

Achievable Inquiry Skill in Science of Mental Retardation Students in Middle School

Developed at 2010 EASE Summer School

National Taiwan Normal University

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Hong-Jung Kim, Daegu University

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Daegu University, South Korea

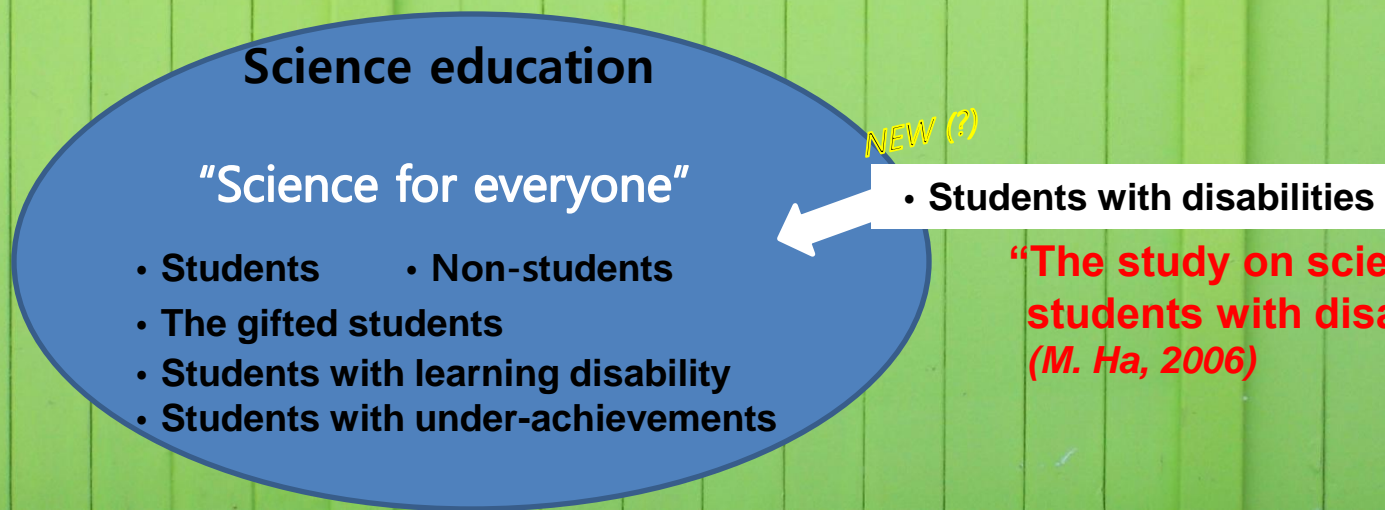
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Necessity, Significance and Introductory discussion of science education for students with disabilities

- STS Education (*Ziman, 1980*)
- Education about STS (*Yager, 1991*)
- Science for all American (*Rutherford & Ahlgren, 1990*)
- Science for everyone (*AAAS, 2001*)

