

# Models of Role-Structure in Project-Based Games for Children in Kindergarten About 5-6 Years Old

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## Abstract

In this paper we report on the use of project-based learning in teaching the children about 5-6 years old. We call it “Project-based game”. It’s a way of proceeding through the organization of mutual collaboration of children to solve the real problems of games, from which can excite children on transferring knowledge and problem-solving ability. Children work as a team. Each team member has the different role and task. So how to integrate resources to play a team advantage, and how to tap the maximum potential of each team member are particularly important. This study was trying to build a role of structural models for children to explain the relationship between the different roles in the project learning and reference for researchers. This study accomplished the following works:

we interviewed normal teachers and children which from different classes, aware of the problems of grouping when teachers carry out the project game. Then we tracked and observed a number of project cases in kindergarten, designed the questions and tasks and collected a wealth of experimental data. Through the collation and analysis, we finally obtained significant achievement in this study “The role of structure model in project-based games for the children in kindergarten about 5-6 years old”.

**Keywords:** children, models of role-structure, project-based games, team

## 1. Introduction

The aim of the present study is to explore how to build models of role-structure in project-based games, and analyze the effect of the model. The game is one type of children learning, which includes designing, problem-solving, decision making, investigative activities and the opportunity to work collaboratively. All the roles were formed naturally when children started the game and the role structure was already present. After reading the related information in the field, found that there's a lack of documenting about children's collaboration work, about how they gave feedbacks, how they articulate and synthesize their work with that of others about the Role-structure in Project-based Games. So it's the necessity to study.

In recent years there has been an ongoing study in China, the ministry of education issued “In the guidelines for the study and development of children aged 3-6”, Instructed the teacher to education the children of 5-6 years old: need to understand the meaning of the rules, can negotiate with peers to make game and activity.

Although many researchers have been widely studied about the definition and characteristics of projects in the game early childhood learning, efficiency, there are the following three aspects of problems: one is to explore the essence and core of cooperative learning and its internal mechanism study is slightly less than; Second, although researchers have studied students' learning situation through platforms such as Moodle, few researchers have explored the tool support in the learning process. Thirdly, there are few empirical studies on the types of children learning and related empirical studies in the project game, which requires us to find a new theory to further explore the children's learning in the project game.

### 1.1 5-6 Years Old Children's Cooperation Learning in Kindergarten

The development of early cooperative behavior in children is closely related to the development of social interaction, social cognition and self-concept. From a social point of view, some researchers suggest that social goals have an obvious impact on cooperative behavior (Doich 1960).The study looked at the impact of

collaboration, personal orientation, and competition orientation on people's cooperation and competitive behavior. The result is that the percentage of selected cooperative strategies under cooperative orientation is higher than those of other guidance directed to choose the cooperative strategy. In addition, in childhood, cooperative behavior is influenced by social goal orientation, researchers (Xiaodong Li) found that "children to achieve social goals, their behavior is also different, under the condition of cooperative goals more children's cooperative behavior."

There are other researchers (Fitzgerald M, Frankie G.H, 1982) the results of the study suggest that children's cooperative tendencies increased. Chosen from the kindergarten middle shift to the third grade of experiments have been carried out to study the subjects, the study found that: with the growth of grade, children's competition gradually reduce, cooperative behavior gradually increased, and the cooperation level is higher and higher (Youshui Li, Lilin Zhang, 2000). Other researchers, found that older students are more willing to cooperate (Yan Li, Zifang Cao, 1997). The research results show that although the preschool age differences in cognitive development cooperation have not reached significant level, but as the growth of the age, gradually reduce the proportion of children's objective conditional cognition, outcome, common interests and values of cognitive are gradually increasing (Qin Chen, 2004). The further study of the scholars showed that the cognitive level of cooperative behavior was gradually improved with age (Qin Chen, Lijuan Pang, 2010).

In the field of cognition, there are researchers from the perspective of social cognition and self-cognition. The study found that the cooperative behavior of children was closely related to their self-concept and their perception of the relationship between themselves and others. The cognitive tendency of children's self-centeredness not only interferes with their exploration of world activities, but also influences their peer interaction and cooperation. However, the development of the relationship between the object and the object can effectively promote the development of peer cooperation (Brownell & Carriger, 1990).a large number of studies have shown that the individual cognitive factors, such as the perception of the intentions of others, for others' attitude, perception of situation, and so on, in the interaction between the individual plays an important role. That is, how children perceive themselves, their peers, and the tasks they face will affect how children behave in groups.

