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The Rise of Global Policy Networks in Education: Analyzing Twitter Debates on Inclusive Education Using Social Network Analysis

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The Rise of Global Policy Networks in Education: Analyzing Twitter Debates on Inclusive Education Using Social Network Analysis

With the Convention on the Rights of Persons with Disabilities (CRPD), inclusive education has become the main alternative to special schools for the schooling of children with disabilities. In order to promote the global implementation of inclusive education, a variety of stakeholders form networks to transmit and exchange information and knowledge concerning political strategies. However, little is known about the actors and actor groups involved in these networks. In the present paper, we draw on general network theory and policy network theory to examine the Twitter communication network that has formed around the topic of inclusive education. Using exploratory and inferential social network analysis, we show that disabled persons' organizations and international organizations, such as the United Nations, hold a particularly central position in the network. This position enables them to potentially exert influence on the content and flow of information within the network. Aside from that, business actors are active participants in the network. Moreover, the Twitter network shows some structural patterns that can also be found in policy networks. Our findings help to map the global sphere of inclusive education promotion and can contribute to a broader understanding of global processes in inclusive education policy.

Keywords: inclusive education; policy networks; Twitter; social network analysis; global governance

9432 words

Introduction

Inclusive education has emerged as the main alternative to special education for the schooling of children with disabilities (Powell, Edelstein, and Blanck 2016). The implementation of inclusive school settings as the main form of education for children with disabilities is a policy process that comprises a variety of actors, both at the national and international level (Biermann 2016). From a cross-national perspective, the implementation of inclusive education varies strongly across states. This stems from

diverging definitions of the issue as well as differences in traditional schooling structures and in the general perception of disability (Mitchell 2005). With the adoption of the United Nations (UN) Convention on the Rights of Persons with Disabilities (CRPD) the right to inclusive education has gained the status of a human rights issue. Adopted in 2006 and ratified by 177 member states (including the European Union as the first ever supranational organization to sign a human rights treaty)[1], the convention is the first human rights treaty of the 21st century and is also the first legally enforceable UN instrument specifically fostering disability rights (Lord and Stein 2008). During the negotiations and drafting of the convention, one of the most controversially discussed parts was the article on education for children with disabilities (Beco 2018). Eventually agreement was reached on Article 24, which stipulates that 'States Parties shall ensure an inclusive education system at all levels' (United Nations 2006). Hence, in light of this perspective, the enrolment of children with disabilities in inclusive school settings needs to be understood as a fundamental right that must not be subjected to a case-by-case balancing of costs and benefits. However, the degree of compliance with inclusive education still varies between CRPD member states. Consequently, state and non-state actors continue to advocate for the rights of persons with disabilities and the right to inclusive education (Biermann 2016), thereby keeping the topic on the agenda of international conferences on disability rights.

As is the case with other policy domains, education policy is no longer confined to the territory of the nation state, but has become global. Global governance entails an increasing importance of non-state actors and their interactions with traditional governmental actors in global policy-making processes (Rosenau 1995; Zürn 2018). These non-state actors, such as non-governmental organizations (NGOs) or businesses,

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[1] In May 2019.

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build networks and coalitions for reciprocal support in the promotion of specific issues (Menashy 2016). In the case of the CRPD, Harpur (2012) argues that disability rights stakeholders should build and strengthen links within and outside the disability rights community to advocate disability rights. More generally, in the field of human rights, transnational actors often create structures that allow for a better diffusion of ideas and practices among different stakeholders (Koh 1999).

Scholars have begun to map networks of state and non-state actors in the field of education policy. Relevant studies focus on policy networks in domestic education policies – such as, for instance, those in China (Han and Ye 2017), India (Ball 2016) or the United States (Lubienski, Brewer, and La Londe 2016) – as well as on transnational networks supporting regional or global education issues, e.g. low-cost private schooling in Africa (Junemann, Ball, and Santori 2016) or the *Education for All* agenda of the UN (Macpherson 2016). This strand of research demonstrates the increasing influence that diverse non-state actors exert by building networks to provide political and financial resources and exchange knowledge. Aside from the mere provision of actual goods to support policy ideas, these actors also participate by diffusing policy-relevant information, thereby shaping political debates. However, there is only limited knowledge about the different actor groups involved in such issue-specific global debates. Moreover, there is little research on the way different stakeholders become involved in and intend to foster the rights of persons with disabilities.

Against this backdrop, our paper studies the emergence of an issue-specific communication network around the topic of inclusive education. This network serves as a forum through which different actors and actor groups attempt to shape the content and increase the visibility of the policy debate on inclusive education. The aim of the present paper is to map the global communication network that has formed around the

topic of inclusive education, identify central and potentially influential actors and actor groups, and to describe and explain key elements of the network's structure. In other words, we ask which actors and actor groups are involved in the global communication network on inclusive education, how influential they are, and how they are involved in the formation and structuration of the network. Whereas scholars already emphasize the role of state and non-state actors in shaping agendas for specific global educational policies (e.g. Jakobi 2009; Mundy et al. 2016), research on the interplay between different actors and their embeddedness and influence in relation to others is still scarce.

We conceive the network on inclusive education as a global policy network. Our analysis draws on social network theory (Wassermann and Faust 2009) and policy network theory (Marin and Mayntz 1991). Empirically, we use social network analysis (SNA) to explore the position and characteristics of individual actors and actor groups as well as characteristics of the network. To address the challenge of how to empirically observe a global policy network, its actors and the inherent communication, we use Twitter data. This allows us to include the full diversity of actors from the local to the global level as well as from the public and the private sphere. Moreover, using this data source acknowledges the increasing relevance of new information communication technologies (ICTs) for the exchange of policy-related information and the establishment of new connections, as well as the growing use of online social media platforms for political debates (Dubois and Gaffney 2014; Guo and Saxton 2014). We examine the Twitter communication network around the CRPD with a specific focus on communication related to inclusive education.

