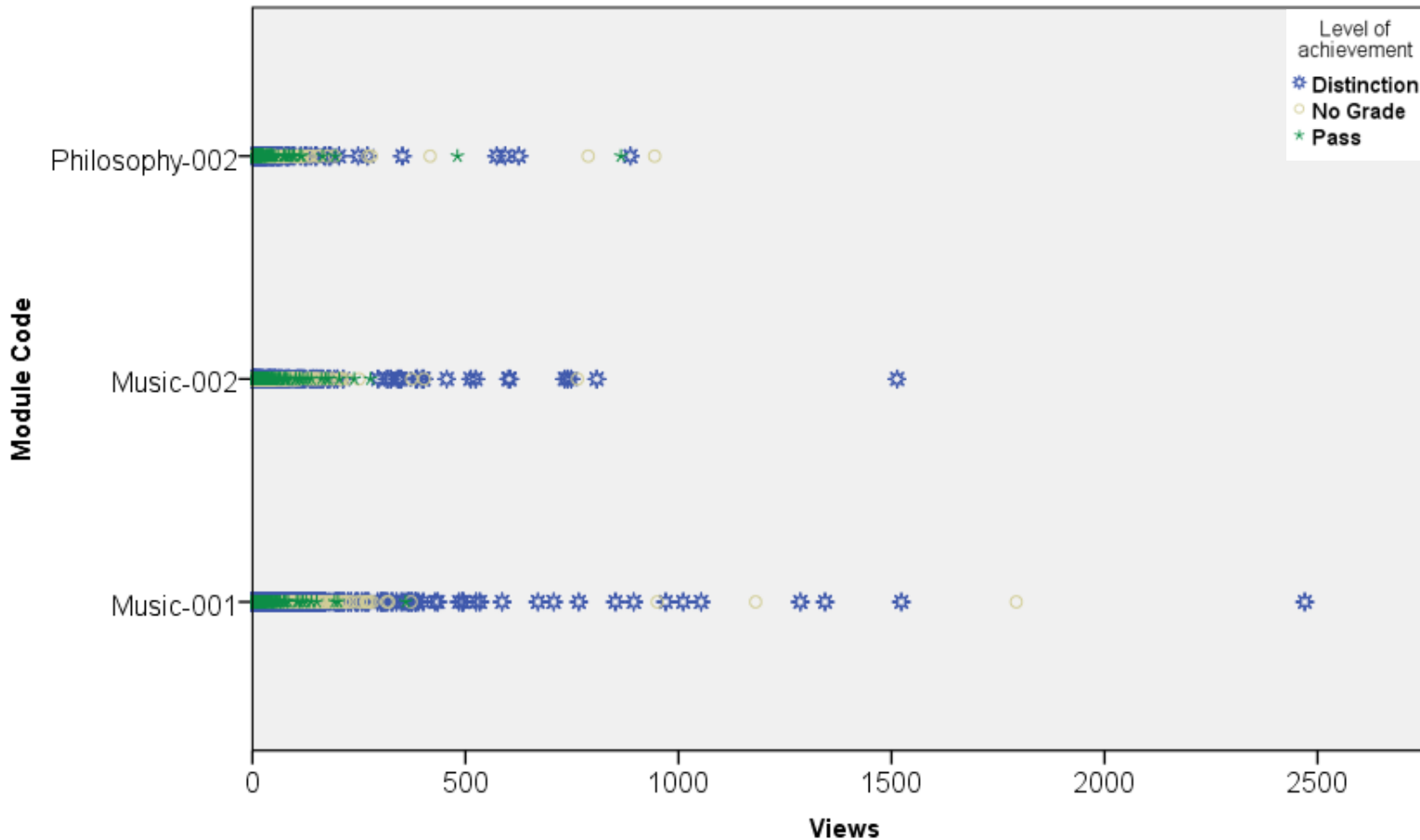


Dataset

MOOC Course	Total students	No. of Views	No. of Posts	No. of Upvotes	Instructor Interventions	Annotated threads*
Write Like Mozart: An Introduction to Classical Music Composition (music-001)	35,714	1,04,418	6,950	4,491	232	133
Write Like Mozart: An Introduction to Classical Music Composition (music-001)	17,753	51,957	1,335	2,119	13	9
Reason and Persuasion: Thinking Through Three Dialogues By Plato (philosophy-002)	37,273	33,562	3,667	2,573	62	21