Some studies have found that the ability of children to adopt complementary roles is closely related to the ability to adapt to each other and complement each other. When children can correctly understand the causal relationship between their own behaviors and other behaviors, and consciously take the complementary behaviors with their peers, he can cooperate more effectively with his peers. The guidance, demonstration, encouragement and reinforcement of the peer will enhance the understanding and coordination among individuals and promote the beginning of cooperation. The cooperation between adults and children is the way to guide and be directed, while in the peer group, children are cooperating through communication, consultation and integration of views.

### *1.2 Factor Affecting Children's Learning in Project-Based Games*

In addition to the problems existing in the game, the key actions of successful teams and failed teams are the most influential factors in the game.<sup>4</sup> major behaviors had been documented after observing the 80 children behave and they are:

First, it's discussion. In the drama about the ugly ducking, what children did mostly was discussing. In this project and it took them 4 weeks to finish this drama after the continuous discussion. Secondly, it's organizing and management behavior. For example, there was a boy who organized the group and assigned different jobs to different team members. Ultimately, they became the first group that completed the task and every one of the group was especially cheerful. Thirdly, exploratory behavior. After trial and error, Children found out that using two hands would pull out carrots faster and that if they had cleared up the farm it would be a lot easier to plant. And lastly, it's promotion or regulatory behavior. By which we mean any behaviors that could help promote coordination and development of a game or project. For example, in a performance, the bee costumes were not enough. Then children decided to make a new bee costume with a yellow T-shirt and some old CDs together. And they also created a Superman role to solve some problems, and these behaviors all provided a support for the performance. From the observing it could say that role-structure is influenced by the role task and the key behaviors. But in the study we also found that there was no clear link between key behaviors and role tasks every time.

After reading the related information in the field, how they gave feedbacks, how they articulate and synthesize their work with that of others had been found.it was shown in Table 1.

Table 1. Literature overview

CONTEXT Collaborating With Other	UNDERLYING DEFICIENCY	INTERVENTION	SOURCE
<ul style="list-style-type: none"> <li>• giving and getting Feedback</li> <li>• Collaborating on written work</li> <li>• distributing work Equitable</li> </ul>	<ul style="list-style-type: none"> <li>• Children are used to working with others, but not with collaborating, giving feedback, articulating and synthesizing one's work with that of others.</li> <li>• Children often fail to distribute work equitably on their own</li> </ul>	<ul style="list-style-type: none"> <li>• “Collaborative and multimedia interactive learning environment”(CaMILE)</li> <li>• Providing norms for individual accountability.</li> <li>• Incorporating the “jigsaw” method and reciprocal teaching.</li> </ul>	<ul style="list-style-type: none"> <li>• Hmelo, Guzdial and Toms (1998)</li> <li>• Barron et al. (1998)</li> <li>• Brown (1992)</li> </ul>

**2. Methods**

A study was conducted for the children in kindergarten about 5-6 years old across Xindu district, Chengdu, China and all of them were the top class children. The sampling process of municipalities and kindergarten is based on the easier observation and case studies on the grounds of which we chose a kindergarten in the countryside with the conditions.

The study was conducted from the end of 2015 to the beginning of 2016. It used the questionnaire included 26 items about kindergarten teachers' viewpoint to children's competences and abilities and also about the grounds for dividing children into groups. Other questions in the study were fixed-format or open-ended questions. All the teacher of the top classes (it has 3 top classes, each of it has 3 teachers) answered the questionnaire. Through the questionnaire, the children in 95 % of the interval were selected as samples. (This would make the sample more universal).It comprised 80 participants (46 males).

The study divided the children into four groups. Every two groups played the same game and twice a week.

**3. Results**

According to *Guideline to the Learning and Development of Children Aged 3-6* and the statistics of 1st kindergarten of Xindu District, Sichuan, China, children 5 years old when the brain weighs about 75% of adults, 6 years of age about 90% of adults. The structure of the brain has been quite mature. Action to enhance flexibility, can skillfully make muscle movement. Improve the ability to balance, can climb, slide, etc. Fine motor function has been greatly improved, can more freely control the wrist and fingers, flexible use of some tools, can be used to shape the fine part of the mud. So this stage of children's similarity is better, suitable for this research.