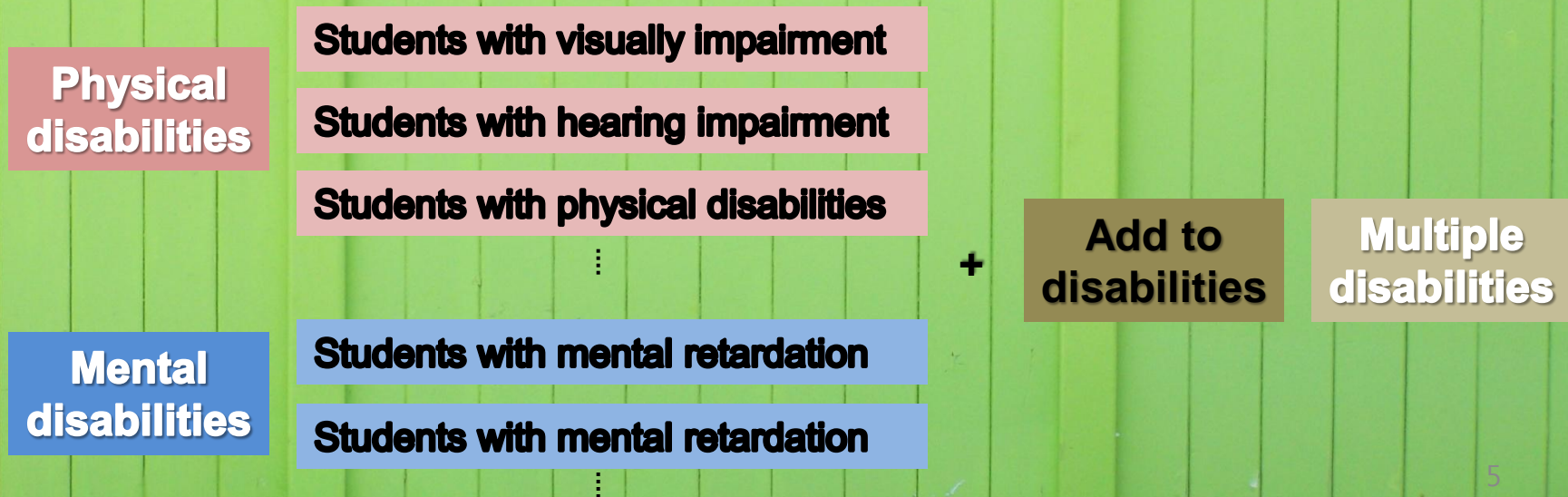
=> But it was not discussed subjects of STS Education concretely (*S. Im, 2009*)



"The study on science education for students with disabilities was lack" (*M. Ha, 2006*)

1. The Study and Practice Present condition of Science Education for Students with disabilities

- 1960 ~ 1980: Focusing on method of increasing learning through textbook
- 1980 ~ 1990: Constructivism learning science
- 1990 ~ : Study on intervention, inclusion, learning characteristics (Scruggs et al, 1998)
- It have been studied depending on the type of disabilities



2. The study and Practice in the meantime by Science education lab. at Daegu Univ.

2-1 Investigating observation action of visually impaired students

(Y. LEE, 2009)

2-2 Assembling Eye model of visually impaired students

(J. Jeong,)

2-3 Training science inquiry emphasized on reading and writing of Students with hearing impairment

(O. KIM, 2009)

2-4 MBL lesson of Students with hearing impairment

(G. Bae, 2010)

2. The study and Practice in the meantime by Science education lab. at Daegu Univ.

2-5 Investigating light concepts of Mental retarded students
(S. Im, 2009)

2-6 Play-experience learning strategy for developmental disability students in learning science *(J. Jeon, 2007)*

2-7 Science Sprout Feast sharing disabilities students

2-8 After School of Students with disabilities

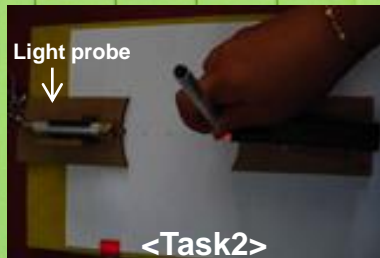
2-9 Significance, Limits and Future Challenges

2-1 Investigating observation action of visually impaired students (Y. LEE, 2009)

- **Hearing Sounds** ← **Alternative sense for students with visual impairment**
- **Subject: Four Students with visual impairment in middle school**



- *Syringe have Groove to adjust Quantity of water.
- ⊙ Students can learn making sounds to heard sounds to blow breath at test-tube with water.



- *Light probe make sounds to detect light.
- ⊙ Students can learn **straightness** of light rays to hear sounds using light probe



- *Light probe make sounds to detect light.
- ⊙ Students can learn **reflection** of light rays to hear sounds using light probe

Conclusion

- Students with visual impairment can learn science using alternative sense hearing sounds.
- Students with visual impairment carried out well objectivity and diversity of observation but they were lack to perform exactness elaboration of observation.

2-2 Assembling Eye model of visually impaired students

(J. Jeong, 2007)

- **Subject: Thirteen Students with visual impairment in high school**

Assembling radio



Speaking structure and function of eyes



Assembling and disjoining eye model



Speaking structure and function of eyes,
concurrently assembling and disjoining
eye model

“Pre-test”

“Post-test”

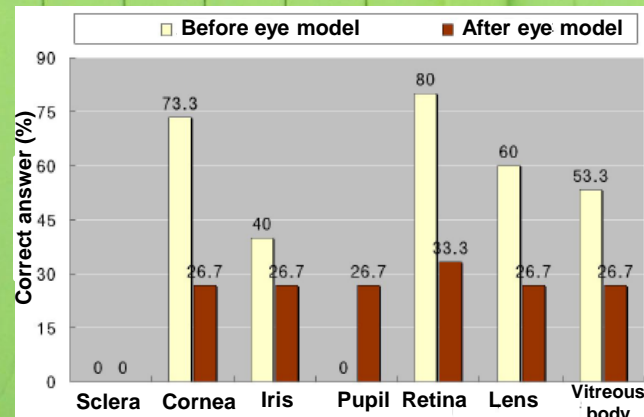
<Procedure of this study>



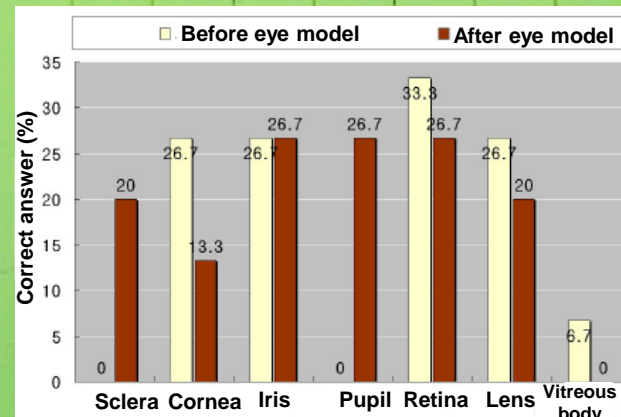
<Eye model image>

Conclusion

- **Students with visual impairment knew eye's structure and function to memorize.**
- **Developed eye's model of this study can use various learning situation.**



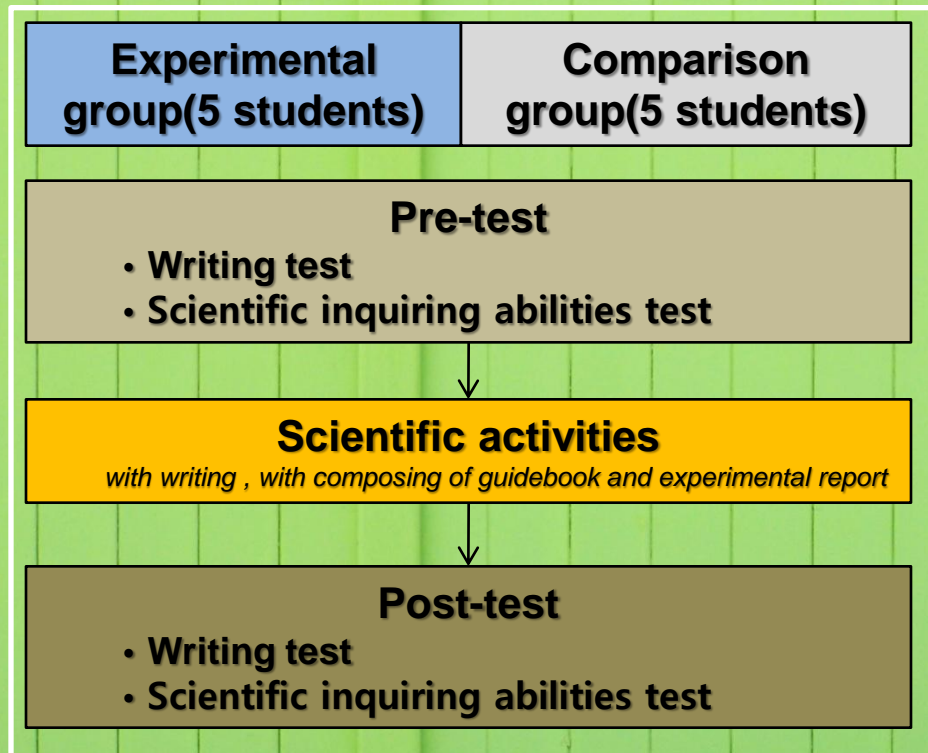
<Comparing correct answer eye's name before and after eye model>



