Networked Learning Analytics
Studying the Association between Learner Generated Discourse and Learning

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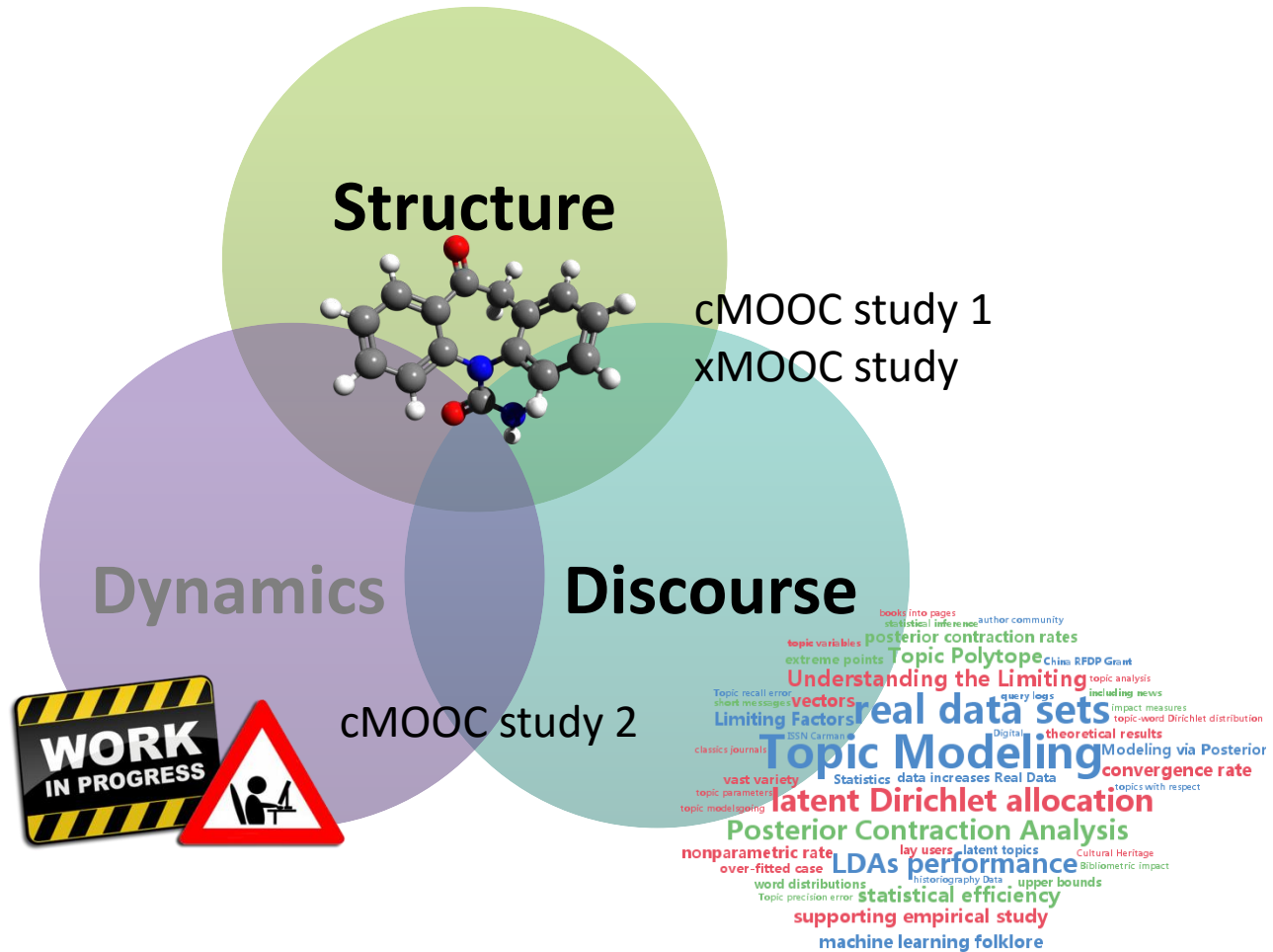@s_joksimovic