Considering 5-6 years old children's age characteristics, 40 children at this stage were chosen as samples of the research. These children were selected from the whole kindergarten, and were divided into two groups on average, which were labeled group A and group B. The research took 4 weeks with a total of 8 classes to complete the project, which included theme discussion, leader selection, making plans, tasks arrangement and final show, etc.

During the project-based games, the behavior of the two groups at each stage and different links was observed and recorded. According to the behavior of the two groups, such as discussion, consultation, role arrangement, making plans, task arrangement, the final show, and so on, the 10 point system was adopted to mark the performance in accordance with the degree of excellence. For example, the simple plan contained several steps was marked by A group, which was shown in Figure 1. According to the details of the plan, such as time, location content, and so on, these elements were considered to evaluate and score. So, A group scored 8 because there was a hand drawn plan, and B group scored 0, because there was no plan. The statistical results were shown in Table 2.

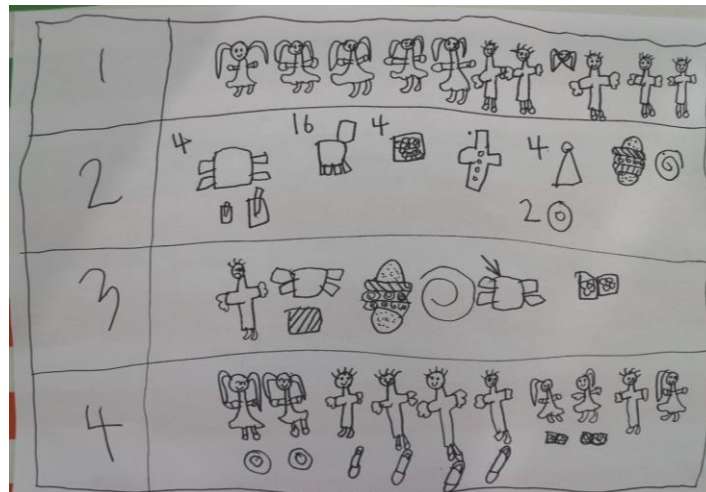


Figure 1. The task arrangement and plan of group A

Table 2. The statistics of performance during the game

Rosies Walk		Project-based Games	
Research time		4 weeks (8 lessons)	
Grouping situation		Group A	Group B
Number of participants		20	20
Discussion situation	Attitudes	9	7
	Theme	8	5
	Interaction with teachers	7	3
Group leader	Familiarity of roles	7	2
	Familiarity of picture book	8	3
	Organization & leadership	8	2
Times of roles consultations		4	1
Making plans		7 (shown in Figure1)	0
Roles arrangement		9 (shown in Figure2)	2 (shown in Figure2)
Tasks arrangement		8	4
Implementation		7	3
Performance of the show		8	4

In order to study and analyze the differences of the final show between the two groups, the personnel allotment for each role task (such as director, actor/actress, narrator, dresser, props preparation, scene preparation, script collection), and the time allocation for each link (such as discussion, planning, preparation, practice, show), in the course of the project, were tracked and counted. The results were shown in Figure 2 and Figure 3, respectively. The percentage in Figure 2 was the ratio of the number of people on the task to the number of entire group, and the percentage in Figure 3 was the ratio of the time spent in the link to the total time of the project.