<Comparing correct answer eye's function before and after eye model>

2-3 Training science inquiry emphasized on reading and writing of Students with hearing impairment (O. KIM, 2009)

- **Subject: Ten Students with hearing impairment in middle school**



<Design of this study>

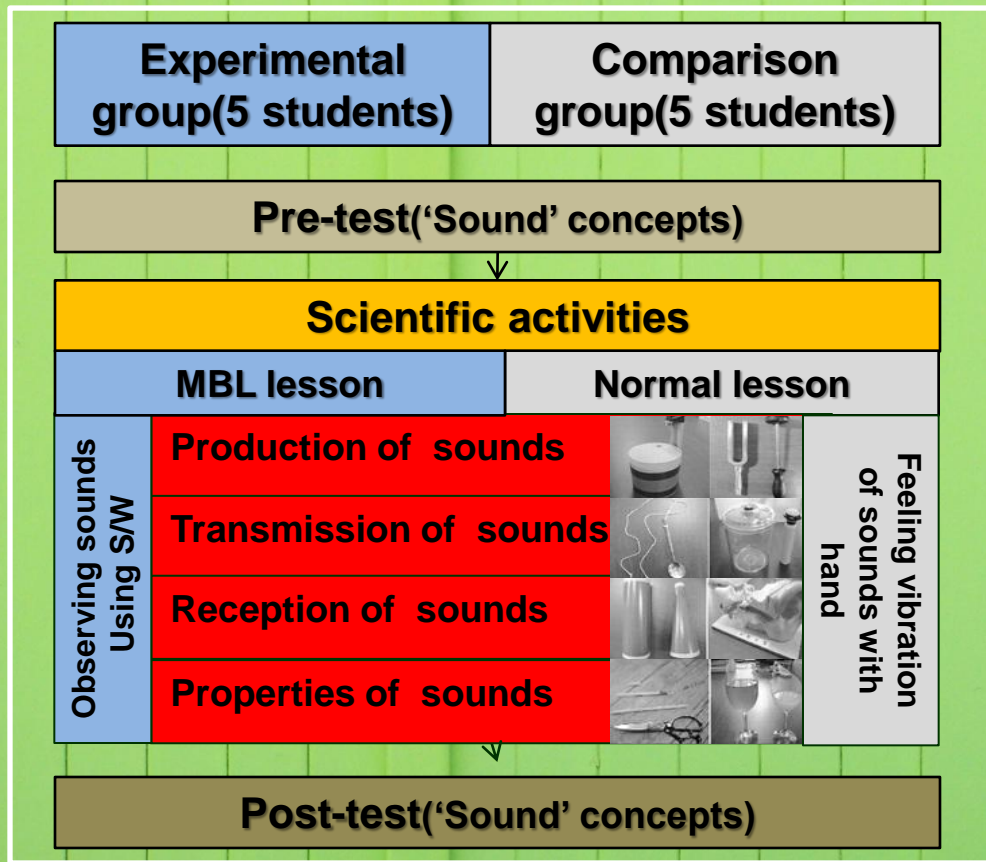
Conclusion

- Comparing pre-test and post test, training science inquiry emphasized on reading and writing could enhance communicating abilities of students with hearing impairment than with non-disabilities.
- Training science inquiry emphasized on reading and writing could improve scientific inquiring abilities of students with hearing impairment.

2-4 MBL lesson of Students with hearing impairment

(G. Bae, 2010)

- Subject: Ten Students with hearing impairment in middle school



<Design of this study>

Conclusion

- Through G-factor analysis on sound concepts, this researchers found that students with computer literacy enhanced sound concepts after MBL lesson.
- Through Video analysis on learning activities of students with hearing impairment, this researchers found that students with computer literacy was interested in learning sounds continuously.