Dragan Gašević
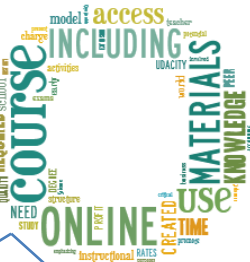
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Dealing with Data Conference
31 August 2015

Dimensions of NLA

cMOOC study 1
xMOOC study

cMOOC study 2

Context
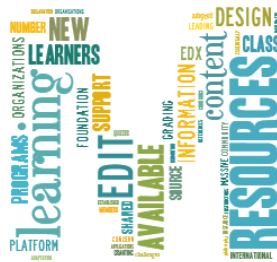
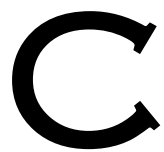- Open design
- Learner centered
- Use of social media
- Distributed communication

C

X

- Fixed design
- Focused on learner-content Interaction
- Video lectures
- Peer assessment

cMOOC Study 1

Word
concreteness

Narrativity

Referential
cohesion

Syntactic
simplicity

Deep cohesion
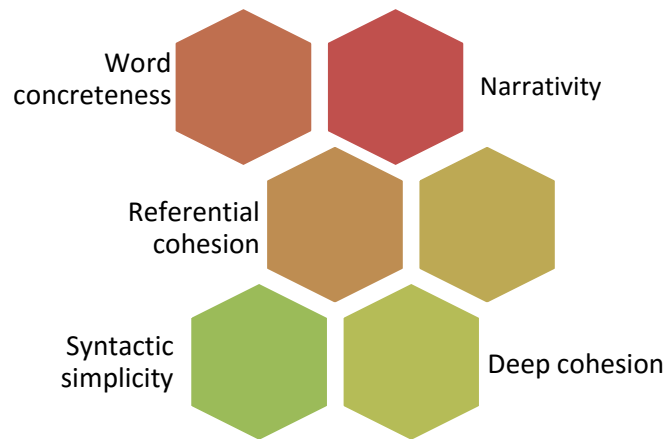
1. Language and
social capital

?
- - - - - - →

Weak ties

Strong ties
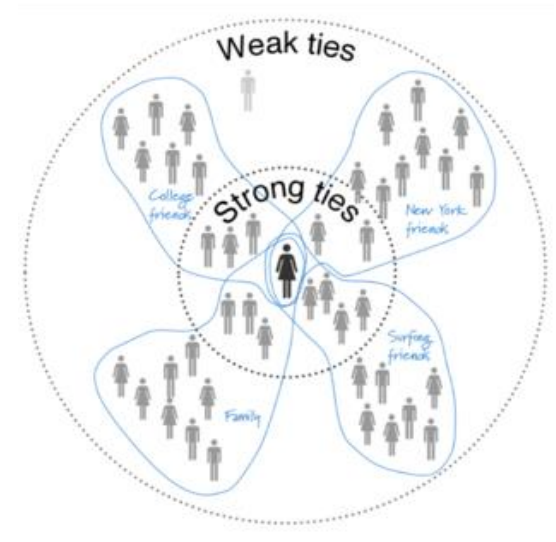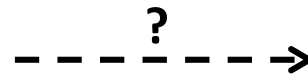
2. Social media affordances?

xMOOC Study

Word concreteness

Narrativity

Referential cohesion

Syntactic simplicity

Deep cohesion
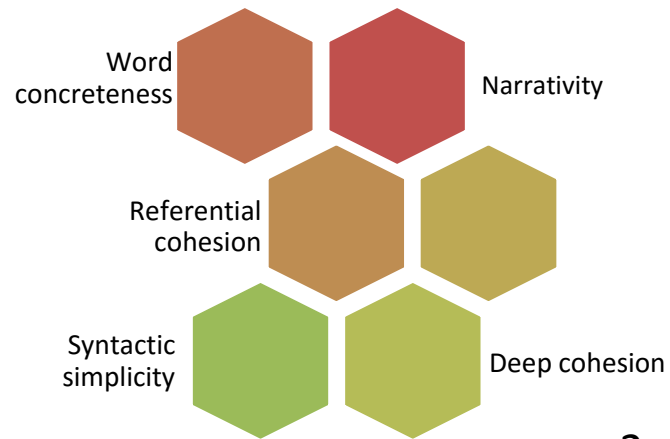
1. Language and social centrality?