*on-site students annotated instructor-intervened discussion threads

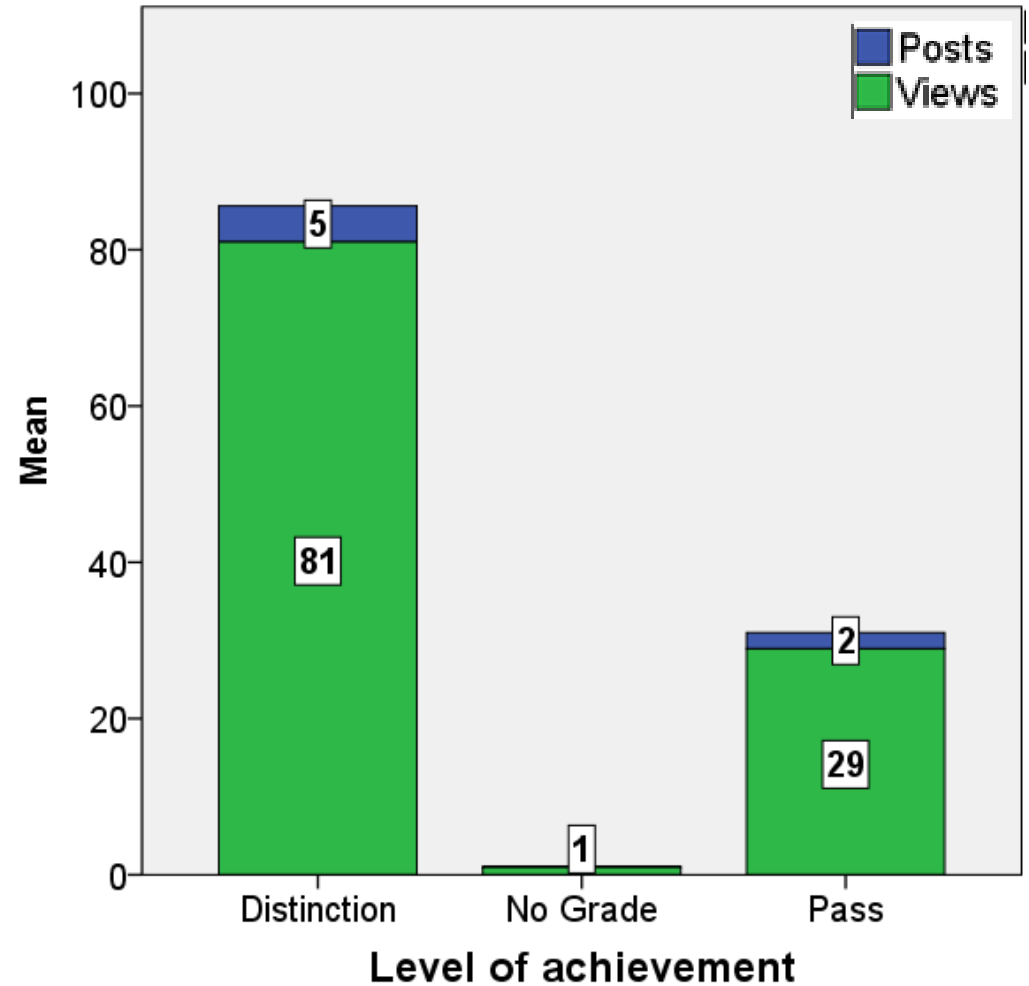
