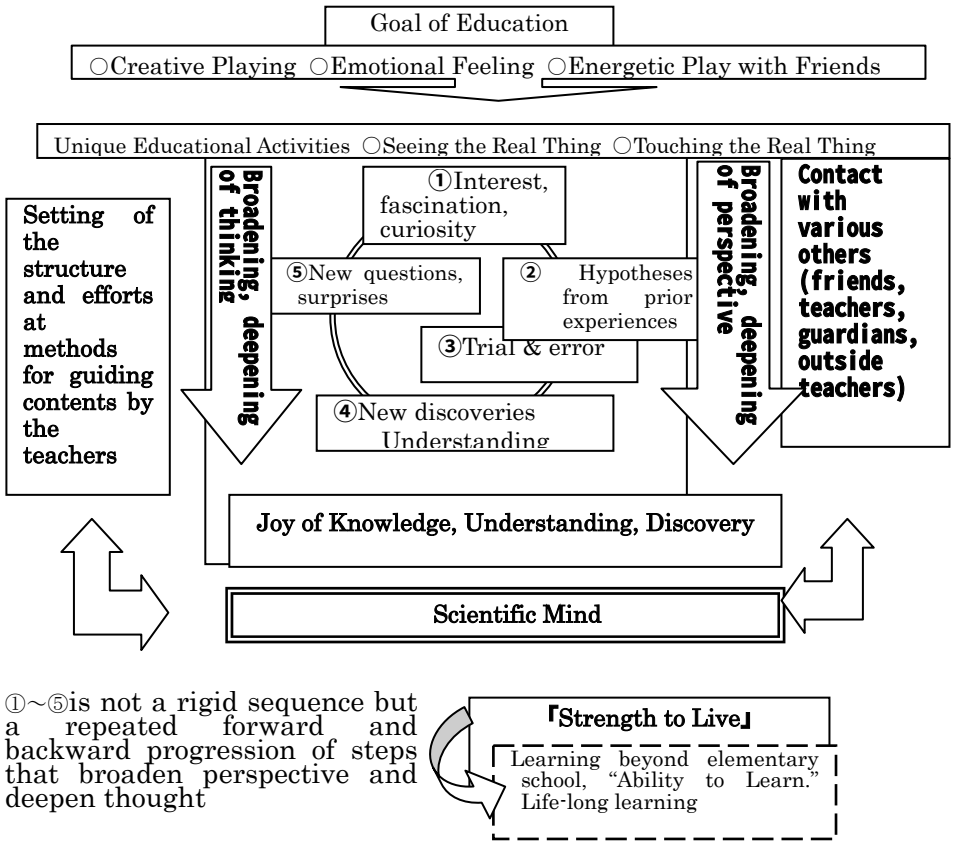
4. Looking Back (Verifying) on Nurturing a "Scientific Mind"
- Relating with Nature and People -
Yanagicho Kindergarten (Bunkyo Ward, Tokyo)

Ⅰ Why this theme was chosen

Through repeated, emotionally moving experiences in the rich natural environment of the kindergarten grounds, each and every child is able to further his/her "scientific mind." In addition, we believe that a child's relationships with others expands his/her perspective, which in turn, deepens his/her thinking; hence, we proposed this as the theme of our study.

Ⅱ Understanding the theme

With the interpretation of a "scientific mind" to mean "expanding perspective and deepening thinking," we repeatedly gave the children opportunities through play to pursue their interest, fascination and curiosity using trial and error. This gave them the joy of knowledge, understanding and discovery. This year's research will focus further on how children "relate to others" in the context of their activities with nature. The various experiences of the children at kindergarten cannot be separated from their personal relationships with friends, teachers, and guardians. This is because the children experience, share emotions, and exchange their ideas with other children; are supported in their activities by their teachers; and communicate and share their experiences at kindergarten with their families. In these relationships with other people, we tried to find what the key concepts related to a "scientific mind" were and the influence of these relationships in an effort to nurture children with a "scientific mind."



