

Attitudes toward Inclusive Education from a Network Perspective

Tom Jannick Selisko , Eric Klopp , Christine Eckert and Franziska Perels

Department of Education, Saarland University, 66123 Saarbrücken, Germany; e.klopp@mx.uni-saarland.de (E.K.); christine.eckert@uni-saarland.de (C.E.); f.perels@mx.uni-saarland.de (F.P.)

* Correspondence: tom.selisko@uni-saarland.de

Abstract: The present study showcases attitudes toward inclusive education in a new light. It contributes to the ongoing debate regarding the extent of inclusive education and highlights the importance of teachers in a process toward inclusion. Based on a framework that involves the reciprocal relation between models of disability, learning theory, and placement of persons with disabilities, attitudes of student teachers and psychology students from a German university are analyzed and mapped through the application of a network approach. This facilitates visualization and categorization based on their statistical relation. An online questionnaire consisting of established and newly developed scales was answered by ($n=$) 132 student teachers and ($n=$) 59 psychology students, resulting in $n = 191$ participants. The study was publicly promoted, and participants were offered study credentials. Using a Spinglass algorithm to analyze the data, we detected two distinct communities in the network: an Exclusion Community and an Inclusion Community. These are supported by further variables (Empathy, Contact, Authoritarianism, and Social Darwinism). The findings demonstrate an especially firm Exclusion Community, whereas inclusive attitudes appear to be varied.

Keywords: inclusive education; teacher education; network analysis; attitudes



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1. Introduction

The present study investigates the relation between the model of disability, beliefs regarding learning and teaching, and the placement of children with disabilities as contributing aspects to a coherent perception of inclusive education. It therefore addresses two major conflicts within the discourse on inclusive education: firstly, the conflict between inclusive education as an individualizing issue and as a barrier to overcome in the environment [1,2], and secondly, the conversion into the practical implementation [3,4]. Previous research regarding inclusive education in general and the attitudes towards it specifically faced the challenge of competing and sometimes contradicting perceptions of inclusive education [2,5–7]. To resolve this issue of competing perceptions, we applied the Framework of Inclusive Education by Selisko et al. [8] and applied a network approach to adequately map the assumed reciprocal relation between attitudinal aspects.

2. Theoretical Background

The Framework of Inclusive Education by Selisko et al. [8] includes different theories and models of inclusion. It provides the rationale for the present study (see Figure 1). It describes the relationship between the model of disability, learning theory, and the preferred placement within the educational system as elements that form a coherent understanding of the education of children with disabilities [8]. The aim of the study is to replicate this theoretical relation in an empirical manner.

Inclusive education is inherently informed by the education of children with disabilities, and although there have been considerable advancements in the discourse to include all children who are marginalized in educational systems, disability is generally considered to be a legitimate cause for segregation [9]. How the education of children with

disabilities should be organized depends predominantly on the aspects of the Framework of Inclusive Education. A medical model of disability states an objective deviation from the norm [10]. This deviation can be used as a legitimate cause for segregation based on the premise that everybody is entitled to adequate education but only in conjunction with the assumption that the best learning outcomes can be realized with as homogenous a group as possible because it contradicts the call for joined education [11]. Early special education endeavors, meaning the separate education of children with disabilities, targeted general exclusion from (any form of) education and provided evidence for the educability of persons with various impairments [12]. This led to the establishment of special education institutions, which later received extensive criticism due to issues such as stigma and normalization [13,14]. The model of disability also changed; rather than an individualizing focus on impairment and the associated perception of deficiency, the social model of disability focused on the barriers in society and environments associated with a lack of participation and opportunity [10,15].

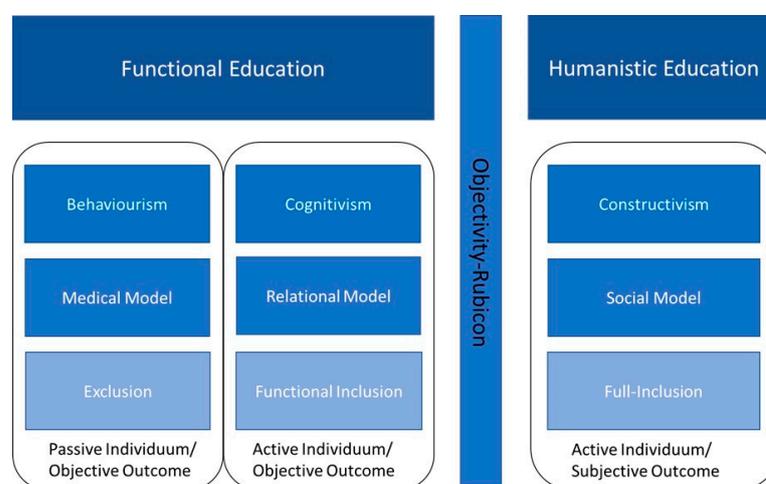


Figure 1. Framework of Inclusive Education.

In a social model of disability, any systematic rationale for segregation functions as a disability, meaning it becomes the cause for restricted participation. Necessarily, special education institutions are viewed as barriers in the same way that inaccessible buildings, public transport, and media prevent full and equal participation. The shift from a medical to a social model of disability has removed the causal relation between impairment (i.e., an objective medical condition) and disability (i.e., barriers to participation) [15]. Under the precondition that disability is socially constructed, the dismantling of barriers becomes the responsibility of society. Unfortunately, the practical implementation did not converge by identifying and reducing barriers that could be considered disabling but by holding up an individualizing perception (medical model) of disability while expecting children with disabilities to adapt to regular education [16,17].

