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Original Article

Trial of a Workshop Adapting Single-/Double-loop Learning for Nursery Student Teachers

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This study develops and trials a workshop using the "theory of action" proposed by Argyris & Schön. The Faculty Teacher Training course taught by the author introduced a "reflective practitioner model" in 2014 and consequently developed several workshops to help student teachers reflect on their teaching practice and gain practical knowledge. However, the student teachers' practical knowledge tended to pertain to their underlying values and assumptions, so the workshop was further improved to develop their practical knowledge beyond just their underlying values and assumptions. The "theory of action" indicated a distinction between individuals' "espoused theory" (what they say) and "theory-in-use" (what they actually do). The participating student teachers' (N=60) practical knowledge was based on their theory-in-use. In single-loop learning, people modify their action strategies according to the consequences, while in double-loop learning they change their action strategies and governing strategies. The workshop's activities provided opportunities for single- and double-loop learning and were expected to enhance practical knowledge. The study examines whether the workshop modified participants' practical knowledge and/or cognitive frameworks beyond their underlying values and assumptions. The participants were divided into 12 groups of four or five. Their practical knowledge was discussed and examined during the workshop. The study revealed that 18 students achieved single-loop learning because they modified their action strategies, but only two achieved double-loop learning by also changing their governing strategies. Therefore it was suggested that the developed workshop could promote single-loop learning for about one third of student teachers and double-loop learning for only a few.

Keywords: Espoused theory, Professional development, Reflective practitioner, Nursery student teaching, Theory-in-use

Introduction

The Ministry of Health, Labour and Welfare revised national nursery curriculum guidelines in March 2017 (MHLW, 2017). The development of the professional competence of nursery teachers was proposed in Chapter 5 of those guidelines. Additionally, the Council of National Nursery Curriculum Review Conference (2017) released a report that indicated that one of the directions of revision is "The development of professional competence and capability as a nursery teacher". Therefore developing the professional competence of nursery teachers is taken for granted, not only for in-service training but also during pre-service

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training.

In 2014, the Faculty of Teacher Training Course, which this author teaches, introduced The Reflective Practitioner Model (Sasaki, 2015), in which the development of professional competence was defined as the practical knowledge which teachers gain through problem-solving through reflection. The faculty developed a curriculum and examined whether the course could enhance the student teachers' competence from the reflective practitioners' perspective in the elementary school teachers' program. The journal notes of student teachers were analyzed and results revealed that student teachers reflected on their practice more deeply and more critically based on their experience (Sasaki, 2016). However, it was unclear whether they themselves were convinced that they had become more reflective, since only a few researchers analyzed their journals and identified episodes of reflection. To solve those problems, based on Dewey's phases of inquiry, a procedure for filling in the reflection worksheet was developed which allowed the student teachers to recognize their gains in practical knowledge (Sasaki, 2018a).

However, this spent much more time to work through the reflection worksheet in a period of a class. So, the reflection worksheet procedure was simplified based on Schön's (1983) process for reflection. The worksheet was trialed in the workshop of a pre-nursery class and it was concluded that it was useful and efficient in facilitating the student teachers to recognize their gains in practical knowledge. However, the student teachers' practical knowledge tended to pertain to their underlying values and assumptions, as the worksheet was written by each student teacher individually. This raises the question of how the practical knowledge should be shared among student teachers and be expanded beyond their own individual underlying values and assumptions in the workshop?

Argyris & Schön (1974, 1978) conducted studies on the relationships of learning between individuals and organizations. Thus, the purