

Assessment of “*Uchu no O-hanashi*” for Kids

Tomita, Akihiko

Faculty of Education, Wakayama University, Japan

atomita@center.wakayama-u.ac.jp

<http://www.wakayama-u.ac.jp/~atomita/>

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Background

Scientists hope...

children to learn scientific methods and skills and to grow up with them.

Some scientists...

visit nurseries/kindergartens/preschools and perform various activities based on their academics.

→ **Records are important**

to assess whether the activities foster basis of scientific methods and skills (*bud of science*),
to reflect the activities with educators there,
to discuss among scientists doing similar activities.

I focus here on the topic:

Does my practice really foster the *bud of science*?

“Story about universe” (*Uchu no O-hanashi* in Japanese)

Who visits: Tomita does.

When: Several times a year, 1 hour before lunch time.

Prerequisites: Slide (from PC), large sheets, small card.

Activity: Talking with slides, chatting with each other;
with 3-to-5-year-old children (about 80 children).

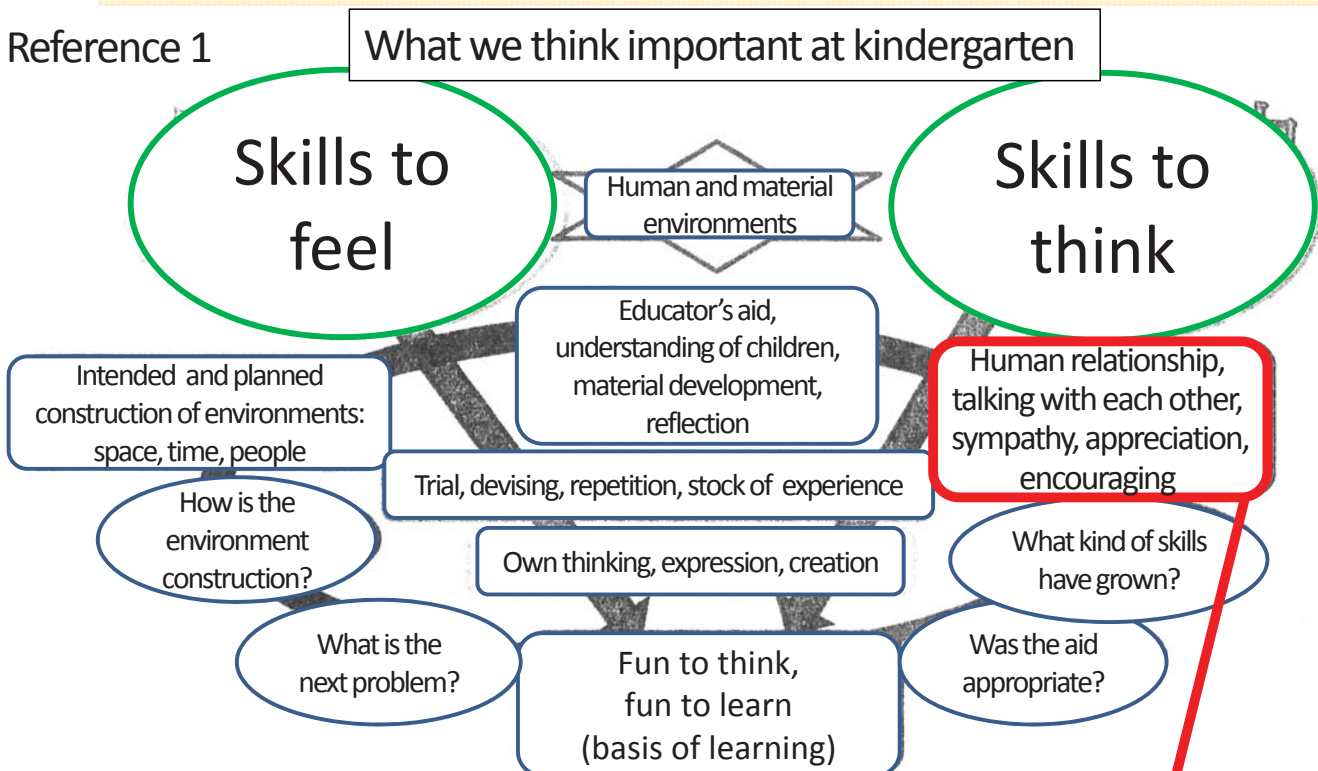
Contents: See following presentations.