Concerning the model of disability, a third and arbitrating model that emphasizes the interaction between impairment and barriers has evolved over the last two decades. The bio-psycho-social model of disability [18], which is also associated with the UN-CRPD [19], can be described as a relational model between the medical/individualizing and social aspects of disability. In this approach, the interaction between impairment and the environment becomes a matter of negotiation between the individual and society, and ultimately, the causal relation between impairment and disability can be upheld argumentatively [15].

The three models of disability have direct implications for inclusive education:

- The medical model of disability allows for categorization and conclusions regarding needs and abilities: how much participation is possible solely depends on the type and severity of the impairment.

- The social model of disability disconnects impairment and disability: any lack of participation is attributed to external barriers. Inclusion equals the dismantling of barriers by society and full participation.
- The relational model of disability takes additional socially constructed barriers into account: how these affect participation depends on the interactions between the individual and the environment. Inclusion is desirable but not mandatory.

In combination with beliefs about learning and teaching, the different models of disability determine what inclusive education can or cannot be. A transmissive belief (and the underlying behaviorist learning theory) [20] in learning and teaching determines learning outcomes beforehand and measures achievement by the correct response to the given stimulus. This belief system is reconciled with the medical model as the individual becomes the passive recipient of education [21]. The medical model determines educational needs based on assessed disability; as individuals are grouped according to need, adequate education becomes a necessary precondition for successful education.

A cognitivist perspective considers the individual and environmental factors, which both determine outcomes [22]. Like the relational model of disability, educational achievement is determined by adapting the environment to individual needs, as well as the individual precondition to achieve some form of status quo. The relation between impairment and ability to participate allows for grouping, as well as the hierarchical assessment of achievement [23].

As it is a direct implication of the social model, unconditional participation can only be realized within an educational setting that employs a strictly intra-individual reference standard. By applying a constructivist learning theory, learning outcomes can only be validated by the individual [24]. Therefore, constructivism establishes the precondition for participation regardless of individual differences because the outcomes cannot be valued inter-individually or arranged in any form of hierarchy [25]. Taken a step further, a (radical) constructivist perception of learning underscores the necessity of joined education because segregated settings inhibit the shared construction of knowledge. This leads to the reproduction of marginalized groups who do not share a common ground.

Contrary to existing categorizations of inclusive education, for example, those presented by Göransson and Nilholm [2], the Framework of Inclusive Education [8] does not advocate a hierarchical relation. While narrow definitions would necessarily be found on the left side of the framework (Functional Education) and wide definitions on the right side of the framework (Humanistic Education), the contradictory approach to disability and learning inhibits the assumption of a fully inclusive process.

2.1. Attitudes toward Inclusive Education

Vertically, the Framework of Inclusive Education establishes three triads that form coherent rationales. Horizontally, it provides distinct and contradictory positions regarding disability, learning, and the placement of children with disabilities, which are the main aspects of attitudes toward inclusive education for this study.

Attitudes in general refer to the evaluation of a certain attitude object [26–28]. In this context, Eagly & Chaiken [29] state that an attitude consists of the conscious or nonconscious evaluation of an entity, alongside a tendency to respond positively or negatively. Based on the framework, beliefs regarding learning and teaching, as well as disability, provide tendencies in the evaluation of joined (inclusive) or segregated (exclusive) education. Learning theory and the model of disability act as references for the evaluation of inclusive education and, in conjunction, form a coherent attitude. The goal of our research is to determine aspects that form coherent perspectives toward the evaluation of inclusive education. To this end, we examine the different aspects included within the Framework of Inclusive Education by Selisko et al. [1], as well as further aspects that have previously been associated with attitudes toward inclusive education.

According to Fives and Buehl [30] (p. 115), “[...] beliefs represent an individual’s representation of reality or what an individual holds to be true, whether or not there is

evidence to support that representation. Beliefs have enough personal validity and credibility to guide behavior and thought". If the belief system subscribed to by the teachers in question does not align with the intended change, there is a barrier to implementation [31]. Therefore, beliefs form the basis for attitudes. In terms of the cognitive-affective model of conceptual change [32], the framework combines aspects of cognitive appraisal, which establish the preconditions for a willingness to apply inclusive practices [28].

Attitudes of teachers play a critical role in the implementation of inclusive education. In light of the Framework of Inclusive Education [8], but also in the wider context of progress toward inclusion, accommodating a diverse group of children within their classes is a significant challenge for all teachers [28]. Inclusive education, understood as full inclusion, therefore puts pressure on both schools and teachers to change common practices. We consider attitudes toward inclusive education to consist of various beliefs that have reciprocal interactions. Theoretically, the interaction of aspects within the triads should be stronger than the interaction with other aspects.

Considering the wider context of inclusion, multiple studies have asserted that previous experience with disability and special educational needs influences attitudes toward inclusion [33,34]. In addition to evidence that general close contact weakens intergroup anxiety among pre-service teachers [35], special education teachers generally have more favorable attitudes toward inclusive education than regular education teachers [36]. Despite this, contact with persons with disabilities, although an apparent (positive) factor in attitudes toward inclusive education, has also previously shown mixed effects [37–39].

Furthermore, empathy has been found to be positively associated with attitudes toward inclusive education [33]. From an affective standpoint, empathy describes that one person adopts the feelings of another person, while a cognitive perspective refers to the ability to understand another person's feelings [40]. Both are considered to be related to inclusive education, although this is especially true for the latter because it is a necessity when considering the learning needs of a diverse student body [41].

Authoritarianism and Social Darwinism are also considered within this analysis due to the close theoretical relation with attitudes toward persons with disabilities. While Authoritarianism consists of submissiveness, conventionalism, and authoritarian aggression, Social Darwinism refers to the specific devaluation of persons who are considered weak and deviant from the norm [35,42,43]. Given the theoretical implications these aspects demand a rationale to identify this deviant group, which can only be provided by the medical model of disability.

