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Promoting children's agency in Chinese kindergartens: Conceptual PlayWorld as a creative science activity

Abstract

In pursuit of more creative and imaginative citizens, the Chinese Ministry of Education has launched policies and curriculum guidelines to promote play-based science learning. However, little research has been directed to Chinese children's experiences in play-based science activity settings. This paper examines how children's science learning experiences have changed after implementing a Conceptual PlayWorld, which is used as an intervention in this educational experiment. In the larger study, video observations of 2 teachers interacting with 34 children (4–5 years; mean age of 4.65 years) during group learning activities (40 hours) as well as children's interviews (3 hours) were analysed. Informed by a cultural-historical conception of play, this paper focuses on the changes in children's play and learning experiences from a teacher-directed group learning activity setting to a collective imaginary play activity setting. Through collective imagining, the Conceptual PlayWorld allows children to co-construct play rules and to have a higher degree of freedom in classrooms, which promotes children's initiatives in science learning. In addition, children's involvement in the Conceptual PlayWorld helped to maintain children's intentional and responsible membership. It is argued that Conceptual PlayWorld has the potential to be implemented in Chinese kindergartens to promote children's play-based science learning and agency.

Keywords: Agency; children; China; playworld; science.

1. Introduction

Cultivating children's creativity is considered as one of the most important objectives of early childhood education (Ata-Akturk & Sevimli-Celik, 2020; Chien & Hui, 2010; Meyer & Eilifsen, 2017), as it helps lay the foundation for future creative and agentic citizens. Historically, Chinese early childhood education has been deeply influenced by the Confucian heritage which emphasized teacher's authority and content knowledge learning (Lin et al., 2019; Zhu & Zhang, 2008). From the 1980s, the Chinese government began to carry out the Reform and Open-up policies, and the societal environment has greatly changed traditional educational values. Since then, the educational authorities in China have launched a series of early childhood education reforms to promote children's active learning and play-based learning in kindergartens (Li et al., 2015; Yan et al., 2005). The Ministry of Education in China released several regulations and guidelines, including the *Early Learning and Development Guidelines for Children Aged 3–6* (Ministry of Education, 2012) which emphasized play as the basic activity in kindergarten settings, advocating for children's imagination, creativity, exploration and active learning.

In the context of early childhood education reform, play-based learning has mostly been accepted by early childhood teachers (Yu, 2015). However, Chinese teachers believe that teacher-directed play activities aiming to achieve pre-set learning objectives can be regarded as play-based learning activities (Cheng & Wu, 2013). Therefore, Chinese playing-learning patterns contain much teacher guidance and adult involvement (Cheng & Wu, 2013; Faas et al., 2017; Wu & Rao, 2011). Specifically, children are expected to follow the teacher's instruction in science activities which often results in loss of agency in science learning (Feng, 2015). Researchers have come up with different approaches to promote Chinese children's active science learning through play. Yi (2020) argues that kindergartens should use a project-based approach and a student-centred approach to engages children with real-world situations or problems, promoting children's play-based science learning. Zhao (2019) suggests that kindergartens should create learning environments that advocate play and agency, for example by distributing various materials and connecting science to children's everyday life. Similarly, Feng (2015) recommends that kindergartens create

an experiential play environment through opportunities to do science experiments. However, far too little attention has been paid to imaginary play and how it could promote children's science learning.

Drawing on the cultural-historical theorizing (Hilppö et al., 2016; Hofmann & Rainio, 2007; Kumpulainen & Lipponen, 2009; Rainio, 2010; Sairanen et al., 2020), this study has defined children's agency as an interactive process between the child and the activity settings, where children take initiatives and maintain the intentional and responsible membership to transform the practices they engage in. As argued by Rainio (2009), imagination and fantasy have the potential in promoting children's agency. To develop children's agency in play-based science learning activity settings, this study implemented a play-based pedagogy named Conceptual PlayWorld. The playworld approach was first introduced by Lindqvist (1995) and allows children and adults to enter imaginary situations based on stories. This allows the children and adults to work together to solve dramatized problems. It has been argued that playworld can offer a genuine solution for early childhood educators who are dealing with how to plan for the learning of concepts in play-based settings (Fleer, 2019). To promote children's conceptual learning in science, the original playworld approach was re-developed through research into a Conceptual PlayWorld (Fleer, 2018). Through employing cultural-historical theory, this study mainly focuses on how a Conceptual PlayWorld can create opportunities for children's agentive science learning in play, which offers insights into understanding children's agency in a Chinese context. To achieve this aim, this paper begins with a brief overview of the background to the study, followed by the theoretical framework, the study design and the findings.