Topics:

- How the records should be taken to see the *bud of science*?
- Does the practice foster the *bud of science* ?
- What kinds of *bud of science* are encouraged by the practice ?

Educators have made much of the *bud of science*.

Reference 1

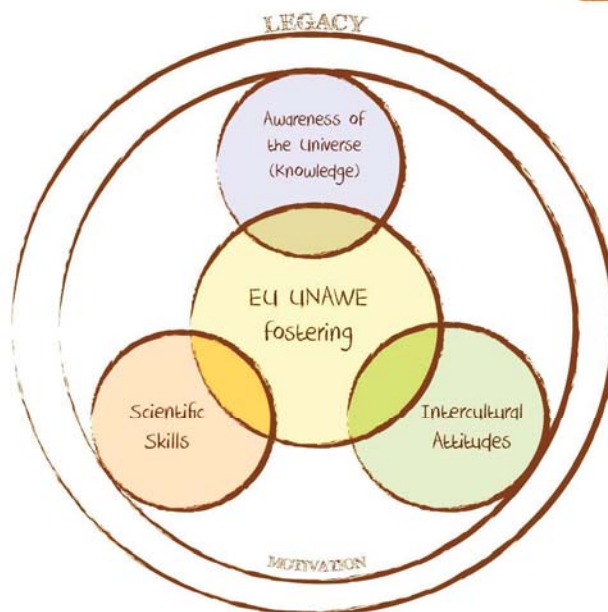


Taken from: An education plan of Nishikori Kindergarten,
Tondabayashi City, Osaka, Japan
Sponsored by Sony Preschool Education Program for Children
Meeting held on 29 June 2013, at Osaka Ohtani University, Osaka

Skills to communicate

Related to science being "common" and "temporary" among people.

Reference 2



EU Universe Awareness Programme Evaluation Guide

1



Similar to “criterion referenced evaluation”
in Japan’s education standards

Domain of Motivation

Objectives	Evidence
Curiosity Tenacity Enjoyment Inspiration	<ul style="list-style-type: none"> –Children are doing the tasks with pleasure –Children seem enchanted –Children react with diligence in front of the proposed activities –Children demonstrate attention –Children apply perseverance / tenacity –Children manifest inquisitiveness –Children introduce some complex questions

Three other domains:

Scientific skills

Universe knowledge

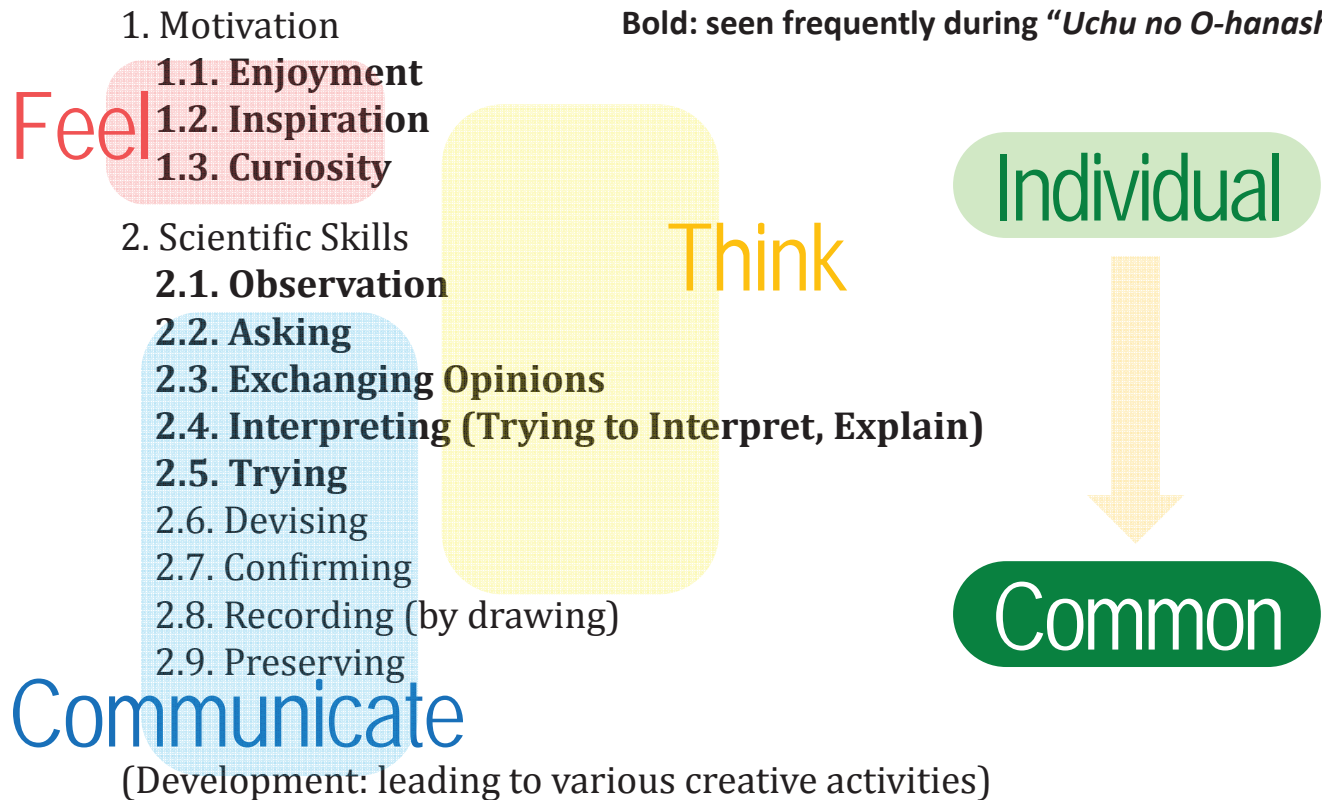
Intercultural attitudes

Taken from Grace Kimble’s presentation
at UNAWE workshop 2013, Heidelberg

Bud of Science expected through “*Uchu no O-hanashi*”

Arranged Universe Awareness Evaluation Guide's objectives through experience of “*Uchu no O-hanashi*”

Bold: seen frequently during “*Uchu no O-hanashi*”



Slide projection (30min)

- Sky and clouds on the day
- Seasonal trees and flowers
- Starry world
- “What’s this?”

“*Uchu no O-Hanashi*”

at Hikari Nursery (Fujiidera City, Osaka, Japan)

Chatting seeing large sheets (30min)

- Ex: April 2013 (1)
- Ex: June 2013 (1)
- Ex: November 2013 (3)
- Ex: March 2014 (3)

Talk:
heaven, earth,
and people

Chatting
with each
child

Small card

- Starry world
- Seasonal living thing

Fun: collection of cards

Reflection,
at home,
with family

Microphone recording

Transcribing

Copy to “4-line table”

Reflection

Discuss *bud of science*



Pre-activity
“What do you think is today’s activity?”



Slide projection (30min)