After this introduction, we first specify our research topic, the CRPD and inclusive education, followed by a short introduction to the social media platform Twitter as our data source. Next, we describe our theoretical and methodological

approach. Finally, we present the results of our analysis and discuss these against the backdrop of current research and limitations.

The CRPD and inclusive education

The term inclusive education comprises a variety of concepts and can therefore be considered from different perspectives (e.g., inclusion of all groups vulnerable to exclusion, inclusion as a general effort to include all children in the education system versus inclusion in the mainstream education system; Messiou 2017). For the present paper, we focus on the inclusion of persons with disabilities in the education system as the only case of inclusive education with a legal foundation (due to its implementation in the CRPD).

Inclusive education has been a relevant topic within global education policy for a long time. In 1990, the *World Declaration on Education for All* first mentioned equal access of persons with disabilities to quality education (UNESCO 1990). In 1993, the *Standard Rules on the Equalization of Opportunities for Persons with Disabilities* noted more specifically that 'adequate accessibility and support services (…) should be provided' for the needs of persons with disabilities in mainstream schools. However, it was still suggested that persons with specific needs, such as blind or deaf persons, be assigned to special schools or at least to special units in mainstream schools. Moreover, the concept of inclusive education was not explicitly mentioned (United Nations 1994). A seminal step was the *Salamanca Statement* adopted in 1994 at the UNESCO *World Conference on Special Needs Education*. The statement included an explicit recommendation for the schooling of persons with special educational needs in inclusive settings and, in doing so, brought inclusive education as the preferable approach onto the agenda (UNESCO 1994). This gradual development eventually

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cumulated in Article 24 of the CRPD, with inclusive education stipulated as the only adequate means of meeting not only the needs but also the rights of persons with disabilities in school settings – although there were long debates about keeping the option for special schools in the formulation (Beco 2018).

As is the case with many other human rights issues, the convention lacks the power to impose legal sanctions or consequences for countries not complying with its standards. As it often takes several years or up to decades for treaties to be implemented, continuing advocacy by non-state actors (international organizations (IOs), NGOs, business actors, etc.) is indispensable (Lord and Stein 2008). Moreover, as advocates in some countries may lack the capacity to run campaigns on their own, they may seize the opportunity to engage in transnational structures of both international and domestic non-state actors to increase their advocacy power (Torres Hernandez 2008). As Koh (1999, 1409–10) contends, these actors 'seek to develop transnational issue networks to discuss and generate political solutions (…) at the domestic, regional and international levels'. For instance, when in the 1990s the *Education for All* initiative was adopted, a well-connected global civil society network formed around the advocacy of education as a humanitarian act (Menashy 2016). Thus, governmental and non-governmental forums are created to 'declare both general norms of international law (e.g. treaties) and specific interpretation of those norms in particular circumstances' (ibid.).

The annual Conference of States Parties (COSP), which is held every July in New York City, represents one possible forum for the international debate about the implementation of the convention. Although only member states and few non-state actors have access to this conference, many sub-national and non-state actors use the timing of the COSP to connect with other actors and exchange information on the topic

via social media platforms such as Twitter. Therefore, the Twitter communication can provide information on a more diverse set of actors than the actual conference network because it does not exclude actors from participation. Actors from both domestic and international levels can contribute to this communication, making the communication network transnational. Thus, the inclusive education network on Twitter can be understood as a manifestation of global education policy in its own right.

Twitter as data

Twitter is a social media platform that is used for real-time information and discussion and is prevalent in all parts of the world (Weller et al. 2014). It allows its users to engage in specific debates and to connect with other users by publishing tweets, i.e., short messages with up to 280 characters. On Twitter, users can participate in particular discussions by using hashtags (i.e., placing a hash ('#') in front of a word). Users can also subscribe to a hashtag in order to be updated with new tweets. Moreover, users can directly contact others by retweeting them (that is, reposting a tweet of another user), by mentioning them (adding the @-symbol to a user name), or by replying to them (mentioning them at the beginning of a tweet). This enables them to directly exchange information, to further disseminate information, to engage in public conversations, or to attract the attention of specific users.

In politics, the importance of Twitter has grown rapidly over recent years. Political actors promote their ideas through the platform (Dubois and Gaffney 2014) and NGOs use it for 'public education' as well as mobilization and organization (Guo and Saxton 2014). Not only governmental and non-governmental organizations, but also private users use Twitter intentionally and strategically to express their issue-specific policy preferences (Conover et al. 2012). Although the influence of Twitter on

education policy is still an emerging research field (e.g. Sam 2019), it can be assumed that the platform is used by both domestic and international policy stakeholders in the negotiations around education policy.

Theoretical and methodological approach

Theoretical approach

International (education) policy regimes are structured as networks rather than hierarchies (Risse 2004). Two observations support this assumption. First, over recent decades, a huge body of work has shown that global governance is not restricted to or dominated by states and their public administrations, but comprises a heterogeneous array of public and private stakeholders from all levels of government (Jakobi 2009). The concept of global governance emphasises the influential role of non-state actors that cooperate with state and non-state actors in an attempt to achieve their policy preferences (Rosenau 1995; Zürn 2018). At the same time, international institutions and policy processes have a great impact on domestic policies, making it difficult to examine national and international policy development separately (True and Mintrom 2001; Jakobi 2009). Second, the understanding of policy-making as a 'process involving a diversity of actors who are mutually interdependent' (Adam and Kriesi 2007, 146) and who operate at different levels of government, has led to the assumption that global governance occurs in networks rather than hierarchies.