2. Play and imagination

This study is informed by a cultural-historical conception of play and explores if and how play and imagination give space to children's active science learning. According to Vygotsky (1998, p. 267), play is a unique relation to reality that is characterized by creating imaginary situations or transferring the properties of some objects to another. When a child gives new meaning to an object through the process of imagination, the child's focus of attention is no longer on the object, but the meaning that the child has given to the object. Since children learn to consciously recognize their own actions and become aware of the object meaning, the imaginary situation they created can be regarded as a means of developing abstract thought (Vygotsky, 1966). Thus, imagination becomes a conscious act by the child through the object-meaning inversion. To be specific, when children give new meaning to objects in an imaginary situation, they get opportunities to broaden their experiences by consciously considering the concrete world. Thus, the simultaneous movement between the real concrete world presented to children in early years programs (concrete) and the abstractions that are demanded during the process of concept formation (abstract) is possible through imagination. This gives the possibility for concept formation to become a conscious act by the child (Fleer, 2011). Children's conscious conceptual learning in the imaginary situation is also manifested through children's continuous movement in and out of the imaginary situation. Imagination moves a child away from reality to give higher forms of cognition, which is closely related to children's concept learning (Fleer, 2011). Therefore, imagination acts as a dynamic bridge between play as a leading activity in preschool children and learning as a leading activity in school-aged children (Kravtsov, 2006).

Besides changing the meanings of objects and moving in and out of the imaginary situation, a child can explore the rules of society that govern the roles and activities of its people in the imaginary situation (Elkonin, 2005). From this perspective, the child is free in play. It is believed that children have degrees of freedom in choosing or changing choices, instruments, goals and rules in play (van Oers, 2010, 2012c). However, Vygotsky (1966) argued that children's freedom in play is illusory. The role the child plays and the child's relationship to a specific object in an imaginary situation always stem from societal rules (Vygotsky, 1966). As Vygotsky (1966, p. 9) states, "what passes unnoticed by the child in real life becomes

a rule of behavior in play". For example, if a child imagines herself/himself to be a mother or a father of a doll, then she/he will obey the rules of caring behaviour they noticed in daily life. Rules define the activity and decide how a role within the activity should be accomplished (van Oers, 2012b). When children have had experience in play of dealing with roles and rules, making explicit how the play should progress, they got opportunities to think consciously about the concepts in imaginary situations (Bodrova, 2008). In addition, rules in imaginary play create an affective engagement and relation with the content of the play (Vygotsky, 1966). This affective engagement further helps children to maintain their play and concept learning in personally meaningful ways (van Oers, 2012c), which further maintains children's involvement. Based on van Oers' (2013a) play framework, where play is defined as a format of cultural activities being characterized by rules that constitute the activity, by the level of involvement, and by the players' degrees of freedom, this study aims to explore children's agentive play and concept learning from children's perspectives.

As stated by van Oers (2012c), agency manifests itself in critical involvement, including acting self-dependently and reflectively in cultural practice and changing basic assumptions in practice. In play, imagination positions the child as an intentional player, rather than as passively acquiring everyday meanings for objects (Fleer & Peers, 2012). According to Vygotsky (1998), imagination is a transforming creative activity directed from the concrete toward a new concrete. Since creativity is the process of meaning-making interrelated with imagination and concept development (Vadeboncoeur et al., 2016), understanding the relationship between imagination and creativity is necessary. We examine this relationship because it informs our understanding of many ways children may imagine and create in Chinese Kindergartens in the context of science learning. Vygotsky's (2004) theory of imagination and creativity is explained by four premises. Firstly, "the creative activity of the imagination depends directly on the richness and variety of a person's previous experience because this experience provides the material from which the products of fantasy are constructed" (Vygotsky, 2004, pp. 14-15). Secondly, imagination becomes the means for broadening a person's experience (Vygotsky, 2004). Thirdly, there is an emotional connection between imagination and reality. The emotion selects separate elements from reality and combines them in an association that is determined from within by our mood as a creative restructuring process (Vygotsky, 2004). The last premise is about the dialectical relationship between imagination and reality. Children's imagination is not merely a reproducing process, but a creative reworking process which is dialectically related to reality. On the one hand, imagination may represent the construction of something new which cannot find any correspondences to any objects in reality (Vygotsky, 2004). On the other hand, once imagination has been externally embodied, "that is, has been given material form, this crystallized imagination that has become an object begins to actually exist in the real world, to affect other things. In this way, imagination becomes reality" (Vygotsky, 2004, p. 20). By looking at the creative imagining of children during the process of science learning in a Conceptual PlayWorld, we determined that our study could show children's agency as a process of new combinations and relationships.

3. Study Design

This study draws upon the educational experiment (Hedegaard, 2012) as a research methodology in the implementation of Conceptual PlayWorld for children aged 4 to 5 years in a Chinese kindergarten. An educational experiment takes place within a naturalistic setting that is part of the everyday life of teachers and children (Fleer, 2021, p. 3). As a planned intervention into practice, educational experiments have to be planned collaboratively by researchers and teachers based on theoretical considerations of learning, teaching and development in relation to the content of the subject matter area (Hedegaard, 2008a). As argued by Hedegaard (2012), the educational experiment is a multifaceted planned preparation of teaching which aims to create optimal conditions for learning and development of participating children in general conditions

within local situations. Through the educational experiment, the Conceptual PlayWorld was planned by teachers and researchers working collaboratively to create a play-based science learning environment, which provides a "condensed and amplified form of development" (Fleer et al., 2020, p. 49) as a living laboratory.