In relation to the Framework of Inclusive Education [8], Contact and Empathy are assumed to be associated with inclusion, whereas Authoritarianism and Social Darwinism are assumed to be associated with exclusion.

It is important to note that all of the aspects under examination influence the attitude toward inclusive education because they are mutually dependent. For example, the call for segregated education necessarily requires a medical model of disability as a frame of reference that allows an objective identification—the other way around, the spatial division reinforces the assumed differences. The same reciprocal effect can be assumed for full inclusion, which requires the assessment of learning as an individual process; constructivism is therefore both a necessary precondition for and a consequence of full inclusion.

2.2. The Network Approach

To explore the relations between the attitudinal factors toward inclusion and the other variables (Authoritarianism, Social Darwinism, Empathy, and Contact), this study employs a network approach, e.g., [44,45]. This approach facilitates an assessment of complex reciprocal phenomena as a system in which the interaction between the elements is described by a network cf. [46]. A network consists of two kinds of elements: nodes, which represent the variables of interest, and edges, which represent the connections between the nodes. Statistically, edges are represented by partial correlation, i.e., they represent pairwise interactions between two nodes controlling for all other variables in the

network. Networks correspond to a Gaussian graphical model described by the precision matrix cf. [47].

The pairwise interactions between the nodes do not have any causal interpretation. Additionally, as edges are partial correlations, they indicate the strength of the connection between two nodes and whether the pairwise interaction is positive or negative. The numerical value of the partial correlation is referred to as edge strength. From a psychological perspective, the nodes may represent cognitions and behaviors, for example, attitudes or the various factors that comprise a certain attitude. Therefore, the network approach allows us to conceptualize broad patterns of psychological phenomena as properties that emerge from the pairwise interactions among certain behaviors and cognitions [48]. For instance, the belief that learning is transmissive in combination with the belief that impairment is mostly a medical issue may foster the belief that education should be exclusive. Vice versa, the belief that education should be exclusive can foster beliefs in transmissive learning and a belief in the medical approach to impairment. As demonstrated in this example, the notion of pairwise interactions means both attitudinal factors are mutually dependent without indicating a direction of causality. The increase in the attitude that learning is transmissive increases the belief about the exclusive placement of persons with disabilities and vice versa.

From the perspective of network topology, nodes can be characterized by their strength and closeness cf. [49]. Node strength is defined as the sum of the absolute edge weights per node. Closeness quantifies the distance between a certain node and all other nodes. It is defined as the average of the shortest paths to all other nodes. Usually, the actual values are not taken into account for strength and closeness; rather, their z-standardized scores are used because they enable a comparison between the nodes as in a profile plot. Another important aspect of network topology is the network's community structure. Usually, there are subsets of nodes with closer relations among themselves than with other nodes; in other words, the distribution of the edges is not homogenous. Thus, there are groups of nodes for which the frequency of edges within a group is greater than the frequency of edges to the nodes of other node groups. These groups are called communities, and all communities within a network form its community structure. Communities contain nodes that usually share some common properties or play similar roles within a network [50].

Thus, the network topology in the sense of the community structure enables an assessment of the hypothesized structure of the attitudes toward inclusive education; in particular, a community structure in which three communities comprise the respective attitudinal factors would support the theoretical model. Moreover, the placement of the associated variables Authoritarianism, Social Darwinism, Empathy, and Contact in the community structure may highlight the roles played by these variables in attitudes toward inclusive education.

2.3. Research Question and Hypotheses

The main aim of the study is to determine whether the attitudes and beliefs established by the Framework of Inclusive Education [8] can be shown by applying it to the network approach, taking into account the following associated variables: Authoritarianism, Social Darwinism, Empathy, and Contact. Thus, we would generally expect to identify a respective community structure in which the associated variables are placed according to their theoretical relations within the Framework of Inclusive Education.

We are interested in the following hypotheses:

H1. *The Framework of Inclusive Education states positive relations (generally referring to pairwise interaction) within the triads consisting of placement, the model of disability, and the beliefs regarding learning and teaching, as well as negative relations between the aspects of Exclusion and Full Inclusion. These aspects are assumed to have a reciprocal effect on each other, as well as on the additional factors of Empathy, Contact, Authoritarianism, and Social Darwinism.*

H2. *In line with previous research [33,34], Empathy and Contact are associated with attitudes toward fully and functionally inclusive aspects. Authoritarianism and Social Darwinism are associated with attitudes toward exclusion [43].*

3. Materials and Methods

3.1. Sample

Participants were recruited at a German university from December 2022 to February 2023. Due to the background needed to assess items regarding learning and teaching, the target participants were student teachers and psychology students who were offered study credentials for participation. These study credentials refer to a system of points that are awarded to test subjects and are needed to advance in their respective field of study. To gather first-hand, personal experiences with scientific research, students are obligated to partake in a certain number of experiments. The initial sample consisted of 215 participants, ($n=$) 24 of whom were excluded due to missing values. This resulted in a sample of $n = 191$ participants ($n = 159$ female, $n = 42$ male, $n = 2$ diverse) comprising ($n=$) 132 student teachers and ($n=$) 59 psychology students. The mean age was $M = 21.7$ ($SD = 3.7$).

The participants completed an online questionnaire in German, created and organized using the online survey tool TRIVIAN.