Consequently, in order to understand global governance, for example in the field of disability policy, it is crucial for scholars to refer to approaches of policy network theory. Policy networks are characterized by informal, decentralized and horizontal relations (Kenis and Schneider 1991) where the exchange of problem-specific information constitutes a 'key feature' Stone (2004, 560). Actors may use these

issue-specific communication networks to build alliances and jointly promote their policy preferences.

In order to better understand the structure of a global education policy network, we apply concepts of social network theory (e.g., see Wassermann and Faust 2009; Borgatti and Lopez-Kidwell 2011). Technically, a network is 'a set of actors or nodes along with a set of ties [or 'edges'; the authors] of a specified type (…) that link them' (Borgatti and Halgin 2011, 1169). The main idea is that social systems are 'networks through which information (or any resource) flows from node to node along paths consisting of ties interlocked through shared endpoints' (Borgatti and Lopez-Kidwell 2011, 43). A social network perspective shifts the unit of analysis from individual actors towards the relations between them and the overall network these relations constitute (Jörgens, Kolleck, and Saerbeck 2016). The examination of relations can lead to the identification of particularly central and, possibly, influential actors within a network as inferred from their relative position to others (Kolleck 2016). Gaining a better understanding of both the general structure of a communication network and the role of specific actors (and actor groups) within it can then lead to growing knowledge about how information is disseminated and how actors might be able to shape that dissemination. Whereas no single theory can be described as 'the network theory', a number of theoretical approaches focusing on the structure of social networks can be subsumed under this term. Due to the structure of our data, we emphasize the concepts of network closure and homophily. Network closure comprises the tendency of actors in social networks to improve their structural embeddedness by reciprocating ties or by closing triads (connecting with 'friends of friends') (e.g. Granovetter 1985; Burt 2000). Homophily describes the tendency of individuals to connect to others with whom they share similarities (McPherson, Smith-Lovin, and Cook 2001). These similarities can

include personal properties, such as race or gender, but also concern affiliations with the same groups or organizations. Both network phenomena can be assumed to be relevant for a policy network as they influence the flow of information as well as the formation of coalitions and alliances.

In international relations and global policy research, the study of actor networks allows us to draw inferences about the roles of different actors and their (potential) influence in shaping policy debates. Scholars from educational science have already widely integrated approaches of policy networks into the study of global policy-making processes, showing that networks play a key role in global education policy (for an overview, see Menashy and Verger 2019). Networks of state and non-state actors constitute important channels for the international diffusion of educational policies and innovations, such as inclusive education. In the study of these networks, the usage of network approaches differs widely. For instance, Junemann, Ball, and Santori (2016, 539) use network ethnography to analyze 'meanings and transactions rather than subjecting the networks to the more quantitative measures offered by social network analysis'. In this way, they are able to reveal the nature of connections between the different members of a global network of state actors, businesses and philanthropies. Kolleck et al. (2017) use centrality measures to identify the central nodes in a Twitter network on climate change education. As these studies show, global education policy networks comprise a high number of diverse actors with different types of connections, such as information or resources. However, inclusive education as a global education policy issue is still largely under-researched, as is the influence of non-state actors on the promotion of the topic. Whereas the remarkable involvement of civil society actors (predominantly disabled people's organizations [DPOs]) in the meetings of the Ad Hoc Committee is documented in the literature (Stein and Lord 2009), there is limited

knowledge about their role in the implementation processes. In order to shed light on the global debate about the implementation of inclusive education as it is led on Twitter, we examine the interactions between different actors and the structures these interactions build.

Methodological approach

In order to examine the global Twitter communication network on the topic of inclusive education, we draw on techniques of exploratory and inferential SNA. In doing so, we identify central actors who can be expected to be especially capable of shaping the flow of information, as well as structural properties of the network in order to make assumptions about the roles different actor groups play within the network (Borgatti et al. 2009). Whereas exploratory SNA allows for an overview of the network as well as the identification of central nodes (Nooy, Mrvar, and Batagelj 2011), inferential SNA offers the opportunity to test hypotheses about the formation of the network (Cranmer et al. 2017; Lusher, Robins, and Koskinen 2013). By using Twitter data, we try to address the main challenge of investigating global policy networks, that is, to 'identify actors in networks, their on-going relations and the structural outcomes of these relations' (Dicken et al. 2001, 89). Although it must be noted that Twitter networks are not representative of the actual population of a research subject and that the channels existing on Twitter represent only some of those available for exchange and information diffusion (Tufekci 2014), they enable researchers to investigate a set of global policy actors who have the opportunity to participate in a communication without being excluded.

Data set

For the purpose of this study, we purchased Twitter data published during five consecutive COSPs (2013 to 2017) from one of Twitter's official resellers and refined it using the free and open-source development environment R (R Core Team 2018)[2]. To receive tweets related to the CRPD and disability policy, we searched for general hashtags, such as *#crpd* or *#cosp*, as well as more specific keywords that were prominently used for the promotion of disability rights in a specific year (e.g. *#post2015* in 2015 or *#thisability* in 2013 and 2014).[3] We added one day before and one day after each conference. The whole data set included a total of 44,545 tweets. In order to extract a network for the debate on inclusive education, we employed a filter using the following search syntax: educa*[4] OR article 24 OR sdg4[5] OR school OR (child AND inclu*). We developed the filter in an iterative process by adding potentially relevant words which were used in combination with already used terms until no more matches were obtained. As we were mainly interested in the network information the tweets contained (i.e. the retweets and mentions), in theory tweets in all languages could be included. Nevertheless, it cannot be ruled out that relevant tweets on other languages were lost during extraction.