?

?

2. Language and learning outcome?

@shellterrell

@profesortbaker

#edchat

#ukedchat #eltchat

Learning Outcomes
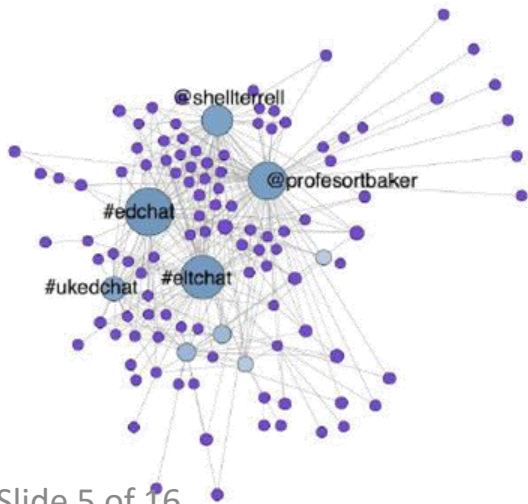
cMOOC Study 2

- Automated content analysis
- Social network analysis

Quantitative

Qualitative

ANALYSIS

Emerging groups of concepts

Topic evolution

In-depth insight

...
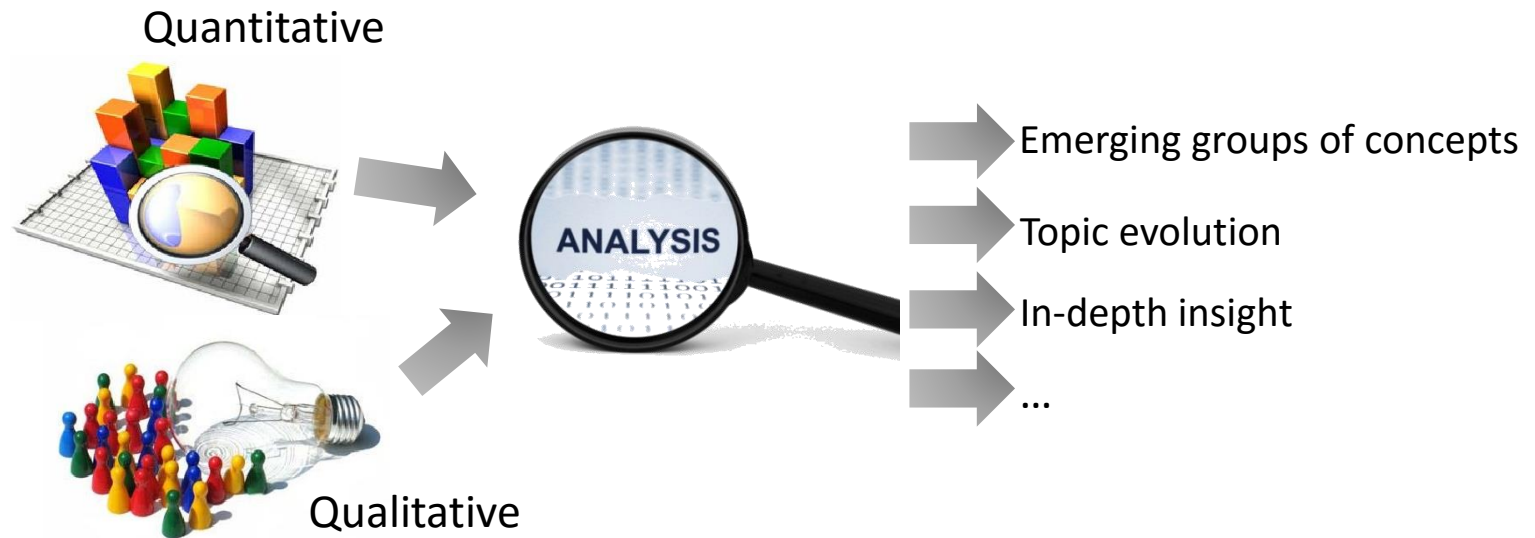
cMOOC Study 1 - Method

CCK11 (12 weeks)