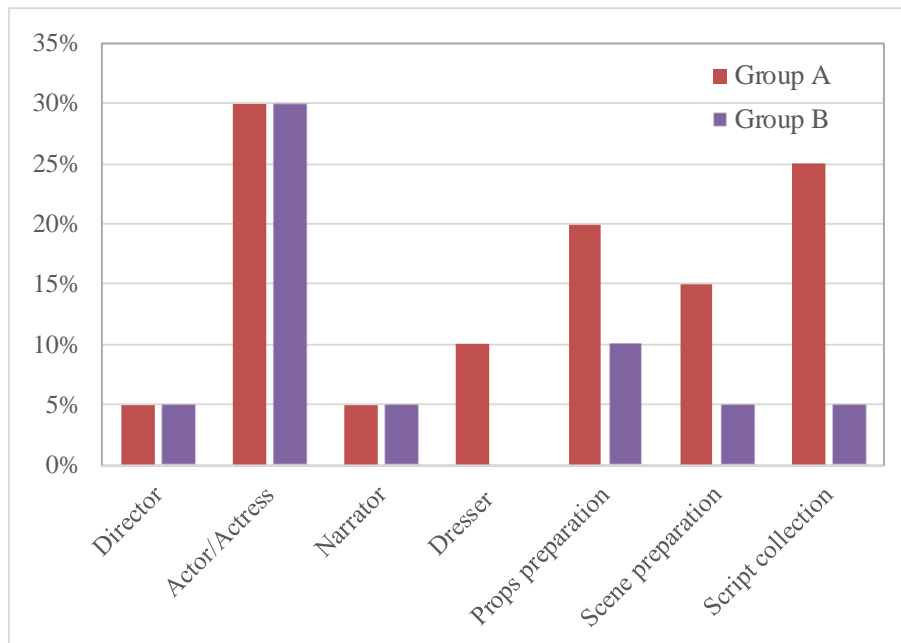
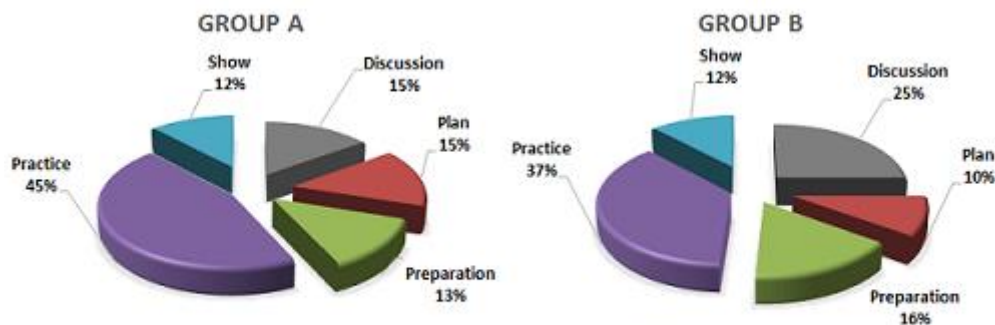


Figure 2. The comparison of the assignment for tasks in the game



Note: the percentage represents the ratio of the time in the task to the total time in the game

Figure 3. The comparison of time allocation in the game

#### 4. Discussion and Conclusions

Through the case analysis of the two groups, the key behaviors and the problems was summarized. So how do the study had been solved or avoid these problems from a grouping perspective? Considering that the current grouping is based on the group of children, it was not the most effective way to consider the children's wishes. So what was the most effective grouping? What type of young children would be more in forming a group? In this way, the social relationship of the class had been analyzed. Based on the above problems, an open questionnaire was designed ,the children could choose their favorite team members, the purpose was to understand young children like and what kind of friends were in the same group games, such as well, or the personality was bright and clear. Then, based on the selection of children's interviews, the author carried out statistics and processing of data, and mapped out the overall picture of the class relationship and the cross-selection of the class children based on the statistics.

##### 4.1 Children's Grouping and Class Social Relations

In this the game situation in Children’s games was analyzed and arranged .Discovered that the game was affected by grouping.

When asked about the way children were grouped, the teacher's answer was the same -- grouping by class. Whether the author asked after the grouping, examined the effect of this way of grouping, as well as the large

children's view of the grouping, the teachers all reflect the effect of grouping does not take into account the follow-up and young children.

Grouping by class is the easiest and fastest. But it's not the most effective. There is no attention to individual differences in children in this way. The young children floated around in groups, outside the edge of the group, not participated in the discussion of the group could often see; Or the team members had a specific problem that made deeper. Visible grouping was closely related to group activities, without using scientific grouping could easily lead to the game team members lack a sense of accomplishment, and thus more foiled their willingness to participate in the project.

In kindergartens, there was little interest in the natural selection of favorite game areas. Therefore, if the interrelationship among children could be fully considered, each project team would be made more cohesive, and the game effect was more obvious, and children could play more effective games together.