The filter reduced the data set to 1,638 tweets. Using the tweets, we generated a directed network with relations based on the mentions, replies and retweets. The extracted education-specific network contained 986 nodes and 1,829 edges. Nodes in this data set represent Twitter accounts which, in turn, can represent persons as well as organizations. Where possible, we added the organization type for each user. The

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[2] For more detail on the data gathering process, see Schuster, Jörgens, and Kolleck (2019).
[3] The complete search syntax can be found in the appendix.
[4] To cover education (engl./fr.) and educación (esp.) for the languages mainly used in the data set.
[5] The fourth Sustainable Development Goal (SDG) proclaims quality education and is widely used in the advocacy for inclusive education.

categories were generated inductively and led to the following organization types: businesses, governmental actors, IOs, general NGOs, DPOs, research, media, and private persons.

Results

Exploratory analysis: describing the Twitter network on inclusive education

In the first part of our empirical analysis we use exploratory SNA to give an overview of the network and identify its most central nodes. For the visual representation we used Gephi's ForceAtlas 2 algorithm. This force-directed layout visualizes networks based on the rule that connected nodes are attached whereas unconnected nodes repulse each other (Jacomy et al. 2014). The edges represent retweets, mentions and replies, but do not contain information about the quality of the relationship. Figure 1 shows the five-year development of the network. The size of the nodes represents their eigenvector centrality which measures the centrality of a node in proportion to the sum of the centralities of the nodes it is adjacent to. Hence, 'a node is only as central as its network' (Borgatti, Everett, and Johnson 2013, 168), making it an indicator of an actor's popularity. In order to keep the graphs readable, we only labelled the most central nodes.

[Insert Figure 1]

Several findings stand out. Regarding the network structure, we observe that both the overall network and its main component (i.e. the largest cluster of interconnected nodes) have constantly grown while the number of loose islands remains relatively constant. The only exception to this development can be observed for the year 2015, when a rather small main component is surrounded by a high number of islands. The visualization also shows a remarkable increase in the number of new, but unconnected,

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accounts until 2015. By contrast, in 2016 the number of unconnected nodes is much lower, indicating that new participants were rapidly integrated and, consequently, that functioning network mechanisms are at work in the education-related Twitter network.

In all five years, the network is dominated by a rather small number of particularly central nodes. These central positions are predominantly occupied by IO-related actors as well as DPOs. Although campaign names change over time, the different UN departments such as *UNESCO* and *UNICEF* and initiatives such as the *Global Initiative for Inclusive Information and Communication Technologies* ('G3ict'), the *Global Education First Initiative*, or the *UN Girls' Education Initiative* ('UNGEI') seem to be highly influential participants of the network. A similar observation can be made for the DPOs, where different organizations dominate over time. Whereas in 2013 the *Disabled Peoples' International* account ('DPI_Info') is the dominant organization, this role is exercised by *Inclusion International* ('InclusionIntl') in 2016 and by *Leonard Cheshire Disability* in 2017. The only two central nodes that do not belong to either of these two organizational types are *Lumos* (an NGO for children's rights) in 2015 and 2016 and *Ai-Media* ('accessinclusion', a business that provides tools to make digital content accessible) in 2016.

In order to make more general assumptions about the network structure and roles of different actor groups, Table 1 provides an overview of the involvement of the different actor groups overall as represented by in-degree and out-degree centrality values. In-degree centrality refers to the number of mentions or retweets users related to a specific group have received. Out-degree centrality measures the number of activities (mentions or retweets) in which the actors of a certain group engage. As the groups differ highly in terms of their overall appearance in the network, the values need to be viewed in proportion to the overall group size. Regarding in-degree, the high value for

IO-related accounts is particularly striking. The 104 accounts presented in the Twitter network received a total of 895 mentions and retweets, which is by far the highest number in comparison to the other groups. Moreover, no other group shows a comparably high in-degree in relation to its out-degree or its overall number of accounts. Regarding out-degree, business-related actors show a remarkably high value compared to their in-degree and to the proportional representation of this actor group in the network, with a value more than twice as large as their group size. Furthermore, DPOs seem to be particularly active in the formation and establishment of contacts. Although private actors also show a high out-degree value, this finding needs to be considered in relation to the group size which corresponds to nearly half of the total network. Furthermore, as (seemingly) unconnected and unknown users are unlikely to be mentioned or retweeted, addressing others is the easiest way for private actors to participate in the network.

[Insert Table 1]

Inferential SNA: Explaining the formation of the Twitter network on inclusive education

The second part of the empirical analysis uses inferential SNA to test hypotheses about the formation of the network. In order to analyze the formation of the Twitter network on inclusive education, we built a model to statistically test the descriptive findings on the actor groups and to describe, in parts, the topology of the network. We then estimated this model drawing on exponential random graph models (ERGMs). The main idea of this approach is to model the characteristics of a theoretical network and estimate their weights in order to identify those characteristics of an empirically observed network that occur significantly more often than would be expected by chance (Robins et al. 2007). An inferential network approach allows for more stable

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assumptions about the topology of a network and, consequently, about its formation. We conducted our model estimation on R, using the 'ergm' package (Handcock et al. 2017). The model was estimated using Markov Chain Monte Carlo Maximum Likelihood Estimation (MCMC MLE).