Ⅲ Verifying case studies by applying the structural diagram of the research

	key concepts related to a "scientific mind"
Children's behavior and the teachers' support	Analysis

Case Study 1: The crawfish died!

◦ 'Child J,' after discovering the shell of one of three crawfish he was raising and keenly observing in a fish tank, makes a fuss: "Teacher, a crawfish is dead. It's not moving." Upon hearing this, other children look inside the fish tank and utter, "Poor thing," "Maybe they had a fight," etc. ①They do not notice that it is just the shell after molting.

Ⓐ Then the teacher murmurs, "Now, there are only two left?" and starts counting the crawfish in the fish tank. The children observe that there are still three moving inside and become relieved.

◦ 'Questions such as: "Were there four to begin with?" "Maybe a baby was born?" "Was one hiding?" arise. ②

ⒷThe teacher then places a crawfish reference book and a shell next to the fish tank within reach of the children.

◦ After a moment, 'Child J' and 'Child K' hold the crawfish reference and create their own imaginary "crawfish lab." With a magnifying glass, the reference and the shell, they begin to think together about the mysterious extra crawfish. When they find the page on molting they wonder: "Maybe it is this?" "Did it come out of the back of its body?" ②"That must be it!" and after being convinced of the molting, they go to the teacher to report. ③

◦ "We figured it out. Look here!" they cry. When the teacher says, "It did not die but just shed its shell. The mystery is solved," the children nod happily, and the two eagerly state, "We have to tell everyone about it!" ④

◦ The teacher then provides an opportunity for 'Child J' and 'Child K' to present it to the rest of the class.

◦ They verbalize what they think after seeing an incident.

Ⓐ The teacher wants the children to realize that the crawfish has not died.

◦ The fact that their number has not decreased raises a new question. ②

Ⓑ The teacher does not give the answer right away but prepares an environment where they can think for themselves.

◦They try to exchange ideas and guess② with friends to find the answer③.

◦They find joy in discovery, and report to the teacher. The teacher acknowledges their glee. ④

◦The teacher encourages the children to communicate and share the new knowledge with the class.

Case Study 2: Where did the shell go?

◦ 'Child J' becomes aware of the crawfish shell-shedding. He tells a friend, "It shed its shell again." 'Child L' also looks in the fish tank to confirm. (This time the shell is not taken out but left in the fish tank.) The next day, 'Child L' looks in the fish tank and tells the teacher and friends, "The shell is gone. Did someone take it out?" But everyone says, "I don't know." ⑤

◦ 'Child L' asks the teacher, "Where did it go? Maybe it was alive…?" ②

ⒶThe teacher says, "But it was not moving. I thought it was a shell. I wonder where it could be?" in order to convey just the fact that there was a shed shell.

◦ Later in class, a picture book called, "I'm a Pill Bug" is read to the class (pill bugs are cousins to the shrimp and crab and the book talks about how pill bugs also shed their skin and eat it to grow). 'Child J' murmurs, "Maybe the pill bug and crawfish are of the same family?" The other children answer how "Crawfish and shrimp are alike. That must be it." ③

◦ 'Child L' cries out loud, "I got it!" "Maybe the crawfish shell from yesterday was eaten by the crawfish?" ④

◦ Other children say, "That may be it," "They are of the same family," understanding and agreeing with what 'Child L' is saying. ④

ⒷThe teacher says, "Everyone noticed many different things. Another mystery is solved."

◦ 'Child L' notices that the shell has disappeared and questions it. ⑤

◦ He/she hypothesizes on his/her own. ②

ⒶThe teacher wishes to have 'Child L' realize that the answer is wrong.

After seeing the picture book, verbalizes own thoughts.

◦ Upon hearing 'Child J,' other children murmur their own thoughts③.

◦ Tries to derive an answer by considering both own thought and those of friends④.