The study was framed as a wholeness model of child development (Hedegaard, 2012), which includes three perspectives, namely societal perspective, institutional perspective and individual perspective. The societal perspective depicts the conditions for institutional practice as political material conditions, cultural traditions, and values (Fleer & Hedegaard, 2010). The institutional perspective shows conventional traditions and demands as practices (Hedegaard, 2012). Finally, the individual perspective reflects shared activity settings of children in a specific institution (Hedegaard, 2012). Although Chinese cultural values emphasize collectivism, teacher authority and children's content knowledge learning (Li, 2012; Lin et al., 2019; Zhu, 2009), the early childhood education reform in China since the 1980s has advocated children's agency and children's active learning through play (Zhu & Zhang, 2008). As a result of the societal demands, Chinese preschools are looking to a play-based science teaching pedagogy to respond to the educational demands and meanwhile maintain the core Chinese values. Our educational experiment was set up between teachers and researchers to develop a Conceptual PlayWorld in the Chinese preschools. In this way, this study was able to explore the change of children's learning experiences (the individual level) within the Conceptual PlayWorld activities in the preschool institution (the institutional level) under the Chinese cultural context (the societal level).

3.1 Participants and research context

The paper focuses on one class of 34 children aged four to five years (mean age of 4 years, 6 months), and two teachers, Ms Li and Ms Han (Pseudonyms), at a kindergarten in Changchun, China. At the time of the research, both Ms Li and Ms Han held a diploma in early childhood education. For this paper, two clips of children's activities were selected for analysis. These two clips show children's science learning before and after the Conceptual PlayWorld implementation. Six children are involved in these two vignettes and pseudonyms are used to increase confidentiality. Ethical approval of this study was obtained from the researchers' university. In line with ethical principles, informed consent was provided by parents and teachers for using the data for research and educational purposes.

3.2 Procedure for data gathering

In this project, 40.38 hours of video observations were generated in the kindergarten, encompassing teachers' practices with children before the Conceptual PlayWorld (12.75 hours), and the educational experiment (27.63 hours) related to implementing the Conceptual PlayWorld. Eleven visits in total were made to the kindergarten, with two to four hours of filming per visit.

Three cameras were used in this study, the first camera focusing on the teacher, the second one focusing on the focus children, and the third one capturing the whole activity setting. The video observation discussed in this paper mainly shows children's experience of science activities. Besides the video observation, the children were interviewed in small groups using a stimulated recall interview method (Lyle, 2003). Two focus group interviews (4-6 children as a group) were arranged after the third and the last Conceptual PlayWorld activities.

Two professional development workshops (1.5 hours each) with teachers were undertaken to explore the play pedagogies and to introduce the Conceptual PlayWorld approach to teachers before the educational experiment. Additionally, the ongoing collective discussion between researchers and teachers was captured in Zoom recordings. Before every session of the implementation of Conceptual PlayWorld, the researchers collaboratively discussed with teachers. The ongoing collective planning sessions helped maintain the

cooperation between the teachers and researchers, and meanwhile captured the teachers' perspectives on the Conceptual PlayWorld approach.

3.3 Data analysis

In this study, the cultural-historical concept of play (Vygotsky, 1966) and degree of freedom, rules and involvement (van Oers, 2010, 2013b) were used to form the analysis. After organizing the video data into a series of video clips, they were analyzed using three levels of interpretation: common-sense interpretation, situated practice interpretation and thematic interpretation (Hedegaard, 2008b). In the common-sense interpretation, the baseline data and the Conceptual PlayWorld data were logged with annotations and summaries. This was followed by tagging data with comments from teachers' and children's perspectives regarding children's experiences. The second step of data analysis was the situated practice interpretation, which transcended a single activity setting and linked observations in several activity settings. According to Hedegaard (2008b), dominating motives of children and patterns of interaction between children and the activity settings and children's play experiences can be explicated in the situated practice interpretation. In this study, efforts were invested into children's science learning experiences, and their interactions with the activity settings. Before the Conceptual PlayWorld was implemented, children mainly receive demands from the science activity settings. However, after the Conceptual PlayWorld implementation, children were able to develop their motive orientation to concept learning within imaginary play and actively contribute to the activity settings. Finally, thematic analysis was used to conceptualize the findings and address the research questions. Explicit relations are formulated by using theoretical concepts to thematically analyze data (Hedegaard, 2008b). Meaningful patterns were analyzed using the cultural-historical concept of play, degree of freedom, involvement and rules. These concepts together answered the question "how does Conceptual PlayWorld promote Chinese children's agency in play-based science learning activities?". Selected examples of video or dialogues are used to illustrate the overall findings in the following section.

