

EFFECT OF GROUPING ON CLASSROOM COMMUNITIES

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ABSTRACT

In the education field, the management of student relationships is one of the most important duties of teachers. Such management usually reflects the teacher's abilities and experiences. The purpose of this study is to clarify management methods to realize appropriate classroom community structures. In this study, we simulated a community-forming mechanism to clarify the influence of grouping on classroom community formation. We represented a community through a communication network using Heider's "psychology of interpersonal relations." The proposed model is applied to the simulation in which the proposed model is modeled as a standard Japanese junior high school class. Simulation results suggest that the grouping in a classroom community effectively decreases isolated and fringe students.

1. INTRODUCTION

In the education field, the management of student relationships is one of the most important duties of teachers. Such management usually reflects the teacher's abilities and experiences.

The purpose of this study is to clarify management methods to realize appropriate classroom community structures. In this paper, we propose a classroom community model based on a network model through multi-agent simulations. The proposed method is based Heider's balance theory to analyze the dynamics of group formation.

In this paper, the influence of teacher interventions is analyzed by multi-agent simulation. We focus on "grouping" and "isolated students." "Grouping" is one method to manage student relationships that is often used in classroom management [1]. "Isolated students" is one of the most important classroom management issues. The aim of this study is to clarify the most effective method of "grouping" and to suggest a platform on which to erect appropriate class management.

2. PROPOSITION OF CLASSROOM COMMUNITY MODEL

2.1. Network model of classroom community

Through communication, people exchange opinions and often alter their attitudes to reflect such obtained information and

opinions. Continual communication provokes various types of relationships between people, such as friendship or hostility; through communication people form communities. In this model, a network approach is employed where people are nodes (agents), relationships are links, and a community is a network.

2.2. Communication model

In this simulation, friendship and attitudes toward a partner are updated based on Heider's "psychology of interpersonal relations" [2], which is often called "Heider's balance" (HB). This very popular theory describes the dynamics of human relationships.

The attitude of one person toward a subject is affected by the relations among the person himself (P), the subject (X), and communication partner (O). Each of the three opinions, PO, PX, and OX, is expressed as "+" when favorable and "-" when unfavorable. When the sign of the product of these three opinions is positive, the relations preserve the balance. On the other hand, when the sign of the product is negative, the relations are out of balance (Figure 1). According to Heider's theory, when the relations are out of balance, the person tries to "change one's opinion to the subject (PX)" or "change one's remark to the partner (PO)" to achieve balance.

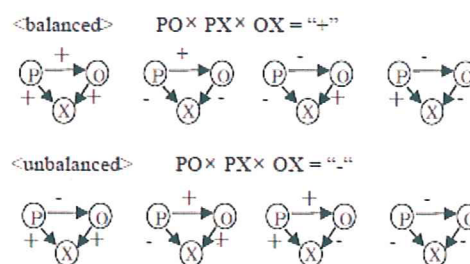


Fig. 1. Heider's "psychology of interpersonal relations"

When the relation is out of balance, the agent changes both PO and PX to achieve it again. In this simulation, even when relations are balanced, the agent changes PO and PX to strengthen the balance because individuals tend to change their minds when receiving new information from partners. In both balanced and unbalanced cases, the agent changes PO

and PX with the following differential equations:

$$\frac{dl_{ij}}{dt} = w \cdot l_{ik}l_{jk} \quad (1)$$

$$\frac{dl_{ik}}{dt} = w \cdot l_{ij}l_{jk}, \quad (2)$$

where w represents the rate of change.

3. EFFECT OF GROUPING IN CLASSROOM COMMUNITY

3.1. Simulation purpose

In experiments, we propose a “grouping” model to analyze the effect of teacher interventions in classroom communities.

3.1.1. Grouping

To represent grouping, we define “group communication turn.” A “group communication turn” occurs in a given probability. When it occurs, all agents perform “group communication” in the turn. “Group communication” is defined as communication between a group members.

Initially, all agents are arranged in groups. At the “group communication turn,” agents do not communicate with friendly agents but with agents who belong to the same groups. Hereafter, we call the frequency of the “group communication turn” the “rate of group communication”.

3.1.2. Criteria

The following parameters are commonly used to evaluate classroom structure.

- Number of isolated agents
- Number of fringe agents

3.2. Grouping effect

3.2.1. Purpose and conditions

The purpose of this simulation is to confirm whether grouping effectively decreases the number of isolated and fringe agents.

Simulation conditions are listed in table 1.

Table 1. Grouping Simulation Condition

Number of agents	30
Number of group members	6

3.2.2. Simulation results

Figure 2 shows the changes in the numbers of isolated and fringe agents, when the rate of group communication increases. The number of isolated agents decreased drastically when the rate of group communication increased from 0 to 10%. In addition, the number of fringe agents decreased when the rate of group communication increased from 0 to 30%.

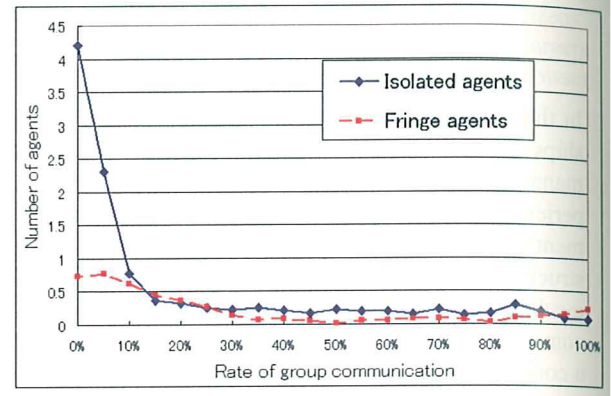


Fig. 2. Number of isolated and fringe agents

4. CONCLUSION

In this study, we simulated a community-forming mechanism to clarify the influence of grouping on classroom community formation. We represented a community through a communication network using Heider’s “psychology of interpersonal relations.”

The proposed model is applied to two simulations in which the proposed model is modeled as a standard Japanese junior high school class. Simulation results suggest that the grouping in a classroom community effectively decreases isolated and fringe students.

The most important future work is confirming the consistency between simulation results and actual classroom problems. We will also try to model other classroom management methods by using the proposed classroom community model, including leadership oriented grouping, individual counseling for isolated students, and so on. Furthermore, considering how to feedback knowledge suggested by the proposed model is another important future work.

5. REFERENCES

- [1] The Japanese Society for Life Guidance Studies, *Kodomo Shudan dukuri nyumon* (in Japanese). MeijitoshoshuppanKK (2005)
- [2] F. Heider, *The Psychology of Interpersonal Relations*. J.Wiley and Sons, New York (1958)