A Social Network Analytics Approach of Exploring the Characteristics of Peer Interaction for Senior Preschoolers

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INTRODUCTION

This study conducted a social network analysis of the peer network in a private preschool to understand the structural characteristics of the participants' peer network, and further measured the indicators of the ego network of the only child and non-only child in the class to understand the differences between the two groups on the ego network. The research questions of this study are as follows:

1. What are the centrality and ego network characteristics of peer network in the large class?

2. What are the characteristics of friendship in the peer network in the large class?

3. Is there any difference between the ego networks of only children and non-only children in the class?

METHODOLOGY

A. Participants

The participants of this study were the students in a senior class from a private kindergarten in Nanning, China, which was selected using the convenience sampling method. The sample included 34 children.

B. Procedure

The study mainly collected data through on-site peer nomination, a social measurement approach. A 14-day informal class observation was carried out to learn about the basic information of the teachers and children, with focuses on the interactions between children and their peers, and the characteristics of peer interaction among the children.

C. Data analysis

Ucinet 6 for Windows was used for data measurement through the whole network approach, centrality analysis, characteristic analysis of ego networks, subgroup analysis, and core-periphery structure analysis. Netdraw 2.084 was used for graphical processing.

D. Peer Nomination Method

In the practice of social network analysis, "name generators" are often used to obtain the data of individual network structure. Peer nomination method is a social measurement method, which is a method of assessing sociometric status in which participants are asked to nominate or rank their peers by the variable of interest.

RESULTS

Figure 1. Peer interaction network of the class

Figure 2. Analysis of ego network indicators of senior class children

A. Whole Network Analysis on Peer Interactions among Senior Preschoolers

The results as shown in Figure 1 revealed that the overall cohesion of the class was weak, meaning that the class was less active, and its peer interactions were not very close.

B. Centrality Analysis of Peer Interactions among Senior Preschoolers

Overall, the mean values of out-degree centrality and in-degree centrality were equal. However, significant disparity between out-degree centrality and in-degree centrality could also be directly observed in some children.

C. Analysis of Ego Network Characteristics in the Peer Interactions

In Figure 2, in terms of connections and size, the mean value of non-only children was higher than that of only children. However, regarding network density, the value of only children was higher than that of non-only children.

D. Friendship Analysis of Preschoolers in the Senior Class

1. Strong ties analysis

There were two kinds of situations in peer nomination; one was one-way relationships and the other was reciprocal relationships. The former was a weak tie, in which a child chose another child who did not choose him/her as well. As for reciprocal relationships, two-way choices were made between two children, making it a strong tie.

Boys had a clearer perception of friendship than their female counterparts, and the strong ties in the class were mainly made up of friends of the same gender as shown in Figure 3.

2. Clique analysis

Using this method, 21 children in the class were divided into 14 cliques of three to four members each. There were overlapping group members in the class.

The clustering test of gender and peer relationships indicated that peer networks in the class were different patterns depending on gender.

3. Analysis of the Core-Periphery Structure of Group Networks

According to the core-periphery algorithm, there were 10 children who belonged to the core group and 24 in the periphery group. In the core group, there were seven non-only children and seven boys.
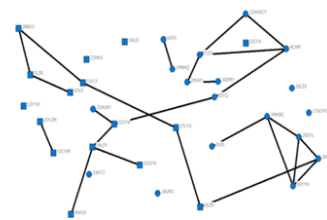

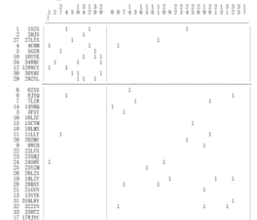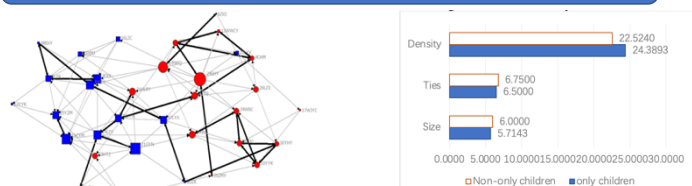Figure 3. Strong ties network in the class

Figure 4. Partitioned adjacency matrix

Figure 4 is a partitioned adjacency matrix. The connotation between individuals in the four sections is observed in Figure 4. The density of the core section was relatively high, at 0.244, while the density of the periphery section was relatively low, at 0.040. The density of the semi-core group was 0.013. As the density represents the closeness of the ties between the nodes in a network, the results in Figure 4 show that the ties between members of the core group were the closest, while those of the core-to-periphery group were the loosest.

The correlation between the ideal model matrix and the partitioned adjacency matrix was calculated using the QAP program. The correlation coefficient was 0.295, with a significance of p < 0.001, presenting extremely significant correlation. This indicated that the two models fitted, that is, a core-periphery structure existed in the peer group of children in the class, but the core-periphery structure was not very well developed.

CONCLUSIONS

People understand themselves, society, and the world while interacting with the environment. By discussing "individuals" and "individual networks," we can better understand the structural restrictions and opportunities that actors face in a network, and the role an actor plays in a social structure.

A. Promoting Children's Social Development through Competence-Based Education

Analysis of children's peer relationship network in the class has found that there were significant differences in terms of betweenness centrality: some children were very popular, while some were rejected by their peers. Teachers can explore the reasons for children's popularity and rejection based on their daily performance, thereby helping the unpopular ones build connections with other children and enhance their interactions.

B. Helping Children Understand Friendship Through Games

Interaction with friends is key for the social, emotional, and cognitive development of preschoolers. For them, playing games is a crucial path to enhance their peer interactions and social skills. Given that there were fewer two-way choices in children's peer interactions, teachers can enhance children's understanding of friends through activities such as picture book reading. As for gender segregation, teachers should provide more games that break traditional gender frameworks in daily teaching, and encourage children to cross the border of role-positioning, so as to provide them with more opportunities for cross-gender interactions.

C. Enabling Small and Medium Group Interactions with Appropriate Measures

The composition analysis of preschoolers' peer groups suggested that there are multiple subgroups with overlapping members in a peer group. These overlapping members enabled close connections between the subgroups. Teachers should guide subgroups to take care of their internal and external relationships, and lead the members of the subgroups to initiate interactions with peripheral members.

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