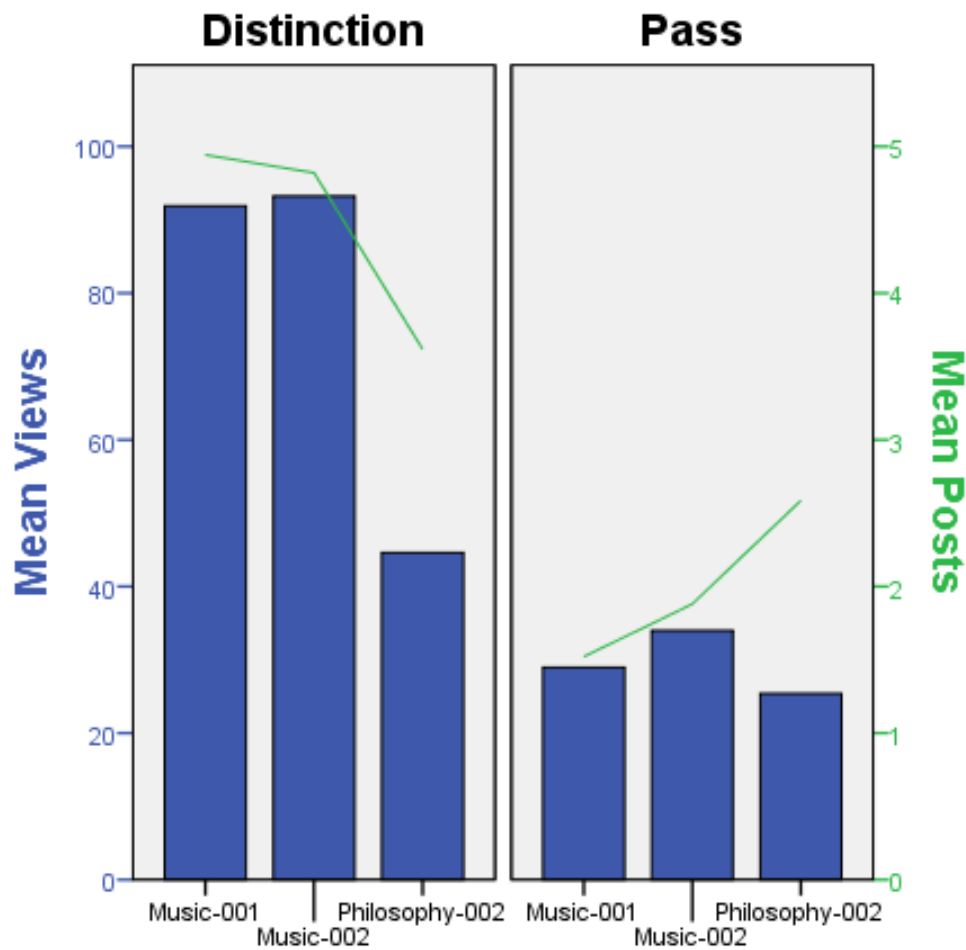
Improved learning through participation in forums