3.2. Instruments

- (1) To adequately depict the assumed constructs within the Framework of Inclusive Education [1], a range of instruments covering attitudes toward placement of children with disabilities, beliefs toward learning and teaching, and the model of disability have been used (Table 1). The instrument concerned with placement was mainly newly developed and consisted of three subcategories, each containing three to four items. Only two items, within the exclusive category, were adopted from the Teachers' Attitude Towards Inclusion Scale [51]. Transmissive and constructivist beliefs have been assessed using instruments developed by Kunter et al. [52] and are supplemented by three newly developed items each, resulting in a total of eleven items for constructivist beliefs and eight items for transmissive beliefs. Models of disability have been assessed based on the instrument developed by Gebhardt et al. [53]. Diverging from the original scale, the implemented instrument consists of separate medical, social, and relational models with five to seven items.
- (2) More distinctive Social Darwinism, as a sub-dimension of right-wing extremism concerning disability, has been assessed by employing three items from the questionnaire regarding right-wing attitudes [54].
- (3) To assess Authoritarianism, we applied the Short Scale for Authoritarianism [48]. This three-item instrument has shown reliable psychometric properties across multiple large-scale applications [55,56].
- (4) Empathy was assessed by the application of the 25-item E-Scale established by Leibetseder et al. [57].
- (5) Finally, we adopted an item created by Woll [39] to assess the Contact Hypothesis.

All items are consistently scaled on a six-point rating scale (from "I don't agree at all" to "I fully agree").

Following an assessment for internal consistency, several items, predominantly those that were newly developed, were removed due to insufficient psychometric properties (low or negative discriminatory power). To increase internal consistency, the following items have been removed: two from the exclusion scale, two from the functional inclusion scale, and one from the full inclusion scale. We have also removed four items from the medical model of disability scale, one item from the relational model scale, and three items from the social model scale. The transmissive learning theory scale has been reduced by three items, while the constructivist learning theory showed good consistency from all eleven initial items (for information regarding final measures see Table 2). Beforehand,

an additional scale intended to measure a cognitivist belief about learning was removed completely due to the lack of internal consistency within a previous sample. Other scales have not been altered.

Table 1. Questionnaire.

Dimension and Construct	Number of Items	Example Item ^a
Placement		
Full Inclusion	3	“Within an inclusive educational system, all children are taught together”.
Functional Inclusion	3	“With the necessary support, children with disabilities can participate in regular education”.
Exclusive	4	“I am against the joined education of children with and without special educational needs”.
Learning Theory		
Constructivist Beliefs	10	“Students learn best when they find their own solutions for tasks”.
Transmissive Beliefs	5	“Students learn best when they follow the instructions of their teacher”.
Model of Disability		
Social Model	3	“Disability is a social construct”.
Relational Model	4	“Disability is the outcome of the interaction between impairment and external barriers”.
Medical Model	3	“Disability is the consequence of congenital or obtained impairment or disorder”.
Additional Variables		
Social Darwinism	3	“Like in nature, the stronger person should prevail”.
Authoritarianism	3	“We should leave important decisions to leaders in society”.
Empathy	25	“I feel sad when I see a lonely person”.
Contact	1	“How do you assess your chances of getting to know a person with a disability?”

^a Translated items. Originals in German.

Table 2. Means and Standard Deviations of Network Variables.

Measures	Abbreviation	M	SD	Cronbach's α ^a
Medical Model of Disability	MED	4.565	0.697	0.65
Social Model of Disability	SOC	2.986	1.087	0.78
Relational Model of Disability	REL	4.243	0.784	0.65
Transmissive Beliefs	T	4.004	0.768	0.81
Constructivist Beliefs	C	5.017	0.532	0.84
Exclusion	EX	4.012	0.905	0.80
Functional Inclusion	FU	4.570	0.790	0.60
Full Inclusion	TO	4.469	0.803	0.70
Social Darwinism	sd	1.330	0.546	0.74
Authoritarianism	au	2.008	0.668	0.63
Empathy	em	4.221	0.571	0.92
Contact	ct	3.739	1.284	-

Note. N = 191, ^a Cronbach's α for scale means after the exclusion of items.

3.3. Network Estimation, Accuracy, and Stability

We used regularized estimation to estimate the network structure; in particular, the graphical LASSO in combination with the extended Bayesian information criterion (EBIC) was used to select the optimal regularization parameter cf. [45,47]. The EBIC tuning

parameter was set to 0.25. For the resulting network, we calculated the usual fit indices for the selected network.

Next, we examined the accuracy of the resulting edges and the stability of the network. Accuracy indicates how prone the estimated edge weights are to sampling variations and was assessed using the bootstrap method [58]. To be accurate, the bootstrap mean of the edges should be close to the estimated value. The number of bootstrap samples was 10,000.

Stability indicates how similar the interpretation remains when there are fewer observations than in the original data set [58]. We used the case-dropping bootstrap method, in which a certain proportion of the cases is dropped from each draw and the correlation between the original estimates and those obtained from the bootstrap sample is calculated [58]. The $CS(\tau)$ coefficient indicates the largest proportion of cases that can be dropped such that the correlation between the original estimate and the bootstrap estimate based on the case-dropping subset exceeds a certain threshold τ . The $CS(\tau)$ coefficient should be greater than 0.25 and preferably greater than 0.5 [58]. The threshold parameter τ indicates the value of the correlation between the original estimates and those obtained from the bootstrap sample. $CS(\tau)$ coefficients in the range from $\tau = 0.5$ to $\tau = 0.7$ are considered to be sufficient for the stability of our networks. As with the standard bootstrap sample, the number of case-dropping subset bootstrap samples was 10,000.