4. Findings

The examination of the baseline and Conceptual PlayWorld data revealed patterns in children's science learning experiences (see figure 1). Before the Conceptual PlayWorld implementation, children followed the teacher's direction and responded to the teacher's leading questions, and they had few degrees of freedom and a low-level involvement. However, after the Conceptual PlayWorld was implemented, children had more degrees of freedom and gradually built up an emotional connection with the imaginary situations. The two vignettes that follow came from the second session of baseline data and the second session of Conceptual PlayWorld data. They reveal how children's experiences were changed, and illustrate how children's agency was promoted in a Conceptual PlayWorld activity setting.
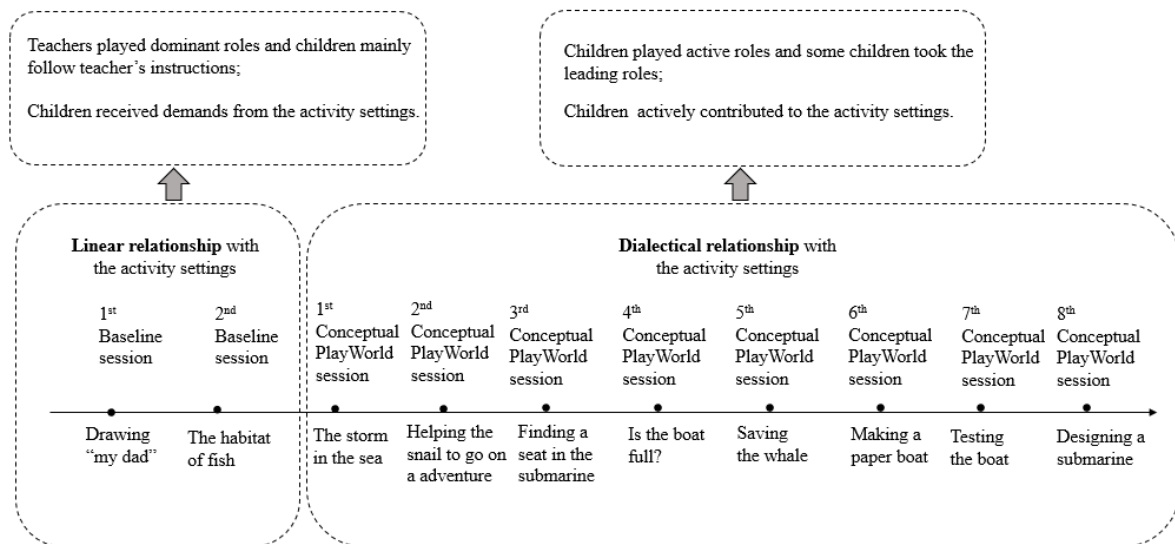
Teachers played dominant roles and children mainly follow teacher's instructions;

Children received demands from the activity settings.

Children played active roles and some children took the leading roles;

Children actively contributed to the activity settings.

Linear relationship with the activity settings

1st Baseline session	2nd Baseline session
Drawing "my dad"	The habitat of fish

Dialectical relationship with the activity settings

1st Conceptual PlayWorld session	2nd Conceptual PlayWorld session	3rd Conceptual PlayWorld session	4th Conceptual PlayWorld session	5th Conceptual PlayWorld session	6th Conceptual PlayWorld session	7th Conceptual PlayWorld session	8th Conceptual PlayWorld session
The storm in the sea	Helping the snail to go on a adventure	Finding a seat in the submarine	Is the boat full?	Saving the whale	Making a paper boat	Testing the boat	Designing a submarine

Fig. 1. Children's science learning experiences in baseline and Conceptual PlayWorld sessions

4.1 Vignette one: Saving the fish from the frozen river

It is a group time in the morning, 26 children sit around 5 tables, facing the direction of the teacher (see figure 2). Ms Li told the children a story, and Ms Han stood in the back of the classroom, assisting Ms Li. In this activity setting, children followed the teacher's instruction most of the time. As shown in vignette 1, four children (Zeng, Guo, Mu, Feng) were asked to respond to this question when Ms Li tried to teach children about the habitats of fish.

Fig. 2. A group science learning activity before the Conceptual PlayWorld implementation

Ms Li told a story to the children in front of the class, which was about the fish and the goat. Winter came, the goat noticed the fish under the frozen river and she thought "the fish might feel cold in the frozen river. My home is very warm, perhaps I can take the fish home". The goat went home and prepared the basket to take the fish out.

After telling this story, Ms Li asked the children, "do you think the goat should bring the fish to her home? Children all said no. Zeng was asked to answer this question and he said, "the fish doesn't like the place without water." Ms Li responded "Don't you think the goat will bring some water with the fish?" Ms Li

further asked Feng, Guo and Mu to answer this question. Feng said, "the space is limited", Mu responded, "because the fish cannot breathe in a small place", and Guo said, "the fish would die if it is taken from the river". Noticing children have misconceptions about the fish habitat, Ms Li asked, "what about putting the fish into a big fish tank? Do you have a fish tank at your home?" Children were quite excited when they hear about the fish tank. They started talking and some of them even stood up to talk. Ms Li clapped her hands and asked the children to be quiet, and then Ms Li told the children that the fish can live in the fish tank. Meanwhile, Ms Han reminded the children to sit well. At last, Ms Li responded: "your answer is right, but the reason is not correct. This is because the temperature of fish can change with the temperature of the river. When the river temperature is low, how will the fish's temperature change?" Noticing Mu was playing with her clothes, Ms Li asked Mu to answer why the goat does not need to take the fish out. Mu responded, "Because it has some cold areas". Ms Li told children the answer "the fish can change its temperature... the fish temperature goes down when the temperature of the river goes down." Ms Li emphasized it several times and asked the children to repeat what she said.