Degree centrality

1755 posts

2483 posts

1473 posts
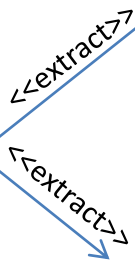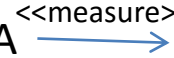
<<analyze>> SNA <<measure>> Eigenvalue centrality
Betweenness centrality
Closeness centrality

<<extract>>

<<extract>>

CCK12 (12 weeks)
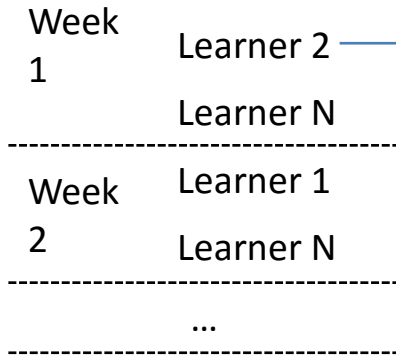
MLM

61 posts

Week 1 — Learner 1
Learner 2
Learner N

Week 2 — Learner 1
Learner N

...

2266 posts

624 posts

<<analyze>>

Coh-Metrix <<measure>>

Narrativity
Syntactic Simplicity
Word Concreteness
Referential Cohesion
Deep Cohesion

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xMOOC Study - Method

NGIx (8 weeks)

<<analyze>> SNA <<measure>> Degree centrality
Betweenness centrality
Closeness centrality

<<extract>>

<<extract>> Learner 1

Learner 2

...

Learner N

<<analyze>>

Coh-Metrix <<measure>>

Active learners

MLM

All learners

Narrativity
Syntactic Simplicity
Word Concreteness
Referential Cohesion
Deep Cohesion