3.4. Community Detection and Graphical Display

The Spinglass algorithm was used to detect communities in the network, e.g., [59]. The basic principle behind this algorithm is that a node can only exist in one community and that nodes belonging to the same community should be connected, whereas nodes belonging to different communities should not be connected. Consequently, this algorithm results in a community structure in which the nodes belonging to the same communities are more interconnected with each other than with nodes belonging to other communities. A remarkable feature of the Spinglass algorithm is that the results are unstable, i.e., different runs of the algorithm may result in different community structures. Therefore, we estimated the number of resulting communities for 500 different runs, each with a unique seed [59]. In each run, we determined the number of communities and computed the median for the number of communities. Ultimately, this median was selected to represent the number of communities.

To display the network, we provide a plot (Figure 2) in which circles represent the nodes, blue lines indicate positive edges, and red lines indicate negative edges between the nodes. The nodes are color-coded, indicating the communities to which they belong, and the thickness of the connecting line represents edge strength. Because the placement of the nodes and the distance of the nodes are not interpretable within typical network plots, we used multidimensional scaling (MDS) to generate a plot [60]. This MDS plot (Figure 2) facilitates an interpretation of the nodes' placement and distances. Nodes that are closely related are placed close together, whereas lowly related nodes are placed far apart. The stress value of the MDS indicates how well the network is reducible to two dimensions. A low stress value indicates a good reducibility and, consequently, a good interpretability of the distances.

In addition, we calculated the measures of strength and closeness. While strength is defined as the sum of the absolute edge weights of a certain node, the closeness value shows the distance of the node to all other nodes of the network. Both measures indicate how central a node is to the network [42].

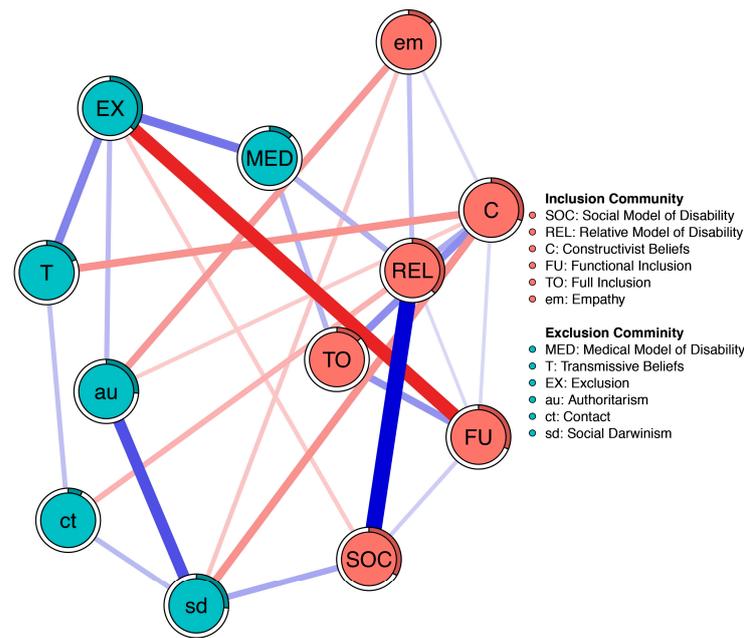


Figure 2. Network of Attitudes toward Inclusive Education.

3.5. Computation

For all computations, we used the R software 4.0.2 (R Core Team, 2020). We used the igraph package [61] for community detection and the package qgraph [62] to plot the networks. The networks, in turn, were estimated and bootstrapped using the bootnet package [58]. Finally, the networktools package [60] was used to generate the MDS plot.

4. Results

4.1. Descriptive Results

In the following section, the descriptive results of the relation between the variables are described.

The correlation matrix (Table 3) generally shows positive relations within the assumed triads, as well as negative correlations between the triads. One exception appears to be the positive relation between functionally and fully inclusive aspects, for example, the Social and the Relational Models of Disability. Aspects within the Exclusion triad do not correlate positively with any aspects of the other two triads.

Table 3. Correlation for Model Variables.

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Medical Model of Disability	—										
2. Social Model of Disability	−0.18	—									
3. Relational Model of Disability	−0.09	0.49***	—								
4. Transmissive Beliefs	0.09	−0.08	−0.14	—							
5. Constructivist Beliefs	0.09	0.16	0.26**	−0.27**	—						
6. Exclusion	0.21	−0.21	−0.05	0.32***	−0.09	—					
7. Functional Inclusion	−0.02	0.21	0.22*	−0.11	0.23***	−0.48***	—				
8. Full Inclusion	0.11	0.06	0.06	0.00	0.27**	−0.17	0.26**	—			
9. Social Darwinism	0.02	0.09	−0.07	0.04	−0.28**	0.03	−0.12	−0.07	—		
10. Authoritarianism	0.02	0.02	0.04	0.11	−0.23	0.20	−0.09	−0.02	0.41***	—	
11. Empathy	0.08	0.06	0.19	0.00	0.19	0.03	0.08	0.05	−0.15	−0.20	—
12. Contact	−0.04	0.01	−0.02	0.03	−0.08	−0.01	0.00	0.06	0.02	0.01	−0.07

Note. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

4.2. Network Analysis

The network is depicted in Figure 2 and demonstrates a good fit ($\chi^2 = 45.00$, $df = 40$, $p = 0.270$, $CFI = 0.985$, $RMSEA = 0.025$, $SRMR = 0.044$). Concerning the network accuracy, the bootstrap is depicted in Figure 3. As the figure reveals, the network shows sufficient accuracy as the estimates of the edge weights and their bootstrap means were not substantially different (the largest absolute difference between edge weight and its bootstrap estimate is 0.020 for the edge between the Exclusion (EX) and Functional Inclusion (FU) variables).

