Research on Teachers’ Knowledge Sharing Features Based on Departmental WeChat Group

Dandan Wei1,*, Lexing Qiu2, Jianting He1
1School of education, Jiangxi Science and Technology Normal University, Jiangxi, China
2Center for information (CIM), The Army Infantry Academy of PLA, Jiangxi, China

*Corresponding author e-mail: 289481204@qq.com

Abstract. The article analyzes the knowledge sharing process and behavior of teachers in the network professional community through social network analysis and content analysis. A semester of interactive data is selected as a sample in the college WeChat group. It analyzes social network structure of network professional community knowledge sharing and the interactive relationship from the aspects of community map, density, centrality, cohesive subgroups, core-edge, etc. The article analyses that, teachers’ knowledge sharing in departmental WeChat group presented the characteristics about complexity of shared subjects, unity of shared knowledge, missing interactions and sharing potential.

Keywords: WeChat group, knowledge sharing, features

1. Questions Raised
In the field of education, it has become a fashion to improve school education by developing professional communities. [1] With the development of the Internet and the rapid rise of various professional communities on the Internet, the potential of the professional community for teachers and student learning has attracted more and more attention. It is hoped that the efforts of educational reforms and continuous improvement will be strengthened through the schools of the professional community. [2]

Foreign research on the professional community of teachers is mainly focused on three aspects: first, the impact of the professional community of teachers on their own professional development; second, the impact of the professional community of teachers on student learning, such as student performance; third, construction of teacher professional community.

The research on the professional network of teacher focuses on the feasibility analysis of the construction of teachers’ learning communities. Although it focuses on the combination of the characteristics of teachers ‘learning communities and teachers’ subjects, the micro-level is about the interactive relationship and knowledge sharing process of teachers in specific professional communities Lack of analysis. In particular, WeChat has become the new favorite of teachers. [3] It is of great practical significance to study the WeChat group built in colleges and universities as a virtual academic community, as well as the development and operation of the virtual academic community,
and the teacher’s interaction in the professional network community.

2. Social Network Analysis of Teacher Interaction in Communities

The teachers in the WeChat group and their interactions constitute a large social network structure, their information behavior is specifically the release and reply of WeChat group information. The Social Network Analysis (SNA) method is a quantitative research method for studying social relationships. This paper defines the response behavior among teachers in WeChat group as relational data, and transforms it into the corresponding relational matrix, and uses Excel2010, social network analysis software Ucinet6.0 and NetDraw2.0 for related data processing and analysis.

Based on long-term participation observations, a simple random sampling method was used. In March 2019, a WeChat group of a college of liberal arts was used as a sample. The period from September 2018 to January 2019 in the group was a time span. The 37 members in the group coded from 1 to 37 to build a matrix of reply relation networks, that is, the rows of the matrix represent the responders, and the columns represent those who posted. The direction of the relationship is from the responders to the posters. Import the encoding information of the sample group members into Excel and implement the following assignments: Among the 37 members, if a member responds to the information posted by another member, the corresponding row and column elements take the value 1, otherwise the element values take 0. Finally, a binary matrix of response relations is obtained, and some data are shown in the following figure:

**Table 1. Sample participant relationship matrix (part)**

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 34 | 35 | 36 | 37 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 3 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 4 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The content of social network analysis includes density, centrality, small groups, and core-edge analysis. It aims to reveal the social network structure characteristics and participant characteristics of the department WeChat group in the process of knowledge sharing.

2.1 Community Graph Analysis

The community graph can reflect the relationship between actors, intuitively express the network of relationships, show the closeness of interpersonal relationships within the community, and reflect the structural characteristics of the group. In the community diagram, the relationships between community members are indicated by directional arrows. [4]

It can be seen from the sample community diagram that most members are on the interactive relationship chain, but some members rarely interact with other members, even in isolation. The relatively dense area of the network nodes indicates that the interactions between members are frequent and the relationship is complex; the sparse network area indicates that there is less interaction between members.

Figure 1 intuitively shows that 35 of the 37 points are connected. Only No.5 and No.10 are lone points, No.1, No.2, No.3, No.6, No.7, etc. have more communication with other members. In the real work of the identity is mostly such as the director of the office, the director of the teaching office, the
chairman of the union, and the vice president. They often post new information, guide interactions, and actively help other members understand the information, which can be called "opinion leaders." Although the network professional community makes the network structure flat, opinion leaders are the core force in the community, which has a great impact on the transfer of knowledge and socialization.