After the grouping, the teacher could only by their generally promote the work of the game, to assign a leader of the team, and less interference inside the team task allocation, most of the work by the team leader within the group activities. This could easily lead to overwork of the group leader. It was necessary to listen carefully, clarify the requirements of the teacher, and organized the team members to complete the project. It could also lead other groups to pass the buck. This required the teacher to assign tasks to each type of team member during project design, and developed a separate evaluation mechanism to allow all members of the team to participate in the project. At the same time, the child's level of play was affected by the number of groups.

From the perspective of social relationship diagram shows the result of this class kindergarten was located in the center circle and the outer circle the number of people were relatively few, most of the children in the middle of two layers of hierarchy (popular character envelopes and general character envelopes). The ratio of central characters to each other is not very high. From the results of the social graph, we can see that there are three people in the center of the class. This is not consistent with the author's expectations, and the author anticipated that the central characters would be more likely to choose each other. The interaction diagram shows that the central characters prefer to select the young children in the middle layer as group members. In order to understand the reasons for the children's choice group members, the author designed an open question in the interview record, so that the children can choose the reasons for selecting the group members while selecting the group members. "He is my friend and we are well" is one of the reasons young children are most valued when selecting a group member, according to the survey. The second is "he" and "he's smart." Thus, children are a major factor in selecting group members.

It could be seen that the social relations between the team members could affect the communication and discussion within the group Impact the implementation of the whole project. When grouping children, the author suggests that should refer to the class society. Make sure that each member of the group had a member of his or her favorite group and balance class. The class was popular with young children and peripheral children, so that each member could feel a sense of belonging within the group, and also ensure the harmony of the group atmosphere.

#### *4.2 Build the Role-Structure for Children in Project-Based Games*

The study tried to draw a clearer picture about Key Behavior and Role Task, intending to see the resulting effect on Role-Structure in this research, and we wondered, would the Project-based Games be better when the role tasks and key Behaviors matched?

We constructed a relatively complete theory of Role-structure in our research based on what we did in the case study of 80 children. And we described the role structure model from three perspectives: role, behavior, and task. It was shown in the Figure 4.

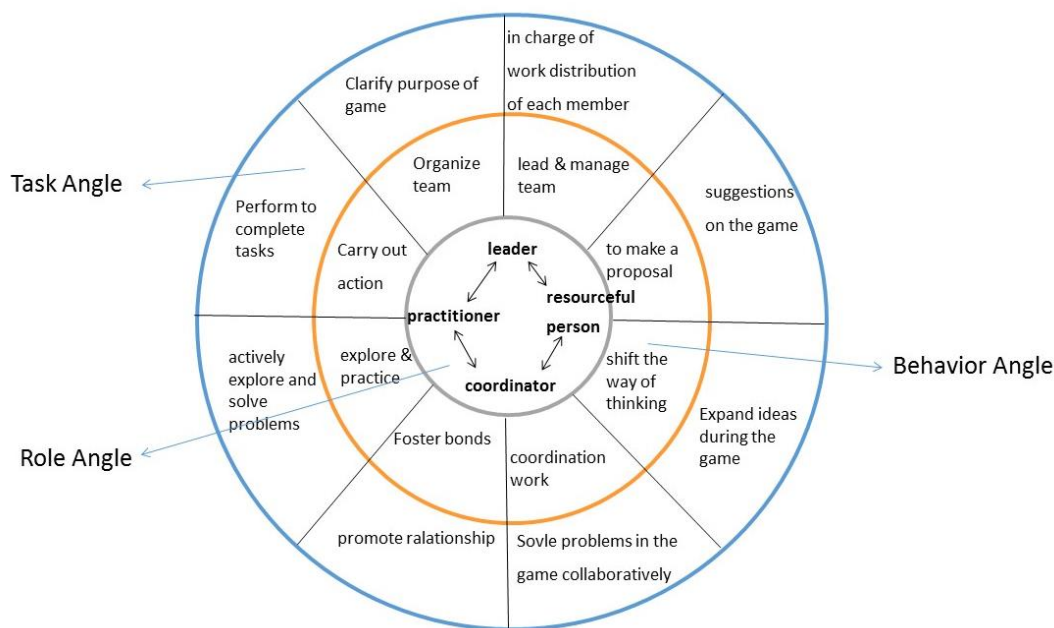


Figure 4. Models of Role-structure

The role: There are at least four key roles: leader, mastermind, coordinator, and practitioner. And they are in the green circle in the center as you can see.