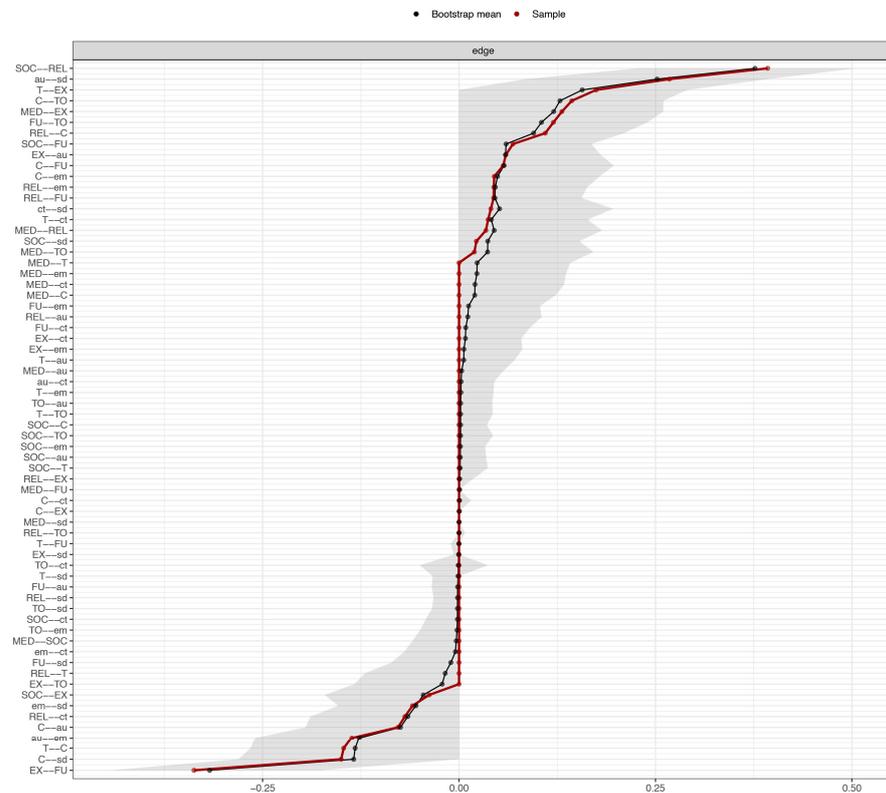


Figure 3. Network Accuracy and Bootstrap.

Concerning the network stability, the stability coefficient for the edge weight is $CS(\tau = 0.50) = 0.44$; $CS(\tau = 0.60)$ as well as $CS(\tau = 0.70)$ both equal 0.36 and are therefore above the necessary level of 0.25 but below the preferred level of 0.50. Consequently, the network shows adequate stability.

In terms of network topology, the network shows two communities, as depicted in the MDS plot (Figure 2). The MDS stress level is 0.07, indicating that the network structure can be displayed well in two dimensions. Although the structure supports the assumed relations (H1 and H2), it lacks the assumed third dimension. The circles indicate the nodes of the network, with red nodes indicating the Inclusion Community and blue nodes indicating the Exclusion Community. The lines indicate the edges, with red edges indicating negative partial correlations and blue edges indicating positive partial correlations; the thicker the edge, the stronger the relation.

The Inclusion Community shows positive attitudes toward inclusion and consists of the Social (SOC) and Relational (REL) Models of Disability, Functional (FU) and Full (TO) Inclusion, Constructivism (C), and Empathy (em), which are all positively related. The Social Model of Disability has the highest partial correlation with the Relational Model, which is consistent with the theoretical overlap (see above). Additionally, there is evidence of negative partial correlations between the Social Model of Disability and Exclusive placement, as well as a positive partial correlation with Functional placement.

The Exclusion Community focuses on exclusion and consists of the Medical Model of Disability (MED), Exclusion (EX), Transmissive Beliefs (T), Authoritarianism (au), Contact

(ct), and Social Darwinism (sd). It is congruent with the Exclusion triad of the Framework of Inclusive Education with positive internal relations and negative relations with the Inclusion Community. Contact shows a positive relation with exclusive attitudes.

Within the network, the Relational Model of Disability, Exclusion, and Constructivist learning theory shows the highest values in terms of strength and closeness. Contact accounts for the lowest strength value, and the lowest closeness value is provided by Empathy (see Figure 4).