Some members of the online professional community are active participants, paying attention to topics and trends in the group, asking their own questions, and participating in the interaction between group members. As shown in Figure 1, No. 4 and No. 9 are front-line teachers in real work. Although they do not have much interaction, they actively communicate with others. Point out degree is significantly higher than point in degree.

2.2 Network Density Analysis
The density of the overall network is an indicator of the closeness of the actors within the network. For a fixed-scale network or organization, the more connections between actors, the greater the network density, the impact of the Internet on actors' attitudes, behaviors, etc. may be greater. [5] In a network graph, the more lines between points, the denser the graph, Thus density refers to the closeness of the connections between points in a graph. The density value in the binary network graph is between 0 and 1. The closer the value is to 1, the greater the density.

Density reflects the enthusiasm of actors in social networks to participate in interaction. The analysis results show that the density value of the sample is between 0 and 1, and the value is 0.219, which indicates that the sample is a loosely structured social network, and there is less exchange and communication between teachers. Sharing level is low.

2.3 Centrality Analysis
Centrality refers to what position and rights an individual has in a group (Freeman, 1979). This study mainly uses the degree centrality index, and combines the point-out and point-in degrees to examine the role characteristics and knowledge transmission characteristics of participants in the online professional community. The degree of centrality measures the ability of actors in the network. In this study, it refers to the sum of the click-out and click-in degrees of members.

Degree centrality is also called point degree centrality, which refers to the degree of concentration of each point in the network diagram, and reflects the actors in the social network that are in a central position relative to other actors. The point degree centrality of a member is the total number of other members in the network that are connected to the member, and is the combination of the degree of click-out and the degree of click-in. The click-through and click-through degrees of No. 6 are high, indicating that the teacher has communicated with most members in the community, has a high degree of popularity, and has established a stable interpersonal relationship. The results of the community graph analysis are consistent. The out-degree of No. 11 and No. 12 is 0, and there is a certain degree of in-degree, indicating that their posts and opinions in the community have received feedback, which
reflects the active help and acceptance of other members.

2.4 Agglomerate Subgroup Analysis
When certain actors in a social network are so closely related that they are combined into a subgroup, such a group is called a cohesive subgroup in social network analysis. It analyzes how many such subgroups exist in the social network, the characteristics of the relationships between individuals within the subgroups, the characteristics of the relationships between subgroups, the characteristics of the relationships between the individuals of one subgroup and the individuals of another subgroup, etc. Through the analysis of agglomerated subgroups, there are 19 subgroups in the sample. And the numbers 1, 2, 3, 4, and 6 repeatedly appear in multiple small subgroups, indicating that there is overlap between the subgroups and the community. The content of the content of the topic is related. It also has something to do with the actual identities of these members. They interact frequently and can actively participate in discussions on different topics. For the college WeChat group, there are more cohesive subgroups, which indicates that the individual members are closely connected and frequent exchanges; the cohesive subgroups have more overlap, which indicates that the formation of subgroups depends more on the participation of core members. The WeChat group consisting of 37 members is just a close relationship between a few people, indicating that the entire community is not interactive, and most members have not participated in the community’s knowledge sharing.

2.5 Core-Edge Analysis
Core-edge analysis results show that teacher numbers 1, 2, 3, 4, 6, 7, and 9 belong to the same area, and the remaining 30 teachers, such as 5, 8, 10, 11, 12, 13, and so on, belong to the same area. However, the correlation coefficient between the initial matrix and the ideal matrix and the values of the related system of the rearranged matrix and the ideal matrix are both 0.688, so it cannot be judged that there must be a core-edge structure.

3. The content analysis of teachers’ knowledge sharing in network community of majors
The method of content analysis further reveals the characteristics of knowledge sharing in Wechat groups of departments in university and relationship of Wechat-group network structure mainly through the deep analysis of content published by Wechat group researching objects, some related data being solved by counting.