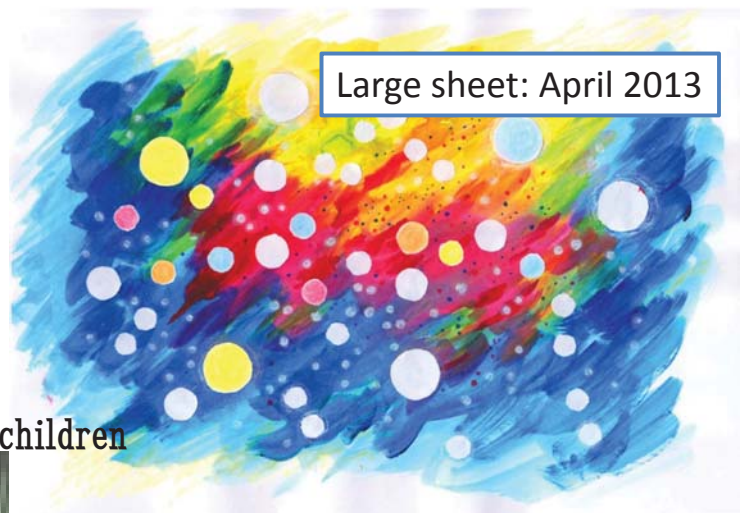
Introduction of today's topic

“Noisy” time:
Chatting with each children



With large sheets printing pictures introduced in slides (30min)

Starry world



Large sheet: April 2013

“What’s this?” Rocket to the space!



Starry world

Large sheet: June 2013

Large sheets: November 2013 (1)

Fallen leaves

Cherry tree leaves turn red,
Ginkgo leaves turn yellow.

"What's this?" Rainbow in the room!

Reflection plate of bicycle:
Sunlight makes rainbow.

Twilight sky color is also "rainbow."

Rainbow in the sky

"What's this?"
Setting Sun

Red color
Long shadow

Large sheets: November 2013 (3)

Orion Nebula

BLUE

Subaru
(Pleiades Cluster)

RED

Large sheets: November 2013 (2)

Evening star
(Brilliant star)



Starry world

Where are below objects
in above big picture?



Crab
innards
(M44)

Orion's Belt
Three stars

Wolf Star
(Sirius)



Shooting star



Subaru

Large sheets: March 2014 (1)

Large sheets: March 2014 (2)



Sunset Glow

Various
Sunset
glows

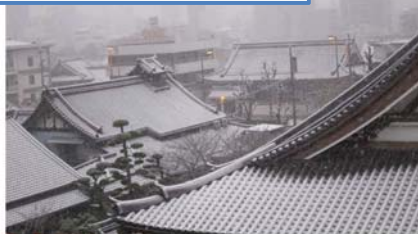


Sunset glow colors
wall and curtain of
the room



Large sheets: March 2014 (3)

Fog



Snow



Snowman



Rainbow
appears even
in winter.



Moon is
crescent today.



Look carefully,
and you can
see the dark
portion as well.

Example of half-postcard-sized card,
double-sided (November 2014)



Bring this home, talk about it,
and enjoy at home.

Practice record summarized in *4-line table*

The record visitor scientist can take is just “one-scene” record in all-day-long childcare. Referring to the 3-line table after-school day care educators frequently take as a reference, I devised 4-line table with following items that can be transcribed from a voice record:

- 1st column: Child’s voice (from record)
- 2nd column: Visitor’s voice (from record)
- 3rd column: Visitor’s feeling and intention
(after reflection)
- 4th column: *Bud of science* shown in the chat
(after reflection)

3 examples

(1) Rocket: up and up! strategy

(2) Search rainbow in the room!

(3) Does the Sun really set?

Scenes at a combined group of 4-year-old class and 5-year-old class



Rocket: up and up! strategy

April 2013, after seeing
rocket launch video

Child's voice	Visitor's voice	Visitor's feeling and intension	<i>Bud of Science</i> shown
Listen, if we do "boo-oh" with bird and firework, would it go with an awesome speed? (Surprising Question)	Ah, you may be right. A bird flies, and with fireworks, you guess that it would fly much more.	-- A strange question comes. (Tomita's interest: low)	Asking Curiosity
Yes.	Well, a rocket goes much farther. A rocket goes much much higher than a bird does.	-- I will gentry tell him that help of bird is not a good strategy. (Tomita's interest: low)	
If we do with bird... bird and firework?	Well, ah...		Exchanging Opinions
With 10 birds and two fireworks, it would go greatly.	Well, combining things that fly may makes it go well.	-- Regardless of reality, with any possible ideas, we will enjoy constructing new strategy. I will change my attitude. (Tomita's interest: high)	(Tomita begins to enjoy)
With bomb and bird... two birds and three bombs, and with firework, it would...	Great combination. It can be a good one.		Interpreting
With bird, and the bomb bangs, and...	OK, then, other than bird, firework, and bomb, what would you have that fly?		
Well, whale?	Whale? Whale does not fly.	All right, anything is OK. What other ideas come? (Tomita's interest: high)	Enjoyment
Mantle.	Mantle!		
Airplane.	Airplane. Airplane flies.		