Vignette 1 is an example of a typical science learning activity setting where Ms Li played a dominant role by leading the discussion, choosing children to share their ideas and delivering content knowledge. Children entered the activity setting, sitting in small groups but facing the teacher, who was the centre of the class. Ms Li told a story to raise a science problem. However, only children whose names were called could stand up and express their ideas. In addition, what children could share and how long they could speak were decided by the teacher. For example, children were quite excited when Ms Li asked them if they had a fish tank at their homes. However, seeing the classroom was chaotic, Ms Li immediately asked the children to be quiet. Meanwhile, Ms Han kept asking children to sit still and behave themselves. Therefore, the teachers highly controlled this activity and children only followed the teacher's direction. After a small discussion, Ms Li directly told the children the answer and she also emphasized that the fish temperature goes down when the temperature of the river goes down. In this process, children followed the flow of this activity and they repeated the answer as required by Ms Li, following a *passive and a responsive orientation* (Rainio, 2008). Since children could not build an interactive relationship with the activity setting, some children lost interest. For example, Mu played with her clothes when Ms Li emphasized content knowledge. This illustrates that children had less degrees of freedom to solve the conceptual problem related to fish habitat because of the teacher's leading role. The class behavioural management was emphasised through the strict external rules, which leaves few spaces for children's engagement and exploration.

4.2 Vignette two: Helping the snail to go adventure while implementing the Conceptual PlayWorld

The same teachers (Ms Li and Ms Han) and their children in the class implement the Conceptual PlayWorld based on the storybook: *The whale and the snail* by Julia Donaldson (2003). As shown in figure 3, children and teachers were in the sleeping room and pretended as if they were going on an adventure under the sea. Ms Li played a whale and Ms Han played a snail who wants to go on an adventure under the sea. Children played the role of sea snail and four children are involved in this vignette (Sui, Lu, Guo, Zeng). This activity aimed to build the concept of habitat and to help children realize that snails and sea snails have different living places.

Fig. 3. Children and teachers pretended to go on an adventure under the sea within the Conceptual PlayWorld

Children and teachers entered the sleeping room as if they were going under the sea. Ms Li reminded children to behave like sea snails. Children pretended to be sea snails who stayed at the tail of the whale, squatting to move forward and pulling the clothes of the previous sea snail. While the whale (Ms Li) and sea snails were swimming in the sea, they found a big snail (Ms Han) waving to them on a rock. One child, Sui reminded Ms Han that her gesture (to pretend snail) is not correct. Ms Li reminded Ms Han: "Have you seen it? Sui has told you that a snail should be like this!" Ms Han then changed her gesture accordingly. After that, Ms Li asked, "Snail, what are you doing here?" Ms Han responded, "I want to go on an adventure with you to the sea." Ms Li asked the children "Sea snails, should we allow the snail to go with us?" Children responded "Yes!" Ms Li further asked, "Where should we ask the snail to stay? " Sui responded, "To the back of the queue!"

The whale (Ms Li) asked the snail (Ms Han) to join them and they plan to dive into the sea together. At this moment, Zeng stated, "But the snail cannot dive into the sea." The snail (Ms Han) quickly responded, "I feel so bad, it seems I cannot breathe under the sea." Ms Li said, "Let's go up to the sea surface, and asked the snail what's wrong with her." They came up and asked what's wrong with the snail. The snail responded, "I cannot breathe under the sea."

Ms Li invited all sea snails to think about how they can help the snail go on an adventure under the sea. "The snail can use a diving tube," Lu said. Following Lu's idea, Ms Li said "It's a great idea. Snail, can you find a diving tube and join us?" The snail (Ms Han) found a diving tube (rolled paper) and went back, and she dived into the sea with children again. However, when they dived deeper. The snail (Ms Han) became worried, saying "It seems I cannot dive into the deep sea. My diving tube is not long enough." Guo said, "You can take the submarine!"

In the analysis of children's learning experience and their exploration, children participated in the process of problem solving and some children took the leading roles within this process. Children entered the snail PlayWorld activity setting as if they were the sea snails under the sea. In the imaginary situation, children obeyed the social behaviour of the sea snail and changed the meaning of the rolled paper as a diving tube. In addition, they were encouraged to use concepts to help the snail go on an adventure with them, which further led the direction of the activity. In this process, children had the freedom to share their ideas. For example, when they met the snail, Sui reminded Ms Han of the correct gesture to present the snail. Later,

when Ms Li asked the children if they should allow the snail to go with them and where the snail should stay. Children actively responded to Ms Li's questions and invited the snail to go to the end of the queue. Children's freedom allows them to build a close connection with the roles and the imaginary situation. Soon, Ms Han played as a snail, dramatising the conceptual problem to ask for help as she "cannot breathe under the sea". Children actively offered their ideas when they heard the snail needed their help. In the teacher interview, Ms Li has mentioned "children love to go to the Conceptual PlayWorld, they always ask me when they will go on an adventure again". Similarly, children's interviews showed their engagement, "It is exciting to go adventure under the sea, we met a snail and helped her!" (Group interview, Child Mu). Through the emotional engagement and active participation, children show their active roles in the Conceptual PlayWorld.

5. Discussion

According to Hedegaard (2008a, 2012), it is necessary to include the societal, institutional and individual perspectives when analysing a child's different social situations, because these three planes of analyses indicate a way to logically conceptualize differences in activities. To give a holistic understanding of children's science learning experience, we present a discussion taken from a societal perspective and an institutional perspective to illustrate how Conceptual PlayWorld meets the emerging cultural demands and changes the institutional practice. In addition, children's personal experiences are discussed from the individual perspective using the play framework of van Oers (2012d) and the cultural-historical conception of agency.

5.1 Societal and institutional perspective: The Conceptual PlayWorld helps to transform teaching-oriented practice to play-oriented practice in a Chinese context

Since societal expectations are realized at the institutional level through rules, values, policies and laws and regulations (Hedegaard & Fleer, 2019), kindergarten practices are closely related to the cultural values and traditions of Chinese society. The Confucian tradition is deeply integrated into China's education system, where collective orientation and teacher authority are emphasized (Li, 2012; Lin et al., 2019). These Confucian values lead to a teacher-directed teaching approach (Wong, 2008) and group teaching approach (Choy, 2017), where children mainly obey the rules set by teachers. Since the 1980s, the early childhood education reform in China has strongly emphasized play-based curriculum and children's active learning (Pan et al., 2018). Therefore, Chinese kindergarten teachers faced a dilemma between the current teacher-directed kindergarten practices and the new societal demands on children's play and agency. Firstly, the Chinese Kindergarten Bylaw and the National Guideline for Kindergarten Curriculum recommend class sizes of 20–25 for K1 (3–4 years old), 25–30 for K2 (4–5 years old), and 30–35 for K3 (5–6 years old). Accordingly, the highest child-to-teacher ratio for classrooms is 8:1 for K1, 10:1 for K2, and 11:1 for K3 (Ministry of Education of People's Republic of China, 2013). Following the requirements, this kindergarten has a relatively large class size and a high child-to-teacher ratio. This is the practical reason on why Chinese kindergarten teachers tend to use a teacher-directed approach in daily activities. In addition, Chinese kindergarten teachers find it challenging to adapt the imported curriculum models in practice (such as high/scope, Reggio Emilia) (Li et al., 2011). Due to the context differences and lack of professional support, Chinese kindergarten teachers have to rely on their experiences and understanding to apply imported curriculum models into practice, which has resulted in a gap between their self-reported beliefs and actual practice (Liu & Feng, 2005). Although the teacher believes she had tried to involve play in the daily practices, children are not given many opportunities to actively play. As shown in vignette one, children sit in groups but all faced towards Ms Li. In this activity setting, children

obeyed the rules enacted by teachers for most of the time, and had limited opportunities to take initiatives and play.

To transmit the scientific knowledge to children, Ms Li highly controlled the activity, which results in the contradiction between the institutional practices and the new societal demands. Therefore, a new play-based model is needed to help the teacher cope with the institution and societal contradiction. It is argued that play-based curriculum reform should build on the Chinese social-cultural context (Yang & Li, 2019). Besides, researchers have studied the sensitive cultural model of Conceptual PlayWorld in Chinese kindergartens (Fleer & Li, 2021). Under this background, the Conceptual PlayWorld approach is implemented as a part of the educational experience to transform the current learning-oriented practices to play-based practices and solve the theoretical problem.

The Snail Conceptual PlayWorld activity draws upon the cultural traditions of China by valuing collectivism and the teacher's role, but it also adapts to the requirement of the educational reform which emphasizes children's agency and play-based active learning. Firstly, the teacher and children collectively enter the PlayWorld activity setting and go on an adventure in this collective imaginative situation. The Conceptual PlayWorld has created conditions for a big group activity, where 30 children can join the activity and build collective membership. As argued by Zhu (2006), "collective activity may be frustrating, but effective in China" (p. 5). Through adding imagination, the Conceptual PlayWorld helps the collective activity be playful, making it exciting and effective. Secondly, the two teachers take different pedagogical positions (Kravtsov & Kravtsova, 2010), one being "above" the children, making suggestions in playful settings, while the other was "with" or "below" the children, seeking the children's help in imaginary situations as a play partner. This allowed the teachers to guide children in solving conceptual problems in imaginary play while promoting children's initiatives.

Through creating a collective imaginary situation for a large group of children, as well as supporting teachers to take different teaching positions, the Conceptual PlayWord created conditions for Chinese children's concept learning in a playful format. As argued by Kumpulainen et al. (2014), children's agentive experiences are based on meaningful and supportive practices. After the Conceptual PlayWorld implementation, it is evident how children actively interact with the imaginary activity settings and personal meaningfully solve conceptual problems. Therefore, Conceptual PlayWorld has the potential to transform the Chinese science learning practice from a teaching-orient to a play-orient by creating a collective imaginary situation.

5.2 Personal perspective: The Conceptual PlayWorld creates opportunities for children to become agentic learners from knowledge recipients

By using van Oers' (2012d) three characteristics of play, this study illustrates how children have changed from knowledge recipients to agentic learners. Before implementing the Conceptual PlayWorld, children can only follow the external rules set by teachers. Under teachers' instructions and commands, children had a limited degree of freedom and a low level of involvement. After implementing the Conceptual PlayWorld, children got freedom in thinking, expressing ideas and changing the meaning of objects and actions within the imaginary play. Meanwhile, children obeyed and co-constructed the rules embedded within the imaginary situation. In cultural-historical research tradition, agency is conceptualised as a continuous process that is contextually and historically situated (Hilppö et al., 2016; Kumpulainen et al., 2014; Rainio, 2008; Sairanen & Kumpulainen, 2014; Sairanen et al., 2020). Considering agency as an interaction process, and children's understanding of themselves as agentive, this study has conceptualized children's agency as an interactive process between the child (an agentive subject) and the activity settings, where the child takes the initiative and maintains an intentional and responsible membership to

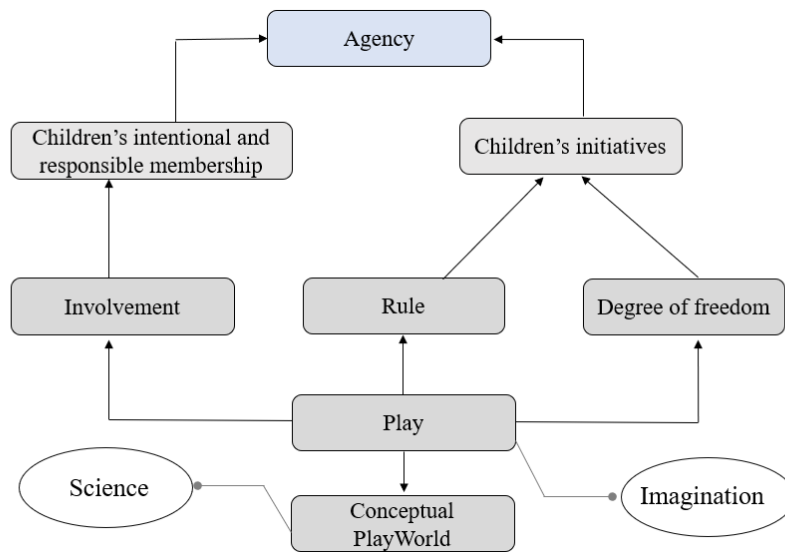transform the practices they engaged in.

Fig. 4. The analytical framework of children's agency in Conceptual PlayWorld activity settings

As shown in figure 4, the rules and degree of freedom in Conceptual PlayWorld allowed children to take initiatives, which helped maintaining children's agentive identity from the individual perspective. Besides, children built an emotional connection with the roles and the collective imaginary situation, which allowed them to get a higher level of involvement. The involvement further maintains children's intentional and responsible membership within the Conceptual PlayWorld and promote children's agency from the social perspective. In this study, how Conceptual PlayWorld promote children's agency is shown from children's initiatives and memberships, and illustrated from the play framework of van Oers (2013a).

5.2.1 Promoting children's agency through encouraging taking initiatives: degree of freedom and rules as prerequisites

In play, children have degrees of freedom in choosing or changing instruments, goals, rules and following their personal sense and imagination (van Oers, 2010, 2012c, 2013a). As stated by van Oers (2010, p. 199), play would be seriously threatened as being play if the degrees of freedom were minimized. In educational practices, using strict rules to reduce participants' freedom is a dominant educational strategy (van Oers, 2013a). As shown in vignette one, Ms Li set rules to regulate the course of activity. For example, Ms Li decided which child can say his/her ideas out and stopped children's discussion when she felt the topic was not related to the content knowledge planned before. In addition, these two teachers kept asking children to behave themselves, sit well and follow teachers' instructions. Therefore, children responded to Ms Li's questions as required, having few degrees of freedom to change the rules and goals of the activity. Besides, children did not have opportunities to play in the imaginary situation, which resulted in children taking fewer initiatives.

Different from strict external rules, rules in play are embedded in the imaginary situation, which allows children to have a certain degree of freedom. According to van Oers (2013a), the nature and number of the rules that regulate human activities are important determinants of how an activity proceeds. There are mainly four types of rules in children's play, namely social rules, technical rules, conceptual rules and strategic rules (van Oers, 2013a). To be specific, the social rules are mainly about community agreements of how people should interact; the technical rules are related to employing technical tools; the conceptual rules are concerned with knowledge of systematic semantic relationships; and the strategic rules regulate

the course of activities (van Oers, 2013a). In vignette two, children changed the meaning of their actions and the environment, pretending as if they were sea snails and following social rules and strategic rules (children follow the rules of the sea snails and told Ms Han how to pretend to be a snail), meanwhile they are motivated to use conceptual rules (habitat) and technical rules (the diving tube) to help the snail and continue their play. In this way, children not only follow the play rules as if they are in roles, but also co-construct the play rules as agents. Consequently, children actively contribute to the activity settings instead of only receiving demands from the activity settings.

Rules in imaginary situations allow children to have a certain level of degrees of freedom. Firstly, children have a degree of freedom in their collective imagination. As argued by Vadeboncoeur et al. (2016), imagination is the foundation of engaging social practices, thus leading to freedom of thought. In an imaginary situation, children can change the meaning of objects and actions, leading to their degrees of freedom in thought. Secondly, children have more degrees of freedom to express their ideas. For example, the child Lu, who said diving the tube can help the snail, was silent from the beginning to end in the fish activity. By sharing their ideas, children were able to contribute to the activity setting. At last, children have the degree of freedom to construct tools and invent goals. Children's ideas of using the diving tube show children actively construct new tools in this process. Besides, children also suggested finding a submarine, which led to a new direction of the activity. This is in line with van Oers' (2012a) argument that children can construct new tools and invent new goals with a certain level of freedom. In conclusion, the dialectical relationship between rules and degrees of freedom within the Conceptual PlayWorld activity settings allow children to take initiatives as agentive participants.