Since we had no empirical or theoretical reason to estimate different models for the five years, we employed the same model for each year. We developed the model with reference to the descriptive findings, on the one hand, and to the aforementioned network theoretical assumptions, on the other. Due to the distribution of in- and out-degree in terms of actor groups, the estimated model contained terms for incoming ties (in the model 'alter') for IOs and DPOs as well as terms for outgoing connections ('ego') for businesses, DPOs, research and private users. Moreover, the model included terms for actor group homophily (one term for each group). In this way, the model was tested for the tendency of actors to interact within their actor group versus outside of it. Also, we added one term for reciprocity and two terms for transitivity, namely geometrically weighted edge-wise shared partner (GWESP) and geometrically weighted dyad-wise shared partner (GWDSP). Whereas GWESP counts the number of connected nodes with shared partners, GWDSP counts any nodes with shared partners. Taken together, they can be interpreted in terms of the transitivity of a network (Leifeld and Schneider 2012; Hunter 2007). As control variables, we also included an edges term as well as degree terms in our model. The edges term controls for the density of the network, ensuring that the number of ties stays constant over the simulations. The in-degree and out-degree terms control for the degree distribution in the network, putting an emphasis on actors with few ties with a parameter of $\theta=0.1$ (Hunter 2007). Moreover, we added one controlling covariate for the general centrality of actors in the network as measured by betweenness centrality, as well as for the number of followers[6].

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In order to improve the readability of the results of the analyses, we divided them into two parts; it must be noted, however, that both parts stem from the same model. Hence, combining both parts, the results for each year have to be seen as independent from each other. Table 2 shows the results related to the descriptive findings (part one). As expected, the estimate for incoming ties for IO-related actors is positive and significant across all five years, thereby indicating an important role of these actors as addressees of mentions and retweets. Less strong, but still observable is the effect for DPOs. With the estimates being mostly positive and significant across the years for both incoming (negative only for 2016) and outgoing (negative only for 2014) connections, actors related to DPOs seem to have an important role in each of the years not only as addressees, but also as active participants of the network who build connections by retweeting and mentioning others. For business-related as well as private actors, the results of the inferential analyses also mostly confirm the expected high level of activity, as both actor groups show a negative parameter exclusively for 2013. The same pattern applies for accounts related to research, although the effects are not significant. Compared to the descriptive findings, it can be noted that some of the findings from the visualization and from the in-/out-degree distribution (e.g., the roles of IOs and DPOs) seem to be statistically significant whereas the significance of others cannot be confirmed.

[Insert Table 2]

Concerning the occurrence of general network theoretical patterns, the results are ambiguous (see Table 3). Particularly for actors related to governments, NGOs, and

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[6] The number of followers can be conceived as a measure of the influence of a user (Recuero, Araujo, and Zago 2011); hence, this suggests that less influential users address those with more followers to increase their visibility.

research organizations, the homophily estimates are consistently positive and mostly significant across all five years (with exceptions only for governmental actors in 2015 and 2017, for NGOs in 2014 and for research-related actors in 2017). This indicates a rather strong tendency of these actors to use Twitter to connect to other actors of the same organization type. In contrast, private actors and IOs seem to overcome these self-imposed 'boundaries' by including different actor groups in their Twitter activities, as can be seen from the not significant positive or even significant negative homophily estimates for these two groups. This is not surprising for private actors, as this category does not represent a homogenous group. Quite remarkable are the results for reciprocity. With the exception of 2013, the estimates for the models are all negative and mostly significant, indicating not only a lack of reciprocity in the network, but also a statistically significant tendency for actors in the Twitter network to not reciprocate activities such as mentions or retweets. This is even more surprising with regards to the transitivity. When controlling for unconnected dyads sharing a contact (GWDSP), there is a significant occurrence of shared contacts between already connected ties (GWESP). Combining the results for reciprocity and transitivity, this means that users in the Twitter network tend to build new connections rather than using already existing channels. However, they use already existing contacts as 'recommenders' of possible new contacts.

[Insert Table 3]

Discussion

The main objective of this paper was to map the Twitter communication network that has formed around inclusive education in order to identify central actors and actor groups and to describe structural patterns in the network. Drawing on approaches of

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policy networks and general network theory, we used social network analysis to explore the role of individual actors and actor groups as well as characteristics of the network, which we then statistically tested using inferential network analysis.

As a global human rights issue that is implemented in particular through the UN CRPD, inclusive education was assumed to be a topic discussed in the global Twitter sphere. Based on the notion of international policy regimes being structured as networks, we focused on the Twitter communication during the COSPs to the CRPD as an opportunity to investigate the global communication network relating to inclusive education. Following the idea of global policy spaces as heterogeneous sets of diverse stakeholders, we expected to find this diversity in the Twitter discussion as well. Hence, the Twitter data allowed for coverage of the wide range of political and private actors engaging in the advocacy of disability rights as well as the connections forming between them. Based on network theory, we inferred the potential influence of individual actors from their position in the network and examined the network in view of general network phenomena, in particular network closure and homophily. Although the use of Twitter data limits the possibility of transferring the findings to offline policy networks, several implications can be inferred which are discussed below.