Balloon. Helicopter, helicopter!	Helicopter, balloon, OK.		
Eh! Airplane?	Airplane.		
Mantle.	Mantle, does it fly?		
Rabbit!	Rabbit? OK.		
Fairy!	Fairy.		
Flying mantle. Flying mantle.	Flying mantle, I want one.		
Well, magic wand.	Magic wand...		
Listen, bird flies.	Yes, bird flies.		
With eagle, bird, bomb... firework and rocket fire, bang! I guess it would travel far farther.	----->	He compiles and summarizes all the ideas by him and his classmates.	→ Trying to Interpret Enjoyment
Crow?	Yes, crow, OK.		



Search rainbow in the room!

June 2013, the rainbow in the building made by bicycle reflection plate was introduced.

Child's voice	Visitor's voice	Visitor's feeling and intension	<i>Bud of Science</i> shown
Ah! (Surprising Finding) Mr. Tomita!	You found something? What? Where?	Here comes! He found something!	Inspiration Observing
This? (A boy reports to teacher.) Teacher, something is seen on a thin glass!			Observing Exchanging Opinions
I can't see at all...	This is round. But you can see...	If we see through an angular aquarium, we easily find the rainbow band, but does this round one make it?	Observing Trying
Ah, I got it! I see! Here!	Then, how about this?		Confirming
Yes.	You can see now.	Goes well!	
I can't see.	Shift your body, to the right, to the left, like this...	No problem. You can catch!	Trying
(on the same day, a little after that)			
Does the rainbow appear where the water goes up? (Surprising Question)	Have you ever seen the rainbow where the water goes up?	Instead of each example, is he thinking about general explanation?	Curiosity Asking Interpretation
At the sea.		Did he see the rainbow-like light in the water at the seashore?	
Far over there!	Over there? Can you see now?	Is he catching anything?	

<p>I can't see from here.</p> <p>No, I haven't seen it.</p> <p>Over there?</p> <p>Bottle.</p> <p>I can see when I see carefully.</p> <p>(Boys and girls move to the bottle on the shelf, bring the bottle down and look into it.)</p> <p>Here I see.</p> <p>It's true.</p> <p>(Boys and girls say.) Yes.</p> <p>This and this...</p> <p>Rainbow.</p> <p>Here, the rainbow is.</p> <p>But...</p> <p>Listen, Mr. Tomita, why... what is the rainbow?</p>	<p>From there? Sometimes you can see?</p> <p>You haven't? Well, where do we get the rainbow now?</p> <p>Well, we saw the rainbow in the bottle some time ago.</p> <p>Don't spill water...</p> <p>Be careful. If you drop the bottle, teacher will do for.</p> <p>From a certain angle, you see the rainbow.</p>	<p>OK, let's continue conversation not to shrink their interests.</p> <p>OK, they got interested in the bottle.</p> <p>OK, they are now trying to confirm.</p> <p>Boys are girls start to exchange their opinions.</p> <p>Here comes! A difficult question! (This kind of question emerges.)</p>	<p>Trying</p> <p>Curiosity</p> <p>Trying Confirming</p> <p>Confirming</p> <p>Exchanging Opinions</p> <p>Curiosity Asking</p>
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Various colors are there.		They got interested in colors as well.	Inspiration
By light?	You noticed various colors! Well...	Now, light!	Trying to interpret
	In the light, various colors are there intrinsically. When they scatter, some are red, others are blue... Thus, when light shines through a bottle like this, colors hidden in the light scatter, and we see the colors.	This kind of explanation can be very difficult. Anyway, I will do my best and explain honestly and sincerely.	
Then, this...	This? Can you see the rainbow in it? It seems to be difficult.	He is trying to see more.	Trying
I got the rainbow.	You got it? The bottle is full of water, so you see rainbow.	He is eager to find.	Confirming