2-5 Investigating light concepts of Mental retarded students (S. Im, 2009)

- **Subject: Thirteen Students with mental retardation in high school**

Concept	Interview method	Procedure
Source of light	IAI(Interview about instances)	'Showing an instance(picture card)', then ask an interview question
Representation	IDI(Individual demonstration interview)	Demonstrating an event, then ask an interview question(explain or draw your ideas)
Vision	IDI(Individual demonstration interview)	Demonstrating an event, then ask an interview question(explain or draw your ideas)

<Method and procedure according to concepts>



<image of learning activities>

Conclusion

• Source of light

Students with mental retardation tended to understand light according to the intensity of light.

• Representation

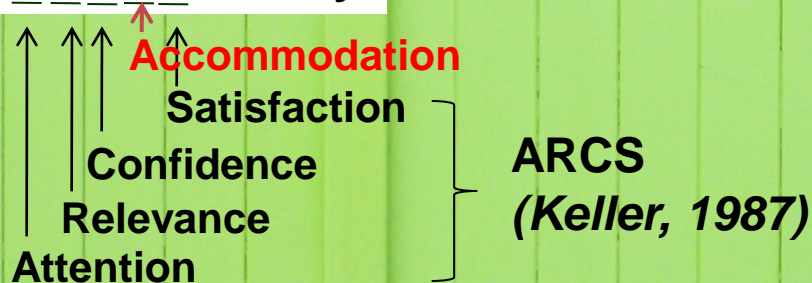
Most of students with mental retardation described long or short line(or beam) about light.

• Vision

Most of mentally retarded students were likely to simply connect two elements among light, object and eye.

2-6 Play-experience learning strategy for developmental disability students in learning science (J. Jeon, 2007)

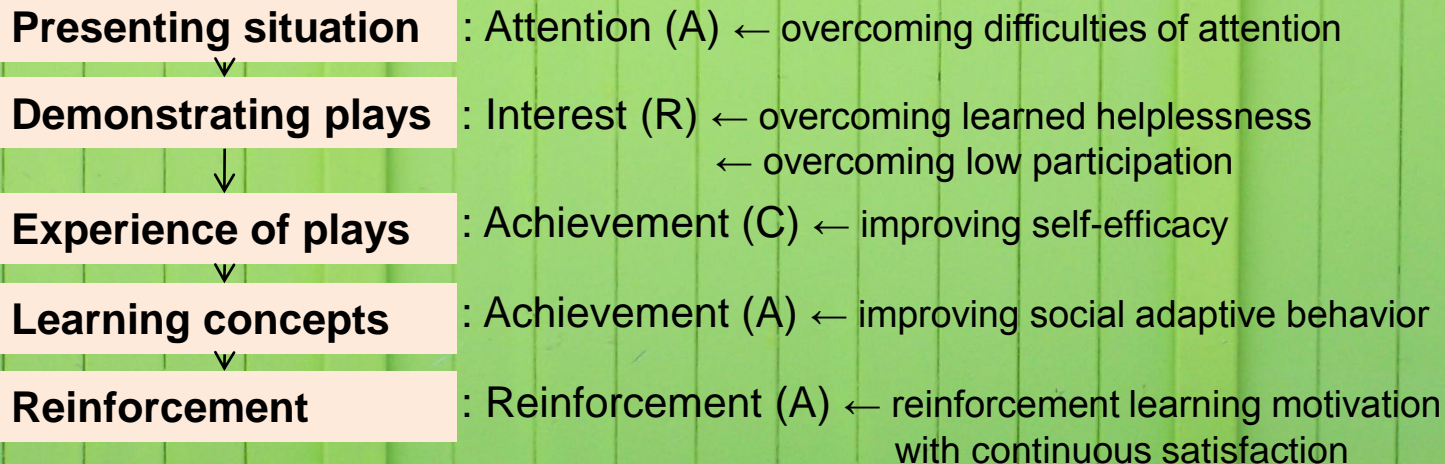
ARCAS Theory



<Concepts of ARCAS model>

1. Outline
2. Scientific concepts
3. Learning objects
4. Learning methods
5. Learning effects
6. Related curriculum
7. Significance points

<Standard of play-experience learning material>



<ARCAS learning model>

2-7 Science Sprout Feast sharing disabilities students



Host: Daegu Univ.



- 2006 Science sprout feast, For students with visual impairment



- 2007 Science sprout feast ,For students with hearing impairment



- 2008 Science sprout feast, For students with mental impairment



- 2009 Science sprout feast, For students with emotional and behavior disorder



- 2010 Science sprout feast (scheduled at Oct.)

For students with physical disability

2-8 After School of Students with disabilities

◆ In South Korea, there are 'After School', which is class to do various activities after school.

- For students with hearing impairment <<2009 After school >>



- For students with mental impairment <<2010 After school >>



2-9 Significance, Limits and Future Challenges

- **Recently, we have studied science education for students with disabilities.**
- **In spite of above this, study on science education for them was lack.**
- **And this studies had no choice but to explore science education for students with disabilities and to practice learning activities for students with disabilities.**
- **It will be expected that many researchers in science education interested in science education for students with disabilities .**

3. Exploration and Discussion about matter of study

“Achievable Inquiry Skill In Science of Mental Retardation Students in Middle School”

Background

- **Science for everyone (AAAS, 2001)**
- **Importance of science education for the disabilities.**
(Rutherford and Ahlgren, 1990; Serna and Patton, 1989)
- **Benefit of activity-based approach for students with mental impairment**
(*Davies and Ball, 1978 ; MacDougall et al., 1981; Mastropieri and Scruggs, 1992*)
- **In most of study on scientific inquiry for students with mental impairment, comparing intelligence of general students and mentally retarded students, it was assumed that possible scientific inquiry of students with mental impairment is low.**

Methodology

- **Subject: Five students with mental impairment in middle school**

Students	Gender	Grade	Feature
Name			
A	Male	3	Depressive disorder
B	Female	3	Lennox Gastaut Syndrome
C	Female	2	WISC3 IQ: 49, SMS SQ: 39, SA: 4.75
D	Male	3	Depressive disorder
E	Male	3	WISC3 IQ: 60(?)

Methodology

- **Collecting materials**

- **video of class, journal of researchers, participant observation, interviewing students**