First of all, the Twitter network regarding inclusive education is constantly growing, which means that the topic is increasingly discussed on Twitter and the number of actors engaging in the topic is rising. However, this growth needs to be put into perspective in light of the growth of the CRPD Twitter network as well as the increase in Twitter usage in general.[7] Assigning the accounts to their respective actor groups shows that the network covers the range of diverse stakeholders participating in global policy regimes. Leaving private actors or actors with an ambiguous affiliation aside, most of the network members are affiliated with the groups of NGOs (particularly

DPOs) followed by IO-related and business actors. This high level of occurrence of DPOs is not surprising regarding their significant involvement already in the meetings of the Ad Hoc Committee to the convention as well as the role of civil society stakeholders explicitly inscribed in the convention (Stein and Lord 2009).

The visualizations of the network over five years provide further information about the actor groups. By calculating and visualizing the eigenvector centrality of the nodes, we show that predominantly IO- (mostly from the UN) and DPO-related actors occupy central positions in the network. Referring to Kolleck (2016), this centrality can be related to the influence of an actor, indicating that UN accounts and leading DPOs in particular are in a position that allows them to exert influence on the Twitter communication in the context of inclusive education. Hence, our results indicate that actors such as UNESCO, UNICEF, or Inclusion International hold potentially influential positions in the Twitter debate around inclusive education. These positions allow them to increase their impact on the information diffusion in the network. This is in line with findings from studies investigating the UNFCCC Twitter network, which showed that the convention's secretariat has a particularly influential role (Kolleck et al. 2017; Jörgens, Kolleck, and Saerbeck 2016).

The inferential analysis that we conducted to confirm the descriptive findings and to reveal general network theoretical patterns produced ambiguous results. First of all, it suggests that the IO-related accounts in the Twitter communication network obtain their central role primarily through the attention of others. The significantly high number of received mentions and retweets suggests, on the one hand, that IOs have their information disseminated more than others. On the other hand, they indirectly are targeted as potential multipliers by users with a smaller reach. Although IO accounts

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7 https://www.statista.com/statistics/282087/number-of-monthly-active-twitter-users/ (accessed 27 May, 2019).

contribute to this mechanism only to some extent (as they mostly remain the addressees in this communication), their role must not be underestimated. Against the backdrop of the limited opportunities provided by social media – which cover discursive aspects of policy-making rather than actual implementation – some of the functions of IOs in policy-making as described by Jakobi (2009) can be identified. Their central role in the Twitter network allows IOs to set the agenda for inclusive education, but also to introduce new actors or initiatives to the network. The fact that the most predominant UN accounts have varied over the years has enabled the UN to put the focus on different aspects of inclusive education, adapted to the respective initiatives and trends for each year. Moreover, by connecting to different stakeholders the UN can even take on a coordinative function. This is further supported by the tendency of IO-related actors to have contacts to other actor groups rather than to their own, as indicated by the negative homophily parameter.

Even more diverse is the role of DPOs in the Twitter network. Our results indicate that accounts related to disability rights organizations are influential both in sending tweets (and thereby connecting to others) and in receiving mentions and retweets. In this way, these actors are in a position to not only have their information further disseminated, but to also address others in order to forward information directly to them or to integrate them in the network. These findings suggest that disability rights organizations may use Twitter as a means of connecting with others to build advocacy coalitions. This is in line with the work of Zwingel (2005) who shows similar patterns for the transnational discourse shaping processes for women's rights in the context of the UN Convention on the Elimination of all Forms of Discrimination Against Women. Moreover, when considering NGOs in general, the results for homophily indicate a strong tendency of NGOs to connect with other NGOs. Cautiously assuming a

deliberate, strategic use of Twitter as an opportunity to exchange information and contact others, this can be interpreted as an attempt of NGOs to build transnational coalitions in order to collectively promote the right to inclusive education. Hence, the network seems to contribute to the required wide and strong interconnections within the disability rights community (Lord and Stein 2008; Harpur 2012).

Our inferential network analysis conducted for this paper partly confirms that businesses are also among the most active participants in the Twitter network. Businesses, such as the Ai-Media venture, can use the platform for advertising purposes. This active participation in the global debate is in accordance with the emergence of a 'Global Education Industry' (Verger, Lubienski, and Steiner-Khamsi 2016). The involvement of private sector stakeholders in education is becoming increasingly present at both national and global levels (Verger 2012; Ball 2012). Moreover, the link between (assistive) technology companies and the disability community has been widely discussed at the intersection of new technologies and disability rights (for an overview, see Alper and Raharinirina 2006). By demonstrating existing opportunities in the context of accessibility for persons with disabilities, these businesses give new input to the disability rights community. Thus, to some extent their involvement in the Twitter communication around inclusive education can also be seen as active advocacy for inclusive education, moving their role from that of a mere market player to that of an advocate.

Overall, the high level of activity – particularly of actors without direct democratic legitimization (e.g. DPOs or businesses, in contrast to governmental or intergovernmental stakeholders) – suggests that these actors try to benefit from the discursive opportunities of Twitter in order to shape the debate and the network around inclusive education. With strictly limited capacities in the implementation process, they

seem to use the global sphere to form coalitions and to team up in the advocacy for disability rights in general and inclusive education in particular. Hence, to some extent the Twitter communication network forming around inclusive education meets Lord and Stein's (2008, 468f.) call for an advocacy that 'fosters the building of stronger and more engaged disability rights coalitions, increases the visibility of disability groups, and fosters linkages between disability groups and other civil-society actors and allies'.