At the conference with teachers, on the day, after the activity, teacher of 4-year-old class reported:

When children saw rainbow slides of “What’s this?” I could not catch children’s impressions so much, but after that, when they enjoyed the pictures on the large sheets, they said “**three colors**” (in the rainbow) at first. They said “only three colors.” Then, I said, look carefully. Our class is now practicing a song of Rainbow March, and in the song, there are lyrics of seven colors. So I said to children, check the colors over singing the song. Children picked up the seven colors in the rainbow pictures as they sang the song.
(omission)

In the end, *A-chan* (fictitious name) got interested in the rainbow so much, and she muttered “Why the rainbow emerges above all?” “I want to know the reason itself the rainbow emerges.” *A-chan* and *B-chan* are usually calm and quiet girls. *B-chan* said “Rainbow projected in the ground is different from one in the sky in its colors.” Maybe it is partially due to artificial effect of photos, she was aware of color difference.

Inspiring, Observing, Curiosity

After three months, at the conference, teacher of 4-year-old class reported:

After enjoying seeing the rainbow pictures in the previous activity, children have been interested in searching the rainbow so much. Some said “I found in front of the room.” Just in the morning, *E-chan* said “I glimpsed the Sun;” maybe her hair tips reflected the sunlight or so, she might find the rainbow, “Teacher! I can see rainbow when I see the Sun!” At first I could not understand her. What was she saying? Then I turned my head to the Sun, I noticed the rainbow around tips of my hair. Amazing! I was so surprised that children could be aware of even such kind of things.



Does the Sun really set?

November 2013, sunset images were introduced.

Child's voice	Visitor's voice	Visitor's feeling and intension	<i>Bud of Science</i> shown
<p>Listen, well, like round Moon, setting Sun is... (Anticipating a Surprising Question)</p> <p>Then, is it floating upward or not? (Here comes!)</p> <p>Mr. Tomita...</p> <p>Mr. Tomita, when... when does it drop down?</p>	<p>Yes?</p> <p>Ah, you are interested in whether it is floating... The Sun is...</p> <p>The Sun is dropping down, so it will go down from now on.</p> <p>Oh, the Sun will go down soon.</p>	<p>Something is coming.</p> <p>What is his interest?</p> <p>Is he interested in so much whether it will drop or not?</p>	<p>Observing</p> <p>Curiosity Asking</p> <p>Curiosity Asking</p>
<p>(When the cards are handed to children, in the end of the activity)</p> <p>Setting Sun. (Yuhi in Japanese)</p>	<p>Next, below character. (I am asking children to read characters printed in the card.)</p> <p>OK, the setting Sun is a red star. To tell the truth, the Sun is one of stars. It's not a star at night, but a star in daytime, in the blue sky.</p>	<p>This is the last corner of the activity. Teachers also listen to my talk, so I will give some didactic talk and end up today's work soon. (I almost feel finished.)</p>	

<p>I am wondering... why are the stars going down? Because the Sun is a star as you said. The setting Sun moves down. But (I think) the stars... (don't move in the night sky)</p> <p>(Surprising Question)</p> <p>Really?</p>	<p>When the Sun is setting, it turns red like this, as you see...</p> <p>Going down? Well, you may think stars are still in the sky. The Moon and stars rise and then set. The fact is that.</p> <p>It's true. Everyone, I am happy now to receive a nice question... Excuse me, what's your name? <i>E-kun</i>? As he asked me, all the Moon, the Sun, and stars... well, from here, the east is the direction of mountains, they rise from the direction of mountains. If you see stars patiently for a while, you will notice that they are setting. Stars seem to be floating still in the night sky, but if you look at them carefully, you will find them moving. Thus, this evening Sun is setting. Therefore, daytime can't be forever. After the Sun sets, night comes.</p>	<p>What? Is he concerned about that?</p> <p>For now, I explain calmly.</p> <p>Is he so interested in it?</p> <p>For now, I continue to explain. Today, they are tenacious!</p>	<p>Inspiration Curiosity Asking Trying to Interpret</p> <p>Asking Exchanging Opinions</p>
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At the conference with teachers, on the day, after the activity, teacher of 4-year-old class reported:

What *A-chan* was concerned about is that **this setting Sun is floating like stars are floating**. So she said “**I can’t judge whether it will go upward or downward**.” Then I explained that the Sun is going down and the Sun turns red as a glowing Sun, and it is setting and going down. *A-chan* said surprisingly that “**then after the setting, where will it go?**” Then I said, you ask your question to Mr. Tomita, but many boys and girls rushed to Mr. Tomita, and so crowded that *A-chan* was never able to ask... This time, she was left with a feeling that **star is mysterious**... She has been saying all though the activity that **it is wondrous**... *B-kun* and *C-kun* are usually calm and quiet boys and they always stand in the rear, but I am surprised that **they asked assertively**. *D-chan* also enjoyed **asking actively** and seeing the pictures.

Inspiration, Observing, Asking, Interpreting, Curiosity

Results from practice of “*Uchu no O-hanashi*”

1. “*Uchu no O-hanashi*” is valid to 3-to-5-year-old children.

- **Record method:** By summarizing long-lasting chat into 4-line table and reflecting it, it is easy to show when and where the *buds of science* are shown.
- **From records:** In *Uchu no O-hanashi*:
Devising and Confirming seem to be relatively rare when compared to other types of science play. Exchanging opinions and Trying to Interpret are frequent.
- **Knack 1:** Instead of only astronomy, talking with heaven-earth-people context encourages children to ask questions based on their daily lives.
- **Knack 2:** Pre-activity of teacher’s talk and long chat time in the activity encourage children to improve their motivation and promote exchanging opinions.
- **Fruit through knacks:** Through increased motivation and using scientific skills, sometimes children speak technical terms, such as Saturn, Mars, or Scorpio. Though knowledge itself is not the aim of the activity, some children get knowledge as a result.

Results from practice of “*Uchu no O-hanashi*”

2. Fun exchanging opinions starts from child’s “Surprise Question.”

- **Fruit through knacks:** Surprising questions and surprising findings are related to contents visitor brings.
- **Children lead the chat:** Sometimes visitor does not get interested in children’s question --- Children ask persistently --- Finally visitor get interested!
- **Summary 1:** Visitor should do his/her best to draw children’s surprising questions and findings.
- **Summary 2:** The surprising questions and findings drawn can be different from visitor to visitor depending on his/her academic specialty.
- **Summary 3:** Therefore, in science play for kids, there are no indispensable contents; any contents can work, and astronomy work with an astronomer!

In other nurseries/kindergartens/after-school day cares, same results are also obtained. The 4-line table can be a useful tool for other kinds of education/science communication activities.

- “*Uchu no O-hanashi*” is a kind of activity where children try to feel, express, and interpret **extraordinary** things of “day and night sky and far above the sky” with a connection to **ordinary** lives, by words and other scientific skills they have developed in their **ordinary** lives.
- In the activity that they feel, express, and interpret, they develop their own scientific skills, especially asking, exchanging opinions, trying to interpret and others.
- Therefore, contents of the activity are better when the contents encourage children’s words and promote scientific skills more.
- Through improving the scientific skills, children gradually get ability to learn scientific knowledge and notion, which will be the firm basis for their life-long science education.

Acknowledgments

This study was based on practice for seven years at Hikari Nursery, Fujiidera City, Osaka Prefecture, Japan. Principal Ms. Keiko Okada, chief teacher Ms. Toshimi Imoto, and class teachers have been kind to open the classes for the practice, and have conferences to reflect and discuss the activity.

I also have many chances to discuss with many educators and researchers on science education for early childhood.

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