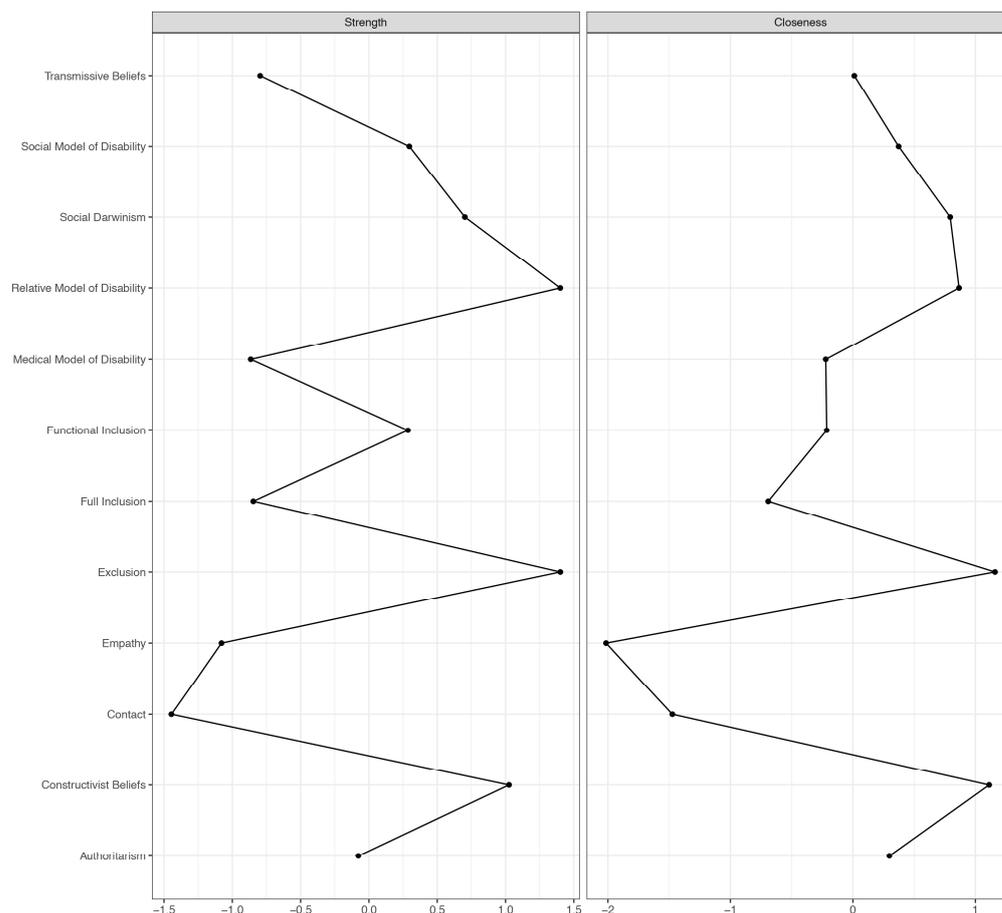


Figure 4. Strength and Closeness of individual variables.

The MDS plot shows a particularly close relation between the Relational Model, Functional Inclusion, and Full Inclusion, while Empathy and the Social Model are located on the outskirts of the Inclusion Community.

The Exclusion triad of the framework is set together within the Exclusion Community, while Authoritarianism, Social Darwinism, and Contact are a greater distance from the triad.

The colored portions of the rings surrounding the nodes indicate the variance of a variable that is explained by the other nodes of the network. An entirely colored ring means 100% shared variance. While Empathy, the Medical Model, and Contact show small portions of shared variance (7–13%), Exclusion, Functional Inclusion, the Relational Model, and Constructivism show significant portions of shared variance with the network (31–38%). This suggests that the latter aspects play a more central role in attitudes toward inclusive education in comparison to the former. Although the Medical Model sets the foundation for any argument regarding the exclusion of persons with disabilities, it appears less associated with the network than Exclusion itself. The Relational Model's large portion of shared variance can be attributed to the theoretical overlap with both the Medical and Social Models.

The assumed reciprocal effect of the aspects within the triads, as well as with the factors Empathy, Authoritarianism, and Social Darwinism (H1), is confirmed by the network.

While Empathy shows the assumed positive association with Functional Inclusion and Full Inclusion, Contact is associated with Exclusion. Social Darwinism and Authoritarianism are, as predicted, associated with Exclusion. With the exception of Contact, H2 is therefore confirmed.

5. Discussion

The aim of the study was to shed new light on attitudes toward inclusive education by combining the newly developed Framework of Inclusive Education [8] and a network approach that allows complex reciprocal phenomena to be assessed [46]. After establishing the relevant theoretical constructs for attitudes toward inclusive education, we applied the network approach to a sample of $n = 191$ student teachers and psychology students to explore the empirical relations. The assumed relations based on the Framework of Inclusive Education have been confirmed, specifically the distinction between aspects that support exclusion (the Medical Model of Disability, Transmissive Beliefs about learning, and Exclusive placement) and aspects which support inclusion (the Relational and Social Models of Disability, Constructivist Beliefs about learning, and Functional and Full Inclusion placement). Additionally, supporting aspects (Social Darwinism, Authoritarianism, and Empathy) are associated with the respective communities.

This study fills an important gap that has not been addressed in the evaluation of attitudes toward inclusive education. So far, despite the strong theoretical links to its feasibility, the cognitive appraisal of inclusive education has not been determined by the model of disability or the beliefs about learning that teachers hold [8]. The network approach allows the depiction of relations without the assumption of a common latent variable. This provides a unique opportunity to represent attitudes toward inclusive education in the same reciprocal way they are connected theoretically.

A previous study by Meschede et al. [63] found that, compared to student teachers who hold less transmissive beliefs, active teachers have a greater professional vision and more pedagogical knowledge; simultaneously, however, they hold more negative attitudes toward inclusive education. Considering the German educational system to be incompatible with the concept of functionally oriented inclusion originating from an Anglo-American background [64], the present study suggests the need for change on a systematic level. Whereas the US and Canada widely recognize inclusion as the 'least restrictive environment' [65], the German system relies heavily on external differentiation [64]. This finding is supported by Menge et al. [66] who found that, despite having more learning opportunities, in-service teachers are more critical and less optimistic toward inclusive education.

Based on the Framework of Inclusive Education [8], we assumed three communities (Exclusion, Functional Inclusion, and Full Inclusion). The network analysis, on the other hand, revealed two distinct communities: an Inclusion Community and an Exclusion Community. We found consistent reasoning behind the opposition to inclusive education. An Exclusive standpoint, Transmissive Beliefs, and a Medical Model of Disability demonstrate the reciprocal effect assumed by the Framework of Inclusive Education. Considering the MDS plot, these variables appear close, whereas Social Darwinism, Authoritarianism, and Contact are further out.

Functional and Full Inclusion do not appear to be as distinct as assumed. The theoretical implications of a Medical Model of Disability compared to a Social Model of Disability did not translate into observable relations. Although there is a small negative partial correlation between the models, it appears that, in general, models of disability are not seen as distinct as is implied within the discourse on inclusion.