Students who **simply read** messages, but did **not post** messages did show **higher student achievement**.

Students may have gained understanding merely by reading others' posts to **check/acquire ideas**; and **incorporated ideas** into their assignments reasoning with themselves but without discussing with others.

Improved learning through participation in forums



Understanding instructor interventions and student learning

Why do individual instructors intervene differently?

Does instructor interventions alter student participation, quality of student discussions?

Transactive discussions in annotated threads

Threads	Transactive discussions	Music-001	Music-002	Philosophy-002
With instructor Intervention (annotated by transactivity*)	clarification	25	1	2
	completion	2	0	0
	extension	12	2	6
	justify	2	0	0
	juxtaposition	1	1	0
	paraphrase	2	1	0
	reasoning critique	9	0	0
	refinement	5	0	1
	disagreement	3	0	2
	agreement	20	0	2
	appreciation	10	0	0
	answer	32	1	1
	other	10	3	7
	Total Annotated	133	9	21

Instructor intervention affects posting rate

Type of transactive discussion	Student posting rate (average length per thread)
clarification	10
completion	15
extension	11
justify	2
juxtaposition	2
paraphrase	7
reasoning critique	12
refinement	14
disagreement	7
agreement	7
appreciation	8
answer	4
other	10

- Requests for clarification, critique of reasoning, extension of ideas, refinement, and completion generates transactive discussion **(46%)**
- Discourse cues such as agreements, affirmations, answers appreciations to original post **(54%)**
- Providing **final answers causes thread death**
- Student posting rates to evaluate discourse quality need to be taken with caution

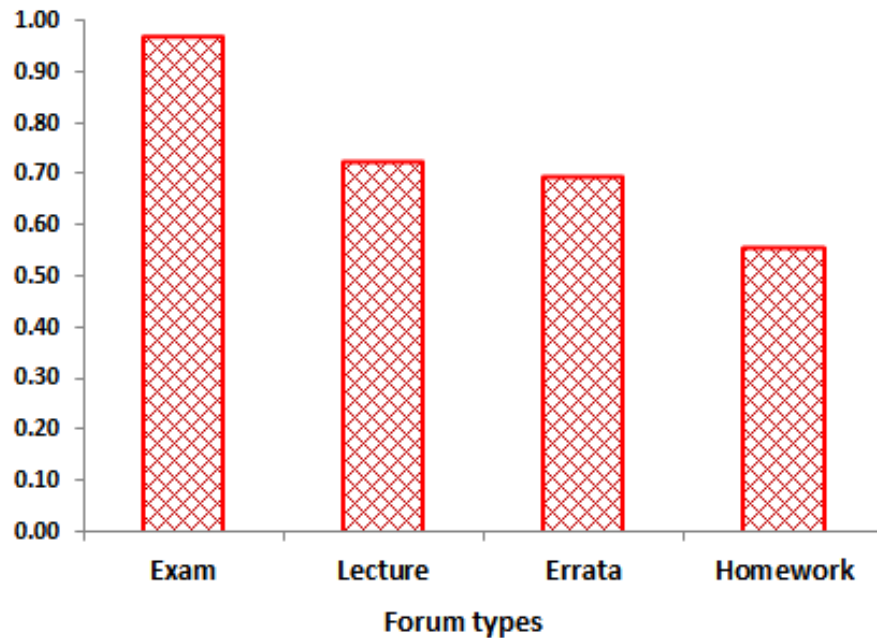
Role	Votes	Forum Posts (Thread length: 66 posts)
Student	17	in the parallel sixths video (lesson 3) i believe i have spotted parallel octaves!?
Student	4	Excellent question Daniel I am with you. Staff please help! I'm lost. As far as I reckon my teacher at the conservatory would have kicked me out of the room? I'm pretty sure each second chord would have to be voiced 3-1-5-1 for BTAS. Not really smooth but required?
Student	1	and there can be no confusion of course with regards to the possibility that the bass stave has been mistakenly labelled thus and should be a treble stave (after all these are all first inversion chords etc.)
Student		[4-51] goes here (removed for readability)
Student	0	So is there any conclusion on this?
Instructor	15	Sorry for the confusion. I'm glad you've raised this issue. [...] First let's look at the 4-part voice le Clarification of parallel octaves. There is a fundamental problem here that some have already pointed out: I'm trying to work in 4 voices with something that can only use 3 voices without causing parallels. What do I mean? [...] Now on to part 2: the issue of parallel octaves in the elaborated example. Why are they there? Well this is really answered in part by the end of my answer to part 1 - it's instrumental music. But as pointed out by someone it is a very transparent Refinement it that this is a borderline case and in retrospect agree that there are better solutions that would cause less confusion and demonstrate elaboration just as well if not better. [...] The parallel quality that is important to this progression is hidden there. It is a possibility though and not a bad solution. [...] Extension Hope this helps to address the various concerns raised above. Thanks.
Student	0	Thank you prof. Edwards. It is nice to see that in a modern environment like this your class can discuss this issue and come to roughly the same conclusion. The power of the internet! [...]
Student	0	Thank you professor. My teacher was adamant about parallel fifths and octaves and wouldn't even cut me some slack [...]
Student	0	Wonderful discussion. This is an example of how these MOOCs can work. Dr. Edwards this is a superb course.
Student	0	Thanks for the explanation Professor Edwards. Can we not also add the parallel sixths are very soothing in classical music and therefore forgive some "mistakes" such as parallel octaves. [...]
Student		[58-66] goes here (removed for readability)