Aside from the involvement of specific actors and actor groups, we also examined the Twitter network in terms of structural characteristics, namely network closure and homophily. In contrast to expectations derived from social network theory, the Twitter users connecting in the context of inclusive education have a surprisingly low tendency to reciprocate ties. A similarly low willingness for mutual following on Twitter has previously been found by Kwak et al. (2010). Our results indicate that this pattern can also be applied in relation to actual Twitter activities (i.e. mentioning and retweeting), suggesting that this could be a Twitter-specific phenomenon. At the same time, for the examined network over the five years the level of forming transitive triples is significantly high. This is in line with studies of communication or information exchange networks by Carpenter, Esterling, and Lazer (2004) and by Leifeld and Schneider (2012), which demonstrated that political actors prefer to form ties with others if they already share a connection. Although the transitive patterns in the observed Twitter network can hardly be interpreted as the tendency to actively rely on the expertise of others, as in the aforementioned studies, the results suggest that traditional network mechanisms also apply for the Twitter network.

Similarly, the findings concerning homophily appear ambiguous. Whereas the tendency to interact with presumably similar others – which is often related to shared characteristics or memberships – is prevalent in many social networks (McPherson,

Smith-Lovin, and Cook 2001; Himelboim, McCreery, and Smith 2013), the inclusive education communication network on Twitter shows these tendencies only in parts. As mentioned before, NGOs as well as research-related actors tend to mention or retweet other users of the same organizational type. The opposite tweeting behaviour can be noted especially for IO-related actors. Compared to other studies on homophily in political Twitter networks, these equivocal findings are not too surprising. When similarity is directly measured over interest, the tendency to interact with others on Twitter is highly related to shared preferences and interests (Conover et al. 2011). However, if the assumed similarity is mediated over group membership (e.g., gender or race), homophily is more dependent on the kind of group (Mousavi and Gu 2015). Hence, given that in the present work the similarity between actors is derived from their affiliation with organizations, the differences in tweeting behaviour need to be explained differently in relation to the actor groups. On the one hand, the high level of homophily for NGOs might be interpreted according to the preference of these actors to strengthen their group in order to consolidate their rather limited opportunities for promoting inclusive education. On the other hand, the tendency of IOs to have interactions with the overall network can be seen as an indication of their role as boundary spanners by connecting to all sorts of different actors, regardless of their position in the network.

In addition to findings related to the inclusive education network, the study also contributes to the literature on the usage of social network analysis in educational research. First, it shows that using Twitter data enables researchers to extend the analysis to actors that are easily neglected or hard to reach with traditional research methods. Not being limited by a predefined set of actors, research on Twitter networks can better grasp the complexity of actors in education policy networks. Second, in the

emerging research field of SNA in education policy (Menashy and Verger 2019), inferential analyses of social networks are still rare (e.g. Shields 2016). However, as can be seen in this article, adding methods of inferential network analysis to more traditional approaches allows researchers to statistically test hypotheses on the topology and formation of social networks. This, in turn, can be used to strengthen results obtained with other methods.

Although the present study has implications for research on inclusive education and education policy networks, some limitations must be mentioned. First of all, it must be emphasized that the analysis of Twitter data can only lead to assumptions about the Twitter network while inferences about the actual policy network underlying the global debates on inclusive education cannot be drawn. At most, the Twitter communication network can approximate the policy network and, consequently, the results can provide hypotheses about the mechanisms at work in the corresponding global governance network. In order to broaden our findings on global inclusive education policy, future research could use other network data sources, such as text documents or survey data, to explore different types of networks.

Another, related, limitation of our approach is the continuing lack of research on the comparability of Twitter networks with offline networks. Although the study of Dunbar et al. (2015) indicates that online social media networks show some of the characteristics that are found in offline networks, studies comparing networks with two different data sources – one based on social media data, one based on survey data – are still missing. In this regard, our study can at least deliver some more evidence in the comparison of offline networks and social media networks, revealing similar structures for both. However, to extend the usability of Twitter networks for policy research, more systematic comparisons of the different types of networks are necessary.

Overall, the study provides valuable information about the global debate on inclusive education as observed on Twitter, mapping the variety of different stakeholders involved in the advocacy of disability rights. Despite being restricted to the Twitter sphere, the results contribute to research on global governance of inclusive education and can lead to further analyses of the roles of different actors and actor groups in the global promotion of the CRPD. Moreover, they can also be used to expand the investigation of the nexus between global and national levels concerning the implementation of inclusive education.

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Appendix 1. Search syntax

Time	Syntax
12-16 June, 2017	#cosp10 OR #crpd OR #csfcrpd OR #cospcrpd10 OR #uncrpd OR (#SDGs AND #disability) OR (#SDGs AND #disabilities) OR cosp10 OR crpd OR uncrpd OR (SDGs AND disability) OR (SDGs AND disabilities)
13-17 June, 2016	#cosp9 OR #crpd OR #crpd10 OR #uncrpd OR cosp9 OR crpd OR uncrpd OR crpd10
8-12 June, 2015	#cosp8 OR #crpd OR #post2015 OR cosp8 OR crpd OR uncrpd OR post2015
9-13 June, 2014	#cosp7 OR #crpd OR #thisability OR cosp7 OR crpd OR uncrpd OR thisability
16-20 July, 2013	#cosp6 OR #crpd OR #thisability OR #cosp2013 OR cosp6 OR crpd OR uncrpd OR thisability

Table 1. In- and out-degree distribution according to actor group.