Through the content analysis of Wechat group in department, the content can be divided into five kinds, including the school notification, social information, pedagogical knowledge, scientific knowledge, the others and so on. Twenty-eight messages were issued totally, which consisted of nineteen messages about school notification, accounting for 67.9% of the total, three messages about social information, accounting for 10.7%, one in the pedagogical knowledge category, accounting for 3.6%, and the rest, accounting for 17.8%. From the published content, the majority is the school notification (including teaching, science research, labor union and so on), and then is the others (such as the method of how to operate a computer program, the congratulation to a teacher on his/her promotion in the title of a technical post or an establishment of project so on), the scientific knowledge and pedagogical knowledge hardly existing.

The response of the school notification is usually “Get it”, while the others is the concrete solution or shared congratulation or “Thank you”. The consequence generally indicates the lack of questioning, discussion, interaction, and the process of its knowledge sharing reveals the knowledge externalization of providers and knowledge internalization of receivers. In the case of lacking interaction, the process of knowledge sharing includes two stages--the transfer and absorption of knowledge. [6]

4. The characteristics of teachers’ knowledge sharing in network community of majors
Above analysis shows that the teachers in Wechat group of department reflect following characteristics concerning knowledge sharing.
4.1 The complication of body
The body of knowledge sharing in Wechat group of department consists of all teachers, concerning the dean, secretary, office administrator, director of teaching office, the head and front-line teachers of each department and so on. The status at work determines that whether the member’s communication with others is rather frequent, and often publishing new information to launch an interaction, helping other members understand information positively, building a stable interpersonal relationship and becoming “an idea leader” unconsciously.

4.2 The singleness of knowledge
The content analysis shows it is not beneficial to the professional growth of teachers that the shared content of community is usually related to school notification, and the others, concerning little knowledge about theory and practice.

4.3 Lack of interaction
The analysis of social network indicates that teachers’ interaction in the group of department shows that the Wechat group of college is a rather structure-loosening community, few exchanges and communication, and the much low positivity of participating in interaction and a rather low level of sharing.

4.4 The potential of sharing
The analysis of social network indicates that there is a small part of the front-line teachers in community, who are positive participators, paying attention to the topics and dynamics in group, putting up with their own questions and taking part in the interaction with group members. Although they were not involved in lots of interaction, shows the positivity of communicating initiatively.

The final worth orientation in the process of knowledge sharing in the teachers’ network characteristic community should satisfy the community members’ needs of respect and self-actualization. The final worth orientation includes the community life of gaining recognition, respect, a sense of achievement, a happy community life, also acquiring harmonious interpersonal relationship, the formation of educational wisdom and the complete personality.[7] If the process of teachers’ knowledge sharing in the community is to be fully interactive, it should include the externalization of knowledge providers, the socialization of knowledge in the community situation, and the internalization of knowledge receivers.[8] However, the quality of effect about knowledge sharing in network professional community is affected and limited by the characteristics of the body of knowledge sharing, content characteristic and the environmental condition of “a shared place”. Among these factors, the key of promoting knowledge sharing is to create a great surrounding condition for knowledge sharing,[9] and pay more attention to the teachers’ potential knowledge, strengthening the mutual transformation of explicit knowledge and implicit knowledge, namely the important link of knowledge socialization.

Acknowledgments
Project Fund: One of the achievements of the "Thirteenth Five-Year Plan" of Jiangxi Province’s Educational Science in 2017, "Research on the Process of Teachers’ Knowledge Sharing Based on the Network Professional Community-Taking the WeChat Group of the Department as an Example" (Project No.: 17YB140)

References
[1] Richard Du Four. What Is a Professional Learning Community? [J]. Schools as Learning Communities 2004（8）: 6-11.
[2] L.Stoll, KS Louis. Professional Learning Communities: Divergence, Depth and Dilemmas. Professional Learning. [M]. Open University Press, 2007:192.
[3] Li Xin. Network + Wechat of educational age becoming the new favorite of teachers[J]. China
Educational Technology & Equipment, 2016, (14): 122-123.

[4] Lai Wenhua, Ye Xindong. the social network analysis of knowledge sharing in virtual learning community[J]. Modern Educational Technology, 2010.10: P97-98.

[5] Huang Wei. Study on virtual learning community from the perspective of social network analysis[J]. audio-visual Education Research, 2011, (12): 53-57.

[6] Li Xingbao, Wu Xijing. Process model and value orientation of teacher’s virtual community knowledge sharing[J]. audio-visual Education Research, 2013.3: P79-80.

[7] Jiang Lin, Kuang Renzong. Study on knowledge sharing and its influencing factors[J]. Modern Educational Technology, 2008.11.