The Inclusion Community combines all aspects that facilitate some form of joined education. Confirming preliminary considerations, we found positive partial correlations between the Relational Model, Full and Functional Inclusion, the Social Model of Disability,

Empathy, and Constructivism. The Relational Model of Disability also appears to be the central aspect of the Inclusion Community due to its high strength and closeness factor.

Interestingly, no edge emerged between the Social Model of Disability and Full Inclusion or between the Social Model of Disability and Constructivism. It is possible that the Social Model of Disability is too radical compared to more established, individualized perspectives, which could also account for the low overall agreement with the Social Model. Set on opposite sides of the Inclusion Community, Empathy and the Social Model of Disability share the weakest relation within the community. Empathy itself, although associated with support for inclusive education, shows the weakest values in strength and closeness within the Community. Negative relations with Authoritarianism and Social Darwinism support Hypothesis 2 [33].

The strong edge of the Social Model of Disability with the Relational Model of Disability can be attributed to the theoretical overlap [15]. The strength of the Relational Model, meaning the sum of all edges with all other nodes [49], shows the highest value within the Inclusion Community. Therefore, the value of the Relational Model strongly affects (and is affected by) the surrounding nodes.

High values in terms of both strength and closeness for Constructivism underline the importance of learning theory within inclusive education (see Figure 4). Confirming the existing theory, it shares positive edges with Full and Functional Inclusion, as well as the Relational Model. The opposite position to Transmissive Beliefs further confirms the assumed relations.

The reasonable suggestion that previous contact is favorable regarding attitudes toward inclusive education cannot be supported. Contact, although part of the Inclusion Community, presents low values in terms of strength and closeness. This reproduces previous mixed findings on the influence of Contact on attitudes, especially regarding operationalization [39]. The explained variance (see colored ring around node) further emphasizes the low relation with the network.

Employing a person-centered perspective, the research by Dörrenbächer-Ulrich et al. [67] highlights discrete profiles of teachers concerned with an increased level of heterogeneity in the classroom; the study shows that teachers who hold less constructivist beliefs are more concerned about the implementation of inclusion. Potentially, teacher profiles concerning heterogeneity reconcile with the attitudes toward inclusive education and therefore expand the understanding of inclusive education. Furthermore, profiles may indicate more detailed areas, especially in relation to self-efficacy [68] and contact with persons with disabilities [35].

Limitations

There are several limitations within the present study, which are outlined as follows.

The items within the scale implemented to measure constructivist beliefs are predominantly informed by a cognitive–constructivist standpoint, which emphasizes the individual construction of knowledge but maintains external control of learning processes [52]. More consequently, an instrument concerned with a radical constructivist perspective would adequately depict the assumed model of inclusive education. Especially as a precondition for fully inclusive education, any form of functional or transmissive aspect can hinder inclusive education [64]. Due to the lack of an appropriate instrument and given the reliable test history presented by Kunter et al. [52], we decided to forgo the option of developing a new instrument in this regard. An instrument concerned with radical constructivist beliefs could further develop our understanding of inclusive education and more accurately reflect the Framework of Inclusive Education.

To increase the internal consistency of the instruments, items had to be removed post hoc. A total of 13 items—nine newly developed items and four items from Gebhardt et al. [53]—were removed. The affected instruments will have to be re-evaluated in future research to ensure their validity and reliability.

Contact was assessed on a one-dimensional basis, where participants were asked how they would hypothetically judge the opportunity to meet persons with disabilities. In

particular, those with low concern for the social dimension of disability might overestimate the chance to meet persons with disabilities. The matter of Contact, as a result of inclusion, has been studied in various contexts, e.g., [33,34,69], but, to our knowledge, not yet in the light of different models of disability. Contact has shown a weak shared variance with the network and a general relation to the Exclusion Community. Positive partial correlations with transmissive beliefs and Social Darwinism, as well as the negative partial correlation with constructivism, were unexpected and require further study.

Although the question regarding the type of disability undermines the integrity of the assumed Framework of Inclusive Education, teachers show different attitudes toward different types of ascribed disabilities [5]. Because a Social Model of Disability does not allow the categorization of persons as disabled based on individual attributes, questions regarding the form of disability undermine the framework. As stated in the theoretical background, an individualizing perception of disability is necessarily informed by aspects of a Medical Model of Disability. Simultaneously, confined to the educational context, a motor or physical disability as the cause of segregation from regular education could be ascribed to the environment, whereas cognitive or learning disabilities have a direct impact on performance in education. Disabilities that appear to have direct implications for teaching practice are generally viewed less favorably [5]. Potentially, the model of disability changes depending on observable impairments or previous experience with disabilities.

While exclusivist attitudes appear to be concise within their logical reasoning, inclusivist standpoints follow mixed and sometimes contradictory demands. This is evidenced by the missing relation between the Social Model of Disability and Full Inclusion, as well as the weak edge between Functional Inclusion and the Relational Model of Disability. The theoretical distinction between the two did not translate to the empirical findings.

Several conclusions can be drawn from the application of network analysis to the discourse on attitudes toward inclusive education. The basic structure and the importance of aspects established by the Framework of Inclusive Education [8] have been empirically reproduced and enriched by attitudes regarding empathy, authoritarianism, and Social Darwinism.

One key question arising from the study is whether contact with persons with disabilities has a positive effect on attitudes toward inclusion—does it generally change the perspective on disability or merely raise sympathy/compassion, based on a medical model of disability?

The network approach serves an important purpose. It shows more accurately than other statistical methods the interaction between variables concerned with inclusive education and therefore underscores the importance of a holistic implementation of change.

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