Actor group	In-degree	Out-degree	N
Business	65	207	91
Governmental	63	55	43
IO	895	169	104
NGO	229	193	127
DPO	353	345	109
Research	67	84	50
Media	6	26	16
Private	100	699	446

Table 2. Exponential Random Graph Model. (First part: control variables and assumptions from descriptive findings)

	2013	2014	2015	2016	2017
Edges	-4.21***	-5.84***	-5.71***	-5.04***	-5.63***
Indegree	-1.20***	-3.43***	[NA][1]	-2.23***	-5.07***
Outdegree	1.50***	2.57***	[NA][1]	0.88***	2.44***
Betweenness centrality	0.11*	0.21***	0.07***	0.10***	0.06***
Follower alter	0.00***	0.00	-0.00	0.00	0.00***
IO alter	0.91***	0.93***	0.62***	0.23*	0.33***
DPO alter	0.52**	0.52*	0.19	-0.05	0.00
Business ego	-0.32	0.52	0.58***	1.03***	0.06
DPO ego	0.27	-0.26	0.32**	0.39*	0.79***
Research ego	-0.44	0.44	0.26	0.41	0.22
Private ego	-0.32	0.13	0.25*	0.57***	0.32*
AIC	532.62	1356.94	3443.33	2791.46	6088.96
BIC	641.85	1510.46	3603.02	2957.71	6293.99
Log Likelihood	-248.31	-659.47	-1703.67	-1375.73	-3024.48

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$; AIC = Akaike information criterion; BIC = Bayesian information criterion

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[1] The terms for in- and out-degree had to be excluded from the model in order for it to converge.
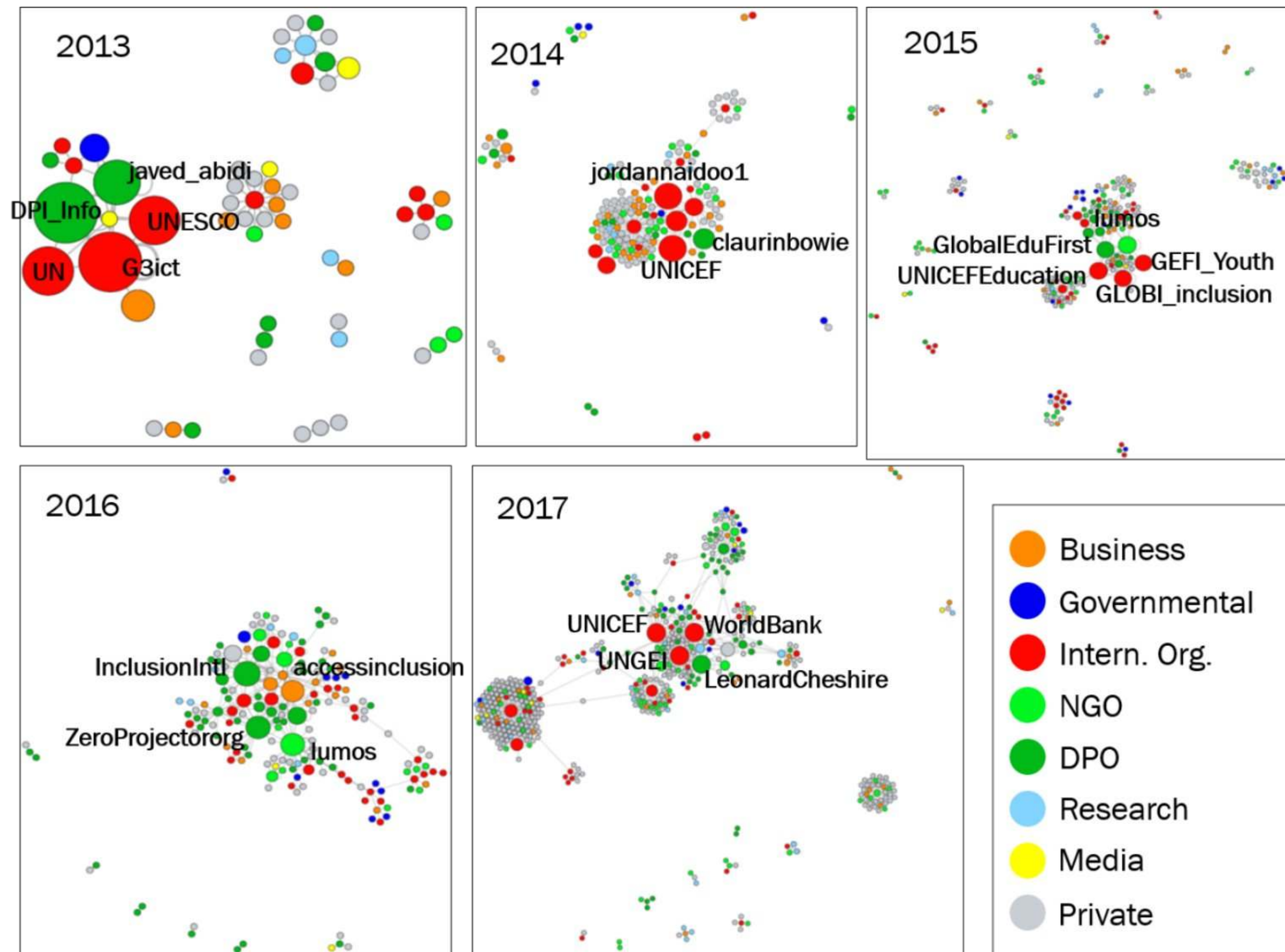
Figure 1. Development of the network over time. (Node size refers to eigenvector centrality, node color refers to actor group.)