By taking initiatives, children change or aim to change the interaction (Sairanen et al., 2020). As argued by Kangas and Lastikka (2019), children's initiatives toward their own actions, their peers, and teachers are considered as active meaning-making through which children shape their environments and reproduce educational culture around them. In Conceptual PlayWorld activity settings, the reproduction process is realized through creative imagining. As shown in vignette two, children's experiences are based on imaginary situations, through which they are able to offer new ideas to influence the activity settings. In addition, children's imagination is based on their experiences, where children reproduce previous impressions or behavioural patterns creatively. It is argued that agency in social activities requires creativity and the production of new forms of action (Wardekker, 2012). On the contrary, creativity is a property of an agent with certain capacities (Gaut, 2010). In this study, children's initiatives continuously helped them to creatively build their capacities, which emphasized children as agentive subjects.

5.2.2 Promoting children's agency through maintaining intentional and responsible membership: involvement as impetus

A membership in shared collaborative social practice is a way to understand agency from the participation perspective (Rainio, 2008). In this study, the intentional and responsible membership is shown from children's intentionality, responsibility and participation. For example, children suppress their immediate impulses and behave intentionally. In addition, they actively and creatively solve conceptual problems as a team in imaginary situation. Children's intentional and responsible membership shows the interaction process and emphasizes children's role in the group, which corresponds to the definition of agency as a dialogical and negotiated characteristic of social interaction (Rainio & Marjanovic-Shane, 2013).

Involvement manifests itself when a child is taking a role in an activity she/he feels emotionally related to (van Oers, 2012c). When children feel deeply involved in the activity they are taking part in, they feel accepted in the activity and play their parts in a personally meaningful way (van Oers, 2012c). The emotional link between children and the story characteristics is fragile in vignette one, which leads to

children's low involvement. It could be seen from Mu's distraction when Miss Li tells the children the answers. This corresponds to Feng's (2015) argument about Chinese teacher's control in science class, which results in children's passive learning behaviour and decrease in interest. Noticing Mu is distracted, Ms Li asked Mu to answer the question and tried to motivate her thinking. However, Mu was not actively involved in this activity thus the learning process was still not personally meaningful to her. As Leontiev (1959, as cited in van Oers, 2012b) argued, the absence of involvement is a result of a complete lack of relationship between a person's meanings (as expressed in Mu's actions and goals), and the purpose and products of the activity in which he was engaged in. Therefore, children can hardly maintain an intentional and responsible membership when they are not involved in a personally meaningful collective activity setting.

As argued by van Oers (2003), it is important to make sure that children are accepted participants in a group that are characterised by togetherness and collaboration when increasing children's involvement. Within the Conceptual PlayWorld, children and teachers were all in their play roles and they created a collective imaginary situation. In vignette two, children were invited to solve a problem, which is to help the snail to go on an adventure under the sea. As sea snails, children quickly built empathy with the snail in the collective imaginary situation, and they decided to help with the snail as a responsible and intentional member. Therefore, they built a close emotional connection between themselves and their roles. This corresponds to Fleer's (2013) argument that children are willing to empathise and help the characters to solve the collective problem in the imaginary situation. The conceptual problem in the imaginary situation has provided a *motivating and emotionally charged context* (Fleer, 2013), through which children can build a dialectical relationship with the activity settings. As argued by van Oers (2012b), the collective imaginary situation could open the possibilities for the child to act based on fantasy, emotion and affect. The emotional connection further promotes children's active involvement, thus allowing children to manifest intentional and responsible membership. Therefore, children's agency is illustrated from children's interaction with the activity settings within the institutional practices.

6. Conclusion

Recent educational research emphasized the importance of children's agency in making the school experience meaningful (Rainio, 2007; van Oers, 2012c). By exercising agency, children are considered to be active participants in their daily play and learning activities (Sairanen & Kumpulainen, 2014). This paper explores how children have changed from passive learners in teacher-directed science activity to active learners and developed their agency in the Conceptual PlayWorld. Firstly, the degree of freedom and rules in imaginary situations allow children to take the initiative and contribute to the activity settings. In addition, in the collective imaginary situation, children are highly involved with the roles and rules, which helps them to develop an intentional and responsible membership. To be specific, before the Conceptual PlayWorld was implemented, children followed the teacher's instruction in science learning with a limited degree of freedom and involvement. This reflects Chinese children's current science learning situation: play-based learning is advocated, but some programs continue to be teacher-centred, with a strong emphasis on content knowledge (Fleer & Li, 2020; Tobin, 2009). After the Conceptual PlayWorld was implemented, children became the co-constructor of the collective imaginary situation. They gained a certain level of degree of freedom, and therefore could take the context the adult has provided and shape it to their interests for whatever periods are available to them (Broadhead, 2004). Besides, children's creative imaging in Conceptual PlayWorld is suggestive of children's emotional engagement and active thinking. In this way, children get a high level of involvement and become agentic learners in play. Children's agency is constructed and promoted through social interaction and dialogue (Kumpulainen et al., 2014). The change of children's experience revealed that children's interaction with the Conceptual PlayWorld activity setting

is dialectical, which allows children to be effective as agents. It is through the collective imaginary situation and dramatic problem scenario that children are given freedom and motivated to solves science problems agentively. In conclusion, this study has identified that the activity setting of a Conceptual PlayWorld appears to be a form of creative play that can promote Chinese children's agency in science learning activities.

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