Poor instructor intervention causes thread death

- Posting a note as a final answer or a simple agreement to an earlier viewpoint can cause thread death (Hewitt, 2005; Chapman et al, 2007)

Role	Votes	Forum Posts	(Thread length: 4 posts)
Student	0	A couple of times in week two the idea that the cadential 6-4 chord can really be thought of as a suspended V chord was presented. So I wondered can a I6-4 go to a suspended V chord before resolving to the V? Like this:	
Student	1	yes	
Staff	0	Yes it can. The A in the "suspended V chord" is accounted for as a non-chord tone which is the commonly used suspended 4-3. This will be explained in Week 3 lectures if you haven't got to them.	Answer (final)
Student	0	Thanks for the replies	

Other features that correlate with interventions



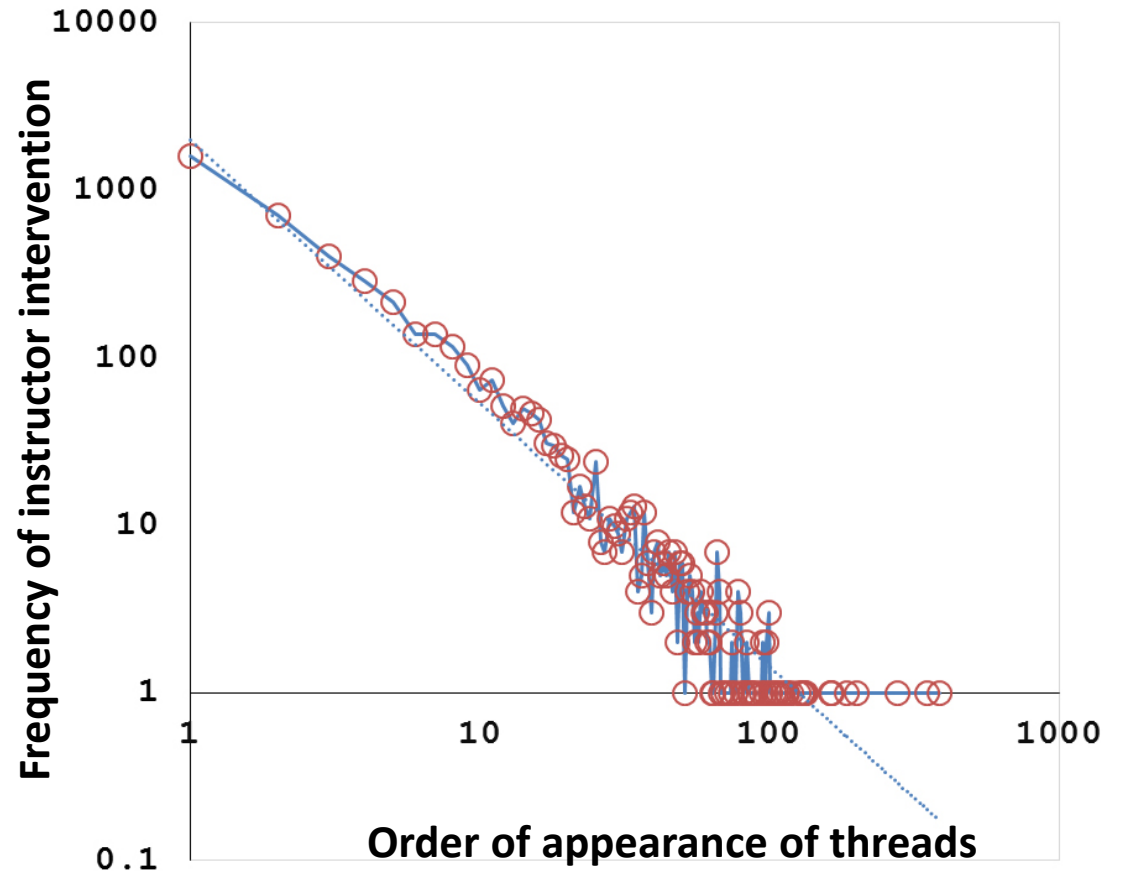
Ratio of intervened to non-intervened threads across 4 forum types

- Forum type encodes intervention priority as perceived by the instructor
- Length of thread
 - # of posts, comments
 - # sentences, words
 - # of views

Muthu Kumar Chandrasekaran, Min-Yen Kan, Bernard C.Y. Tan, Kiruthika Ragupathi (2015). "Learning instructor intervention from MOOC forums: Early Results and Issues". In Proceedings of the 8th International Conference on Education Data Mining (EDM) 2015, Madrid, Spain, 218-225, IEDMS.

Order bias in instructor intervention

- instructors exhibit a tendency to intervene based on the order in which the thread appears (top/new threads gets intervened)
- students have tendency to focus on newer posts (Hewitt, 2005)
- **an automatic triage that ranks and re-orders threads** may prompt instructors to intervene threads that promote further attention/discussion, and stimulate higher levels of learner interaction



Muthu Kumar Chandrasekaran, Min-Yen Kan. "Countering Position Bias in Instructor Intervention in MOOC Discussion Forums". Under Review.

Lessons learnt

- Annotating instructor posts alone does not provide
 - a holistic picture of discourse development
 - methods to organize meaningful interaction sequence
 - ways to automatically classify and rank threads
- Annotating both instructor and student posts can support effective decoding of learning patterns
- Possible use of critical inquiry framework to understand intervention effect

Proposed Framework

- Transactive category mapped to 4 phases of Community of Inquiry (CoI) model
- Models for assessing quality in forums; categorized into 3 areas
 - Transactive content
 - Interaction quality
 - Objective measures
- perform macroscopic and microscopic analysis
- assign weightages for each category

Proposed by team, adapted from Garrison et al, 2000; Henri (1992); Newman et al (1996); Nandi & Chang (2009)

Framework item	CoI category	Transactive Category
Transactive content	Triggering (clarification, restating)	Clarification Request
		Justification Request
		Paraphrase
	Exploration (divergence, information exchange)	Disagreement
		Extension
		Feedback Request
		Juxtaposition
	Integration (connecting ideas, convergence, synthesis)	Reasoning Critique
		Refinement
		Completion/Integration
	Resolution (summary)	Agreement
		Appreciation
Answer		
Interaction Quality	Initiation of new posts	
	Engagement with other posts	
	Follow-up posts	
	Sharing outside knowledge	
	Reference to learning materials	
Objective measures	Timeliness	
	Participation rates	
	Consistency of participation	
	Grades	

Conclusion

- Transactivity is a key construct for understanding what makes discussion forums work
- Leverage **transactivity for collaborative learning** process analysis
 - Iteratively creating a dataset of interventions; and building models for predicting interventions
- Leverage on technology for **thread recommendation to instructors**
- Enabling in future research
 - Forum triage tools
 - Prescriptive guidelines for intervention

Let us know if you would like to collaborate,
contact us at: kiruthika@nus.edu.sg

Download Presentation slides at: <http://cdtl.nus.edu.sg/profile/kiruthika-ragupathi/ragupathi-issotl2017.pdf>