The behavior: a successful team will reflect the eight key features in the project, and they are the orange circle right in between: Organizing a team, leading and managing a team, making a proposal, etc.

The task: It stipulates and specifies what should be accomplished by each role in the execution process of the entire project. And we computed eight of them and they are in the biggest red circle.

#### 4.3 The Personalisation of the Models of Role-Structure

Ideally, to guarantee any task being accomplished accurately and quickly, all of these individual elements in this diagram would be seen all together, but not necessarily. The role-structure Model would be formed naturally when these three aspects were integrated automatically on their own. Would this work better if incorporated in a realistic situation?

The body design of the model was carried out in this section. Before the game, the learning content and laid out role task and key behaviors was designed. They were shown in the Table 3 & Table 4.

Table 3. Project task & Mission Support

Project phase	Project task	Mission support
initial plan	choose theme	Determine the theme & purpose of the picnic
	plan	Determine the content, draw the task
	make a plan	Determine the time and task
medium-term planning	identify and collect resources	Determine the resources collect resources
	assigning task	assigning task to everyone

	planning the layout	layout
the late review	activities	
	project evaluation	peer reviewing teacher evaluation

Table 4. Role task & Key behavior

Project phase	Role task	Key behavior
entire	<ul style="list-style-type: none"> <li>➤ for the picnic theme, purpose, content and other members of the discussion</li> <li>➤ speak freely in the discussion, express their idea</li> </ul> When there is disagreement, coordinate the relationship between members, to avoid the phenomenon of quarrel and marginalization	organization discuss proposal innovate coordinate Plan Decision

Learning content design: The theme of this project was "picnic". And the project was divided into three stages. Then each stage was furthermore decomposed. After decomposing the task of the project clearly, the corresponding mission support was made as shown in the table. Role task and key behavior: Each role has various tasks at different stages of the project. Therefore, we demonstrably designed the role task and key behavior of the project phase and chose the initial plan as an example to explain the specific details of the design. two teams were chosen as an example to explain the design of the model. There were ten children selected randomly from the senior grade of a kindergarten in each team.

The first successful team had 6 boys and 5 girls, and it had the best division of duties, after discussion, they picked their leader and the leader began to assign the task to every child, then the children began to set the tables and pick flowers to decorate the table, two children got food ready, and gave it to the waiter and waitress. And finally all the children enjoyed the food together. The second successful team had the best implementation of the plan, the children drew everything they needed to do. They drew down whom they wanted to be with and the leader concluded all the things they needed to do. They prepared together: putting on clothes, preparing tables and chairs, making the drinks and foods ready. Finally, they invited friends to enjoy the meal together.

**5. Conclusions and Prospect of Research**

In this study, research topics were from a line of teachers' practical problems, from the classroom observation summed up the model, the application strategy was put forward, and a return to the classroom experiment verification, the results of the study was available. Based on the role of children's game, the models of structure were proposed, pointed out that a successful project team need which member of the role, which is the key members of the group behavior, and these roles need to undertake the task team. For teachers in the infant group provides reference. Also according to the character of models structure learning tasks, roles and corresponding problems list, points out that the teachers in the project design needs to be targeted for different role assignments, so that every child can effectively participate in the project process from the project exercise their various aspects ability in learning. Using the interactive discourse analysis research method, the observed group word fragments were analyzed, and draw the interactive graphic, sums up the successful team members of interaction between team members and failure, and the role of structure model is obtained. The use of this method is a reference for other researchers.

This study put forward the models of role-structure of project-based games and provided new ideas and methods for teachers to design the project. However, it is still necessary to continuously test and verify, especially in other subjects. In different disciplines, the application of research will be alter and complete. it will also help to make



the model more common. Under the premise of each course standard improve the students' learning. Due to the small number of children of carrying out the game class from this study cases, observed experimental study were gone through half a semester time, with the effect of model confirms that still lack a long-term investigation. Moreover, the improvement of children's ability is also a long-term process, which requires follow-up and feedback. All this needs further improvement.

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