

The communication infrastructure during the learning process in web based collaborative learning systems

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1. Motivation

2. Goal

3. Methods

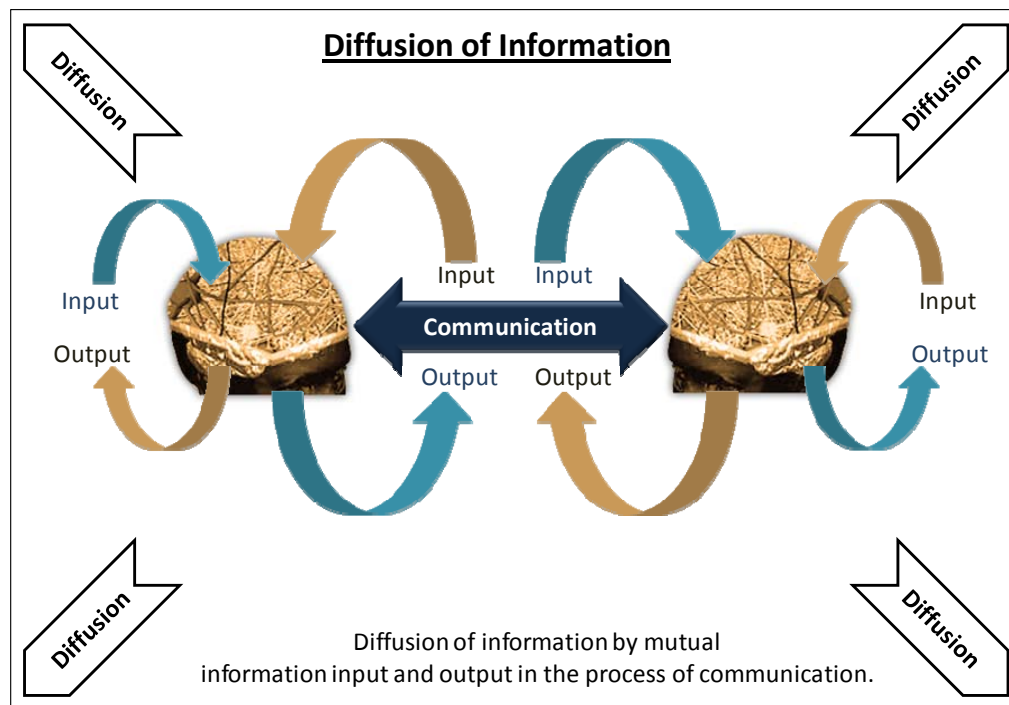
4. Data

5. Results

6. Conclusion

1. Motivation

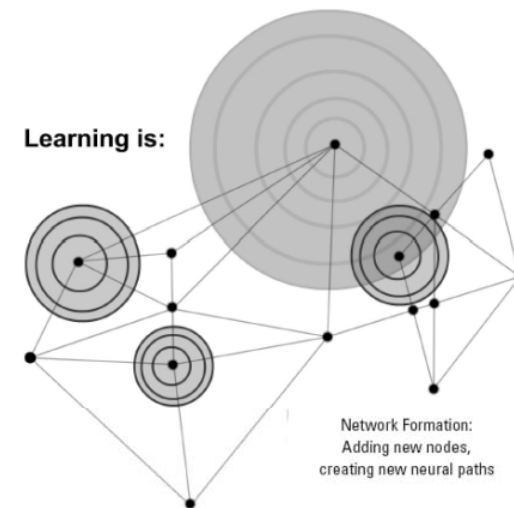
Transferring network perspective to education sciences



Process of diffusion of information in communication systems

Source of image: C.M.Stuetzer in „Interpersonal Communication and Local Identities“, 2009

Constructivism theory Connectivism theory



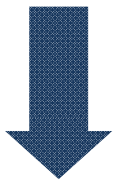
Learning theories

Source of image: G. Siemens, Knowing knowledge , 2006, S. 29

„ Social systems do not consist of people, also not of actions, but of communications therefore.“
(Luhmann 1986: 269)

Conceptualizing communication structure in e-learning systems

Previous work: Exploration of discussion boards in distance learning networks and extraction of high “attractiveness” subnets (Cathleen M. Stuetzer et al. (2010))



Exploration of communication roles (macro view)



Identification of emergent network roles of actors via *social network analysis (SNA)* (micro view)



Identifying participant roles and their structural conditions in order to understand theories about *social learning under the impact of educational technologies*

3. Methods

Quantitative relational analysis via *social network analysis* (SNA)

1. Statistical relational analysis

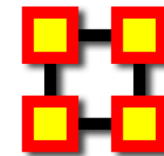
2. Subnet analysis

3. Subnet relational analysis

Exploring the entire network in order to find high attractiveness “giant component” cluster

Exploring structures in macro view to **explore communication roles**

Exploring positions in micro view to **explore emergent network roles**



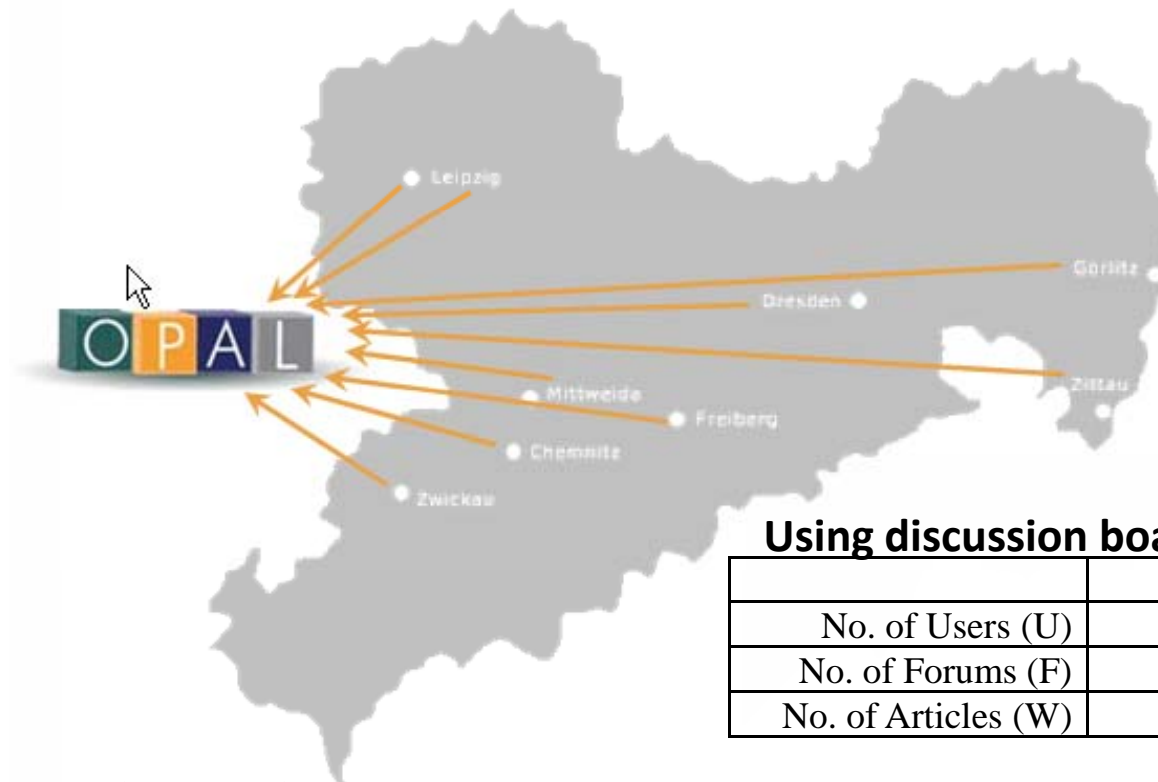
**ORA*

Identifying emergent communication roles of participants in discussion boards within e-learning systems

4. Data

Educational Portal Saxony (BPS), Germany (2001-2010)

(Source: J. Schwendel, BPS GmbH, 2009)



1 central web application
11 universities in Saxony, Germany

Using discussion boards to explore the structure

	Original	Selected
No. of Users (U)	5808	834
No. of Forums (F)	2567	120
No. of Articles (W)	49863	11030

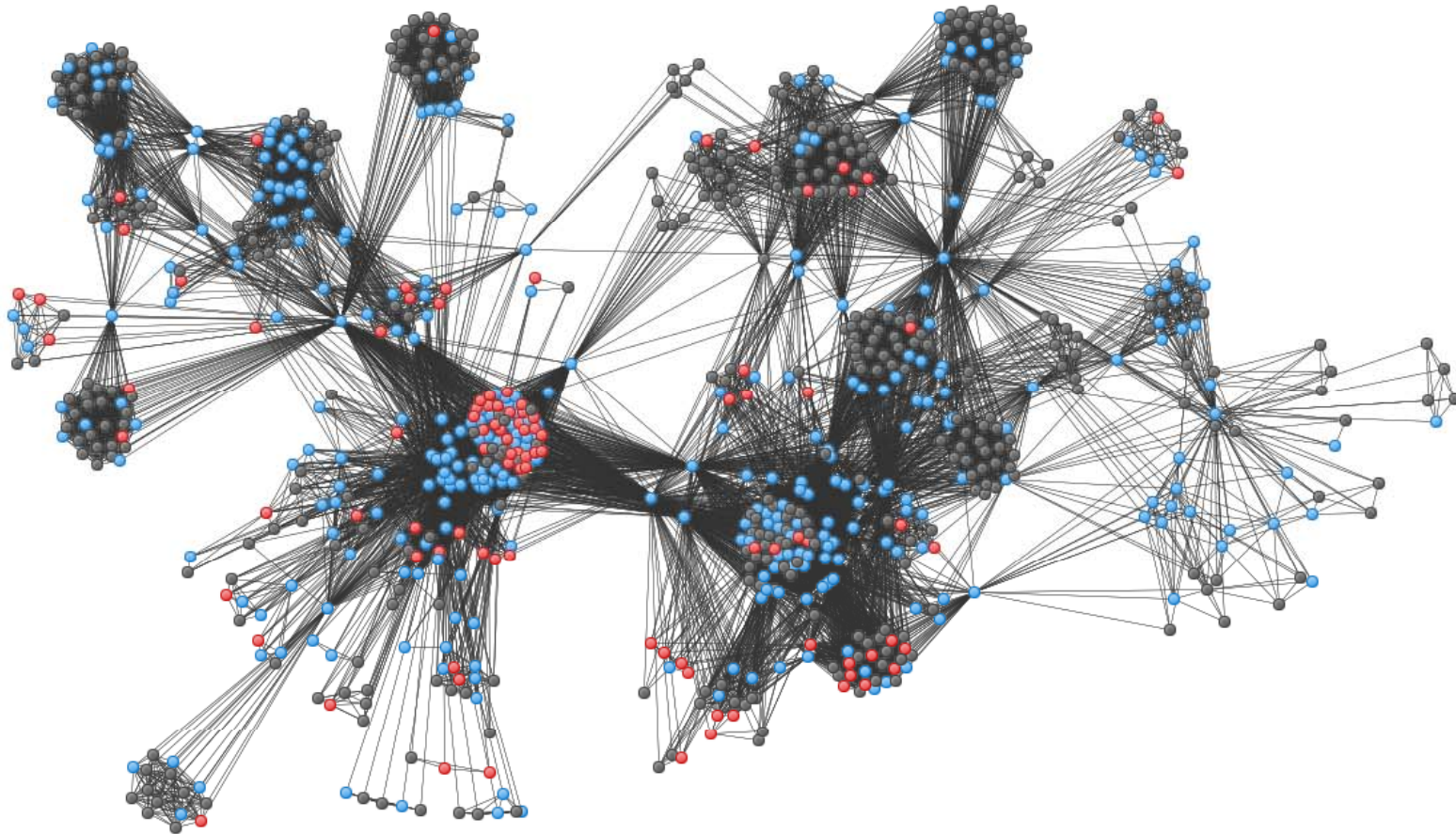
learning platform



platform provider

 **BPS BILDUNGSPORTAL SACHSEN GMBH**
— Ein Unternehmen sächsischer Hochschulen —

Structure of communication (N=834)



- Follower (49%) – follows articles only → [View \(UxU\)](#)
- Initiator (11%) – instructs articles only → [View \(UxU\)](#)
- Role Switcher (40%) – follows and instructs articles depending on topic and discussion board → [View \(UxU\)](#)

5. Results

Positional analysis: Emerging roles and positions (N=834)

Code	Emergent role	DC (U)	BC (U)	WC (U)	EC (U)
0_0_0_0	Sightseer	-	-	-	-
1_0_0_0	Cosmopolitan	+	-	-	-
1_0_1_0		+	-	+	-
1_0_0_1		+	-	-	+
1_1_1_0	Broker	+	+	+	-
1_0_1_1		+	-	+	+
1_1_0_0		+	+	-	-
1_1_1_1		+	+	+	+
0_0_1_0	Individualist	-	-	+	-
0_0_1_1	Alpha Dog	-	-	+	+
0_0_0_1		-	-	-	+

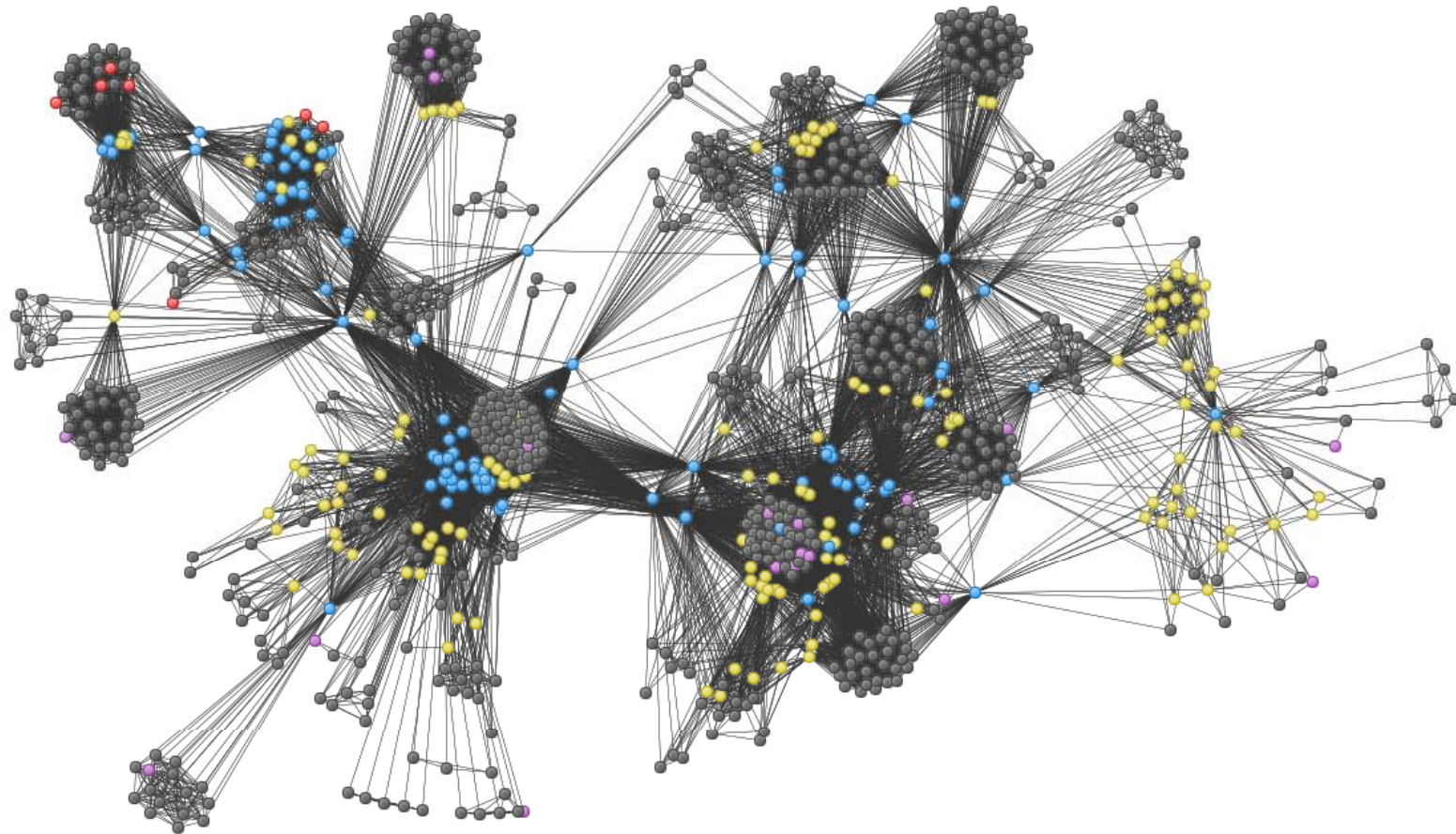
DC(U) = Degree Centrality → Measurement for **communication activity** (Freeman, 1979)

BC (U) = Betweenness Centrality → Measurement for **information flow control** (Freeman, 1979)

WC(U) = Weight Centrality → Measurement for **strength of ties** (Granovetter, 1983)

EC(U) = Eigenvector Centrality → Measurement for **group leader function** (Bonacich, 1972)

Positional analysis: Emerging roles and positions (N=834)



- Sightseer (68%) → [View \(UxU\)](#)
- Cosmopolitan (17%) → [View \(UxU\)](#)
- Broker (12%) → [View \(UxU\)](#)
- Individualist (2%) → [View \(UxU\)](#)
- Alpha Dog (1%) → [View \(UxU\)](#)

Conclusion

- Extracting high „attractivness“ subnet of users in discussion boards
- Explorating communication infrastructure

Results

- 3 communication roles
- 5 emergent roles → f.e. Broker are self-organized, underlie self-dynamics and self-organization, broker-network high complex connected

Further work & limitations

- evaluate emerging roles
- identifying scripted roles → semantic analysis of actor roles
- longitudinal analysis of evolution from emerging roles
- qualitative analysis of actor scripted roles through integrating balance theory aspects (Heider(1949); Kleinberg (2007))

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Thanks a lot!
Merci beaucoup!
Vielen Dank!
Mange Takk!
Muchas gracias!
Prego!
شُكراً
非常感谢!

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