- **Analysis of materials**

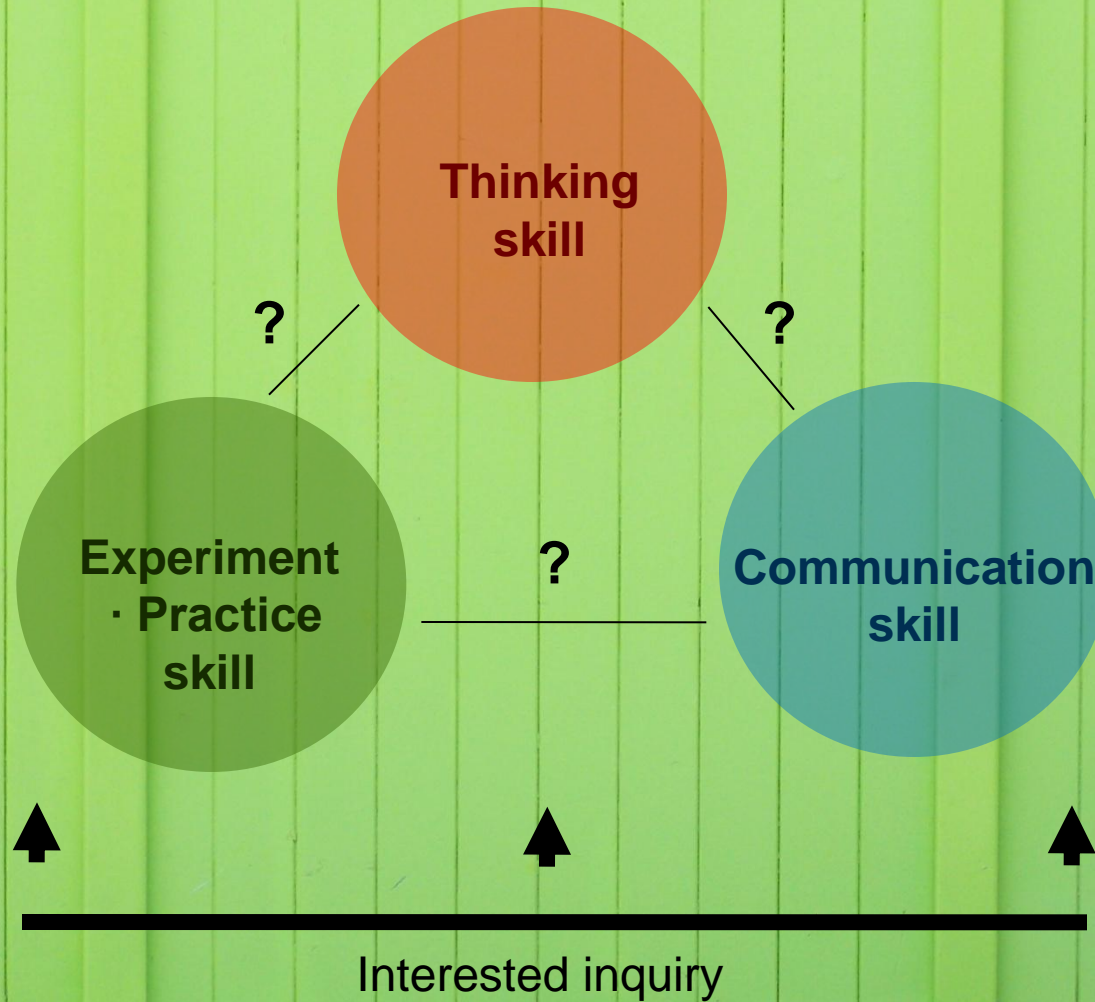
- **Description -> Analysis -> Interpretation**
(Wolcott, 1994)

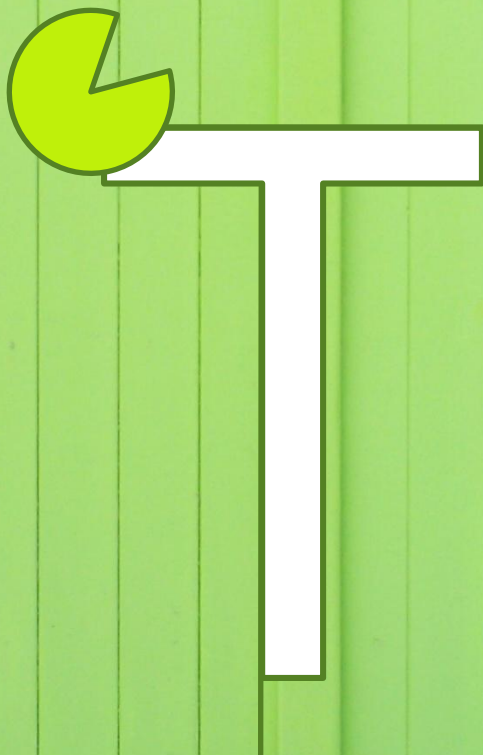
Methodology

•Motivated inquiry skills of ASE (1987)

Inquiry skill	Inquiry activities
Thinking skill	<ul style="list-style-type: none">•Hypothesis setting•Making situation for hypothesis testing•Make a conclusion based evidence•Explain phenomenon based appropriate principle and theory•Solving problem•Evaluate one assertion from evidence
Experiment <ul style="list-style-type: none">• Practice skill	<ul style="list-style-type: none">•Simple observation•Simple measurement•Methodical and careful observation•Methodical and careful measurement•Carrying out experiments safely•Carrying out experiments certainly•Improve environment to experiment
Communication skill	<ul style="list-style-type: none">•Explaining fact observed•Explaining contents others explain•Explaining solution•Understanding others' explanation•Understanding contents others' comment•Applying and selecting related contents from various information

Methodology





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