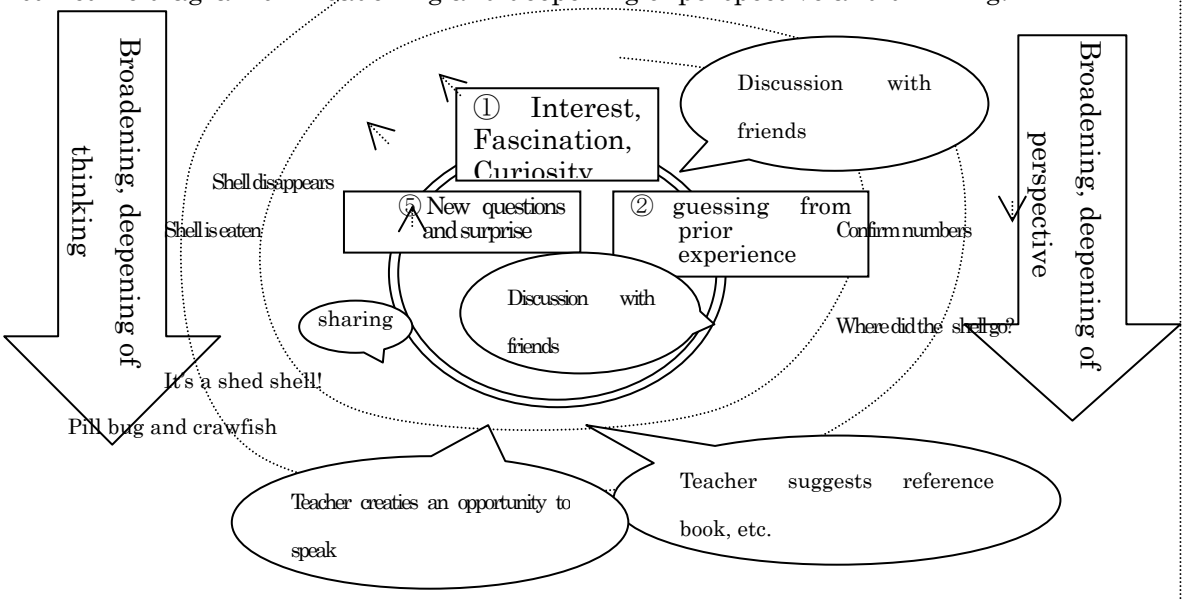
◦ Accepts friend's opinion④.

ⒷThe teacher wishes to convey that the question was not solvable by only one child.

Broadening and deepening children's perspective and thinking

The broadening and deepening of perspective and thinking are repeated in cycles within each child.

Take the key concepts generated from Case Study「Crawfish…」(5 years old) and apply it to the research structure diagram's "Broadening and deepening of perspective and thinking."



○ By connecting all key concepts generated from the case study, we verified that they were related to the "broadening and deepening of perspective and thinking" portion of the research's structural diagram.

○ Children's process of "broadening and deepening of perspective and thinking," which consists of [interest and fascination⇒guessing⇒trial and error⇒discovery, realization and understanding], does not end in one cycle. Realization and understanding bear yet new cycles of interest and questions. The "broadening and deepening of children's perspective and thinking" does not follow a rigid sequence but progresses in repeated forwards and backwards steps.

"Broadening and deepening of perspective and thinking" is facilitated by relationships with others!

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○ The "broadening and deepening of perspective and thinking" always involves key concepts of conveying, communicating, empathizing, sharing, transmission, etc., which are a result of there being another person. A "scientific mind" is nurtured more fully in a small group or class or even in a one-to-one relationship.

Editor's comments

By studying "the development of a scientific mind" as the broadening and deepening of both "thinking" and "perspective," Yanagicho Kindergarten tried to show that a "scientific mind" is linked with "relationships with others." By applying the case study to their structural diagram (hypothesis), they observed that the children's cycle of [interest⇒guessing⇒trial & error⇒understanding⇒questioning and surprise] created a "broadening and deepening of perspective and thinking," and nurtured a "scientific mind." Furthermore, by deriving the key concepts from the case study, they observed the relevance of "relationships with others" in their approach to the theme subject.