Active learners

MLM

All learners Grades
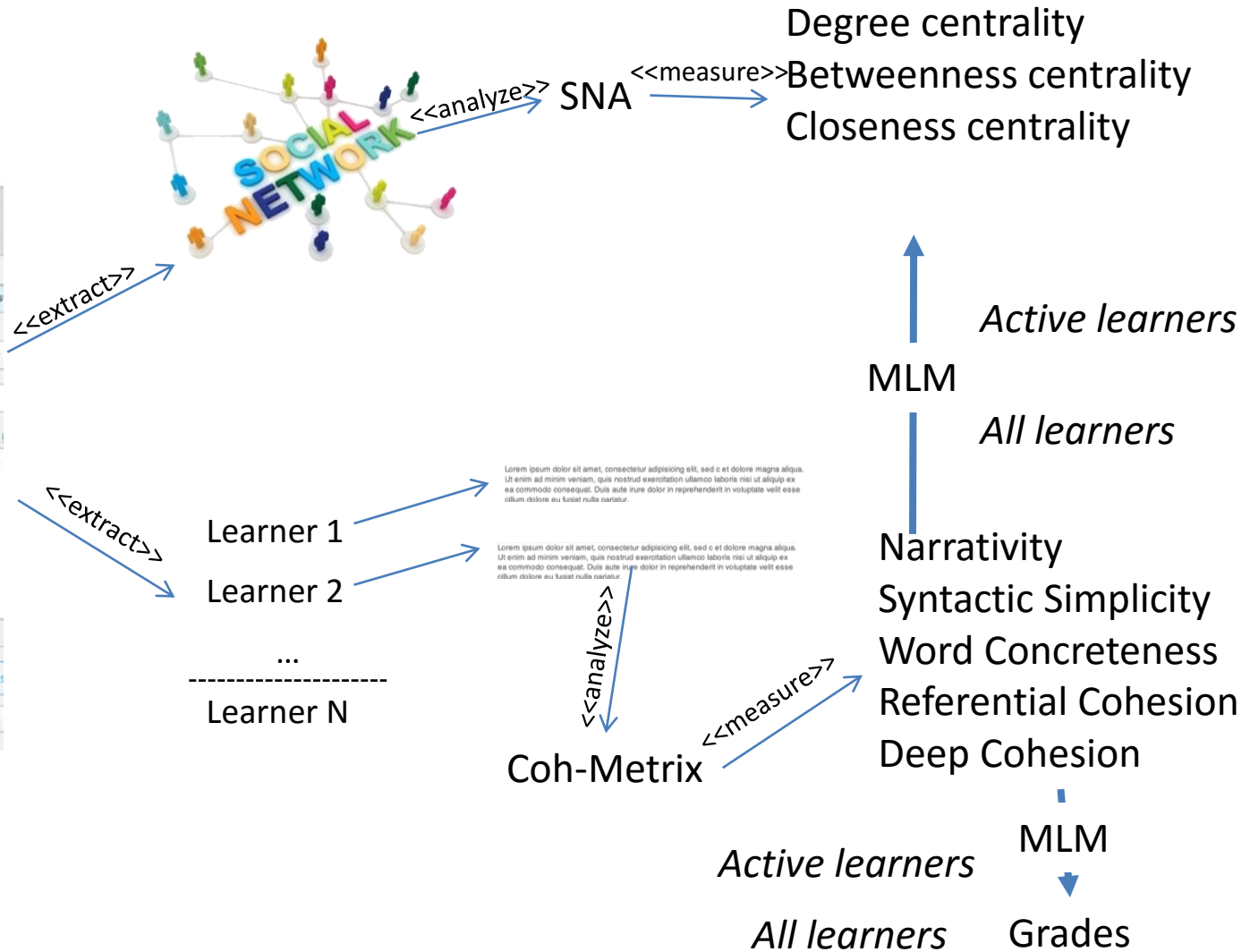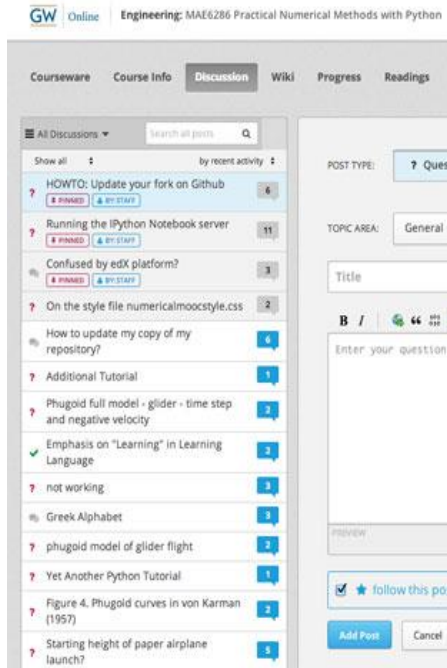
cMOOC 1 and xMOOC Study Results

	Negative (significant)	Positive (significant)
Social Centrality/Social Capital		
cMOOC	Referential Cohesion **Syntax Simplicity**	Narrativity
xMOOC (all learners)	Referential Cohesion Word Concreteness	Narrativity **Syntax Simplicity**
xMOOC (active learners)	Word Concreteness	Narrativity **Syntax Simplicity**
Performance		
xMOOC (all learners)	Narrativity Word Concreteness	Referential Cohesion Deep Cohesion Syntax Simplicity
xMOOC (active learners)	Narrativity Word Concreteness	Referential Cohesion Deep Cohesion

cMOOC *Contextual factors*

- Media
  - Twitter vs. Facebook vs. Blogs
    - Differ in their affordances
- Time
  - Negative association?

- Activity
  - More active -> more likely to grow influence

Week 1   **Week 2**   **...**   **Week 12**
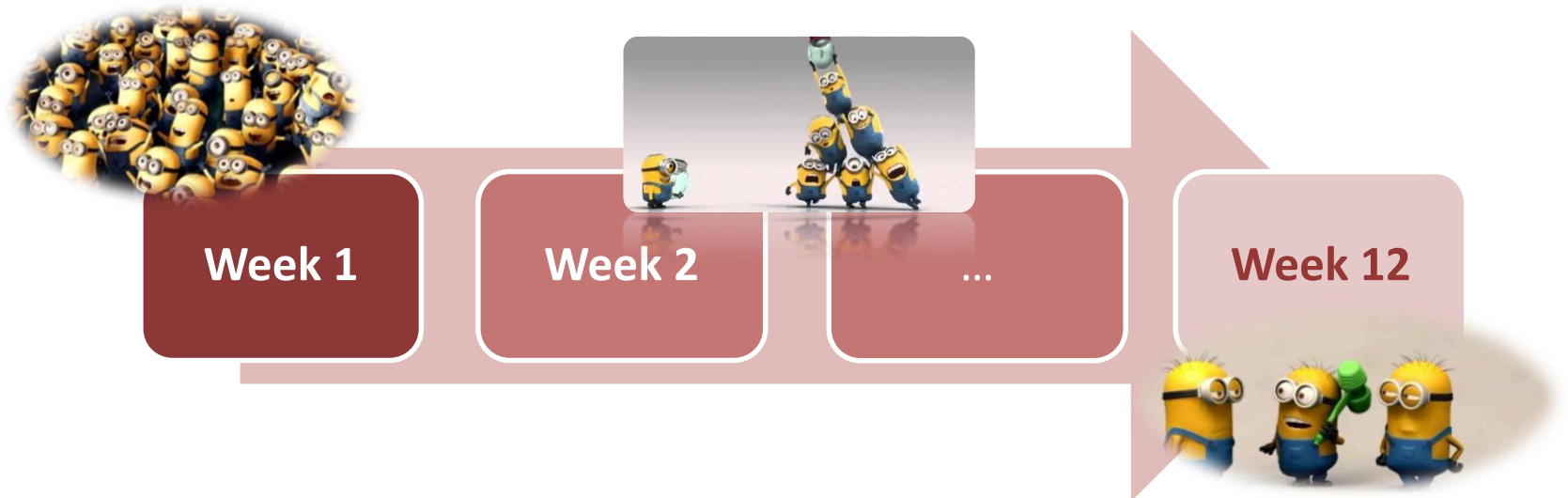
cMOOC 1 and xMOOC Study Findings

Contextual, as well as linguistic and discourse features of written artefacts, are **important determinants** of **learning in a MOOC** environment.

- **cMOOC:**
  - The language and discourse used by learners' with **more social capital** has a **more conversational style**

- **xMOOC:**
  - Better performance – **more expository** style discourse
  - Higher centrality – more **narrative style**, with **less overlap** between words and ideas

Further work

- Explore the dynamics of the network interactions

- Rely on statistical (instead of mathematical) models
  - Reveal underlying social processes
  - Effect of homophily

- Learner properties
  - Learners with the same/similar characteristics tend to collaborate more often?

cMOOC Study 2 - Method

- Semantic annotation of learners' posts and recommended readings
  - TagMe
  - AlchemyAPI

- Creation of concept co-occurrence graphs
  - 36 undirected weighted graphs

- Clustering of concepts into topics
  - Structure and cohesiveness

- Similarity of learner generated posts and recommended readings

cMOOC Study 2 - Findings

Twitter

.24	.32	.30	.29	.19	.18	.21	.27	.11	.25	.26	.25
	.18	.33	.25	.35	.16	.22	.30	.20	.27	.12	.15
		.36	.35	.25	.23	.27	.32	.15	.30	.31	.30
			.10	.10	.06	.10	.13	.09	.12	.04	.06
				.01	.05	.02	.06	.03	.03	.01	.02
					.06	.02	.06	.01	.01	.03	.02
						.17	.27	.11	.18	.24	.20
							.07	.03	.05	.03	.04
								.20	.24	.14	.16
									.04	.04	.05
										.10	.12
											.09

P 01 P 02 P 03 P 04 P 05 P 06 P 07 P 08 P 09 P 10 P 11 P 12
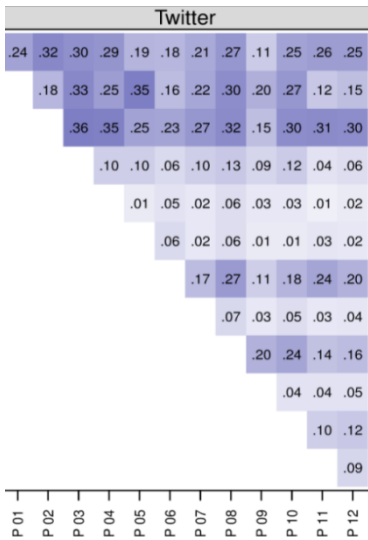
Connectivism as a learning theory

- Connectivism,
- Social media,
- Emergence,
- …

Blogs

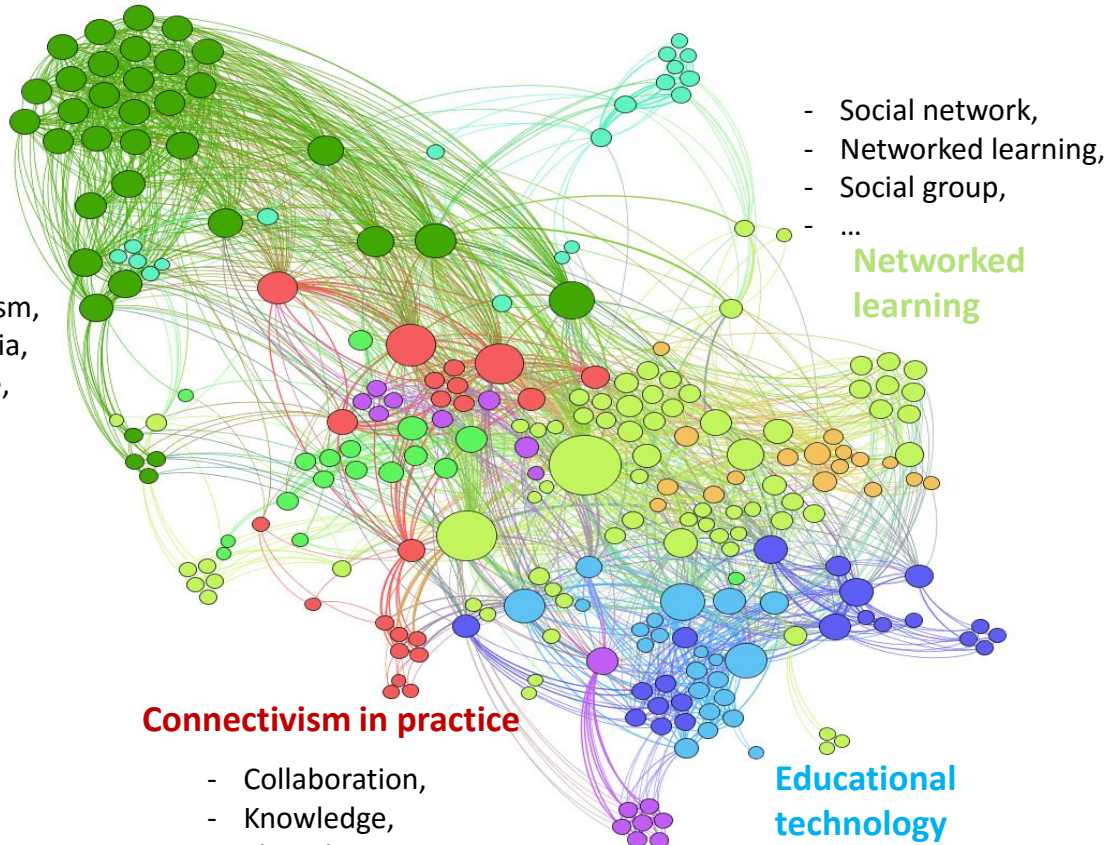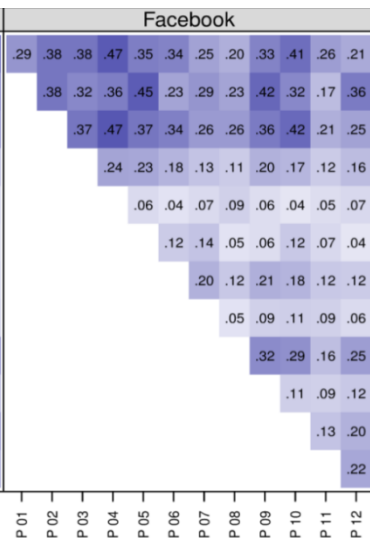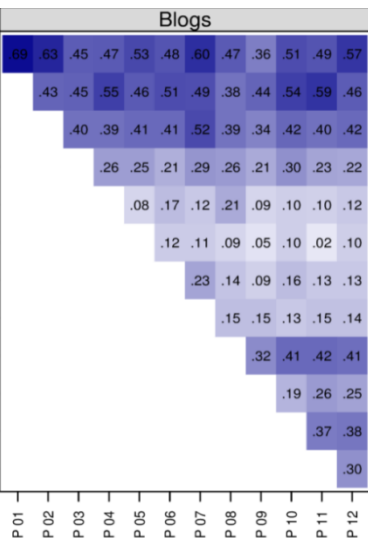|											
.69	.63	.45	.47	.53	.48	.60	.47	.36	.51	.49	.57
	.43	.45	.55	.46	.51	.49	.38	.44	.54	.59	.46
		.40	.39	.41	.41	.52	.39	.34	.42	.40	.42
			.26	.25	.21	.29	.26	.21	.30	.23	.22
				.08	.17	.12	.21	.09	.10	.10	.12
					.12	.11	.09	.05	.10	.02	.10
						.23	.14	.09	.16	.13	.13
							.15	.15	.13	.15	.14
								.32	.41	.42	.41
									.19	.26	.25
										.37	.38
											.30

P 01 P 02 P 03 P 04 P 05 P 06 P 07 P 08 P 09 P 10 P 11 P 12

Facebook

.29	.38	.38	.47	.35	.34	.25	.20	.33	.41	.26	.21
	.38	.32	.36	.45	.23	.29	.23	.42	.32	.17	.36
		.37	.47	.37	.34	.26	.26	.36	.42	.21	.25
			.24	.23	.18	.13	.11	.20	.17	.12	.16
				.06	.04	.07	.09	.06	.04	.05	.07
					.12	.14	.05	.06	.12	.07	.04
						.20	.12	.21	.18	.12	.12
							.05	.09	.11	.09	.06
								.32	.29	.16	.25
									.11	.09	.12
										.13	.20
											.22

P 01 P 02 P 03 P 04 P 05 P 06 P 07 P 08 P 09 P 10 P 11 P 12

- Social network,
- Networked learning,
- Social group,
- …

Networked learning

Connectivism in practice

- Collaboration,
- Knowledge,
- Thought,
- …

Educational technology

- E-learning,
- Complex adaptive system,
- edtech,
- …

Further work

- Topic modeling
  - Improve the algorithm
    - Improve filtering
    - Mixed Membership Stochastic Blockmodels (MMSB)

- Social component
  - Implement State Transition Topic Models
  - Transition over communities

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Q&A

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Dealing with Data Conference
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References

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- Dowell, N. M., Skrypnyk, O., Joksimović, S., Graesser, A. C., Dawson, S., Gašević, D., Hennis, T. A., de Vries, P., Kovanović, V. – Modeling Learners' Social Centrality and Performance through Language and Discourse, *The 8th International Conference on Educational Data Mining*, Madrid, Spain, 26-29 June, 2015 (accepted).

- Joksimović, S., Kovanović, V., Jovanović, J., Zouaq, A., Gašević, D., Hatala, M., "What do cMOOC participants talk about in Social Media? A Topic Analysis of Discourse in a cMOOC," In *Proceedings of the 5th International Conference on Learning Analytics & Knowledge (LAK 2015)*, Poughkeepsie, NY, USA, 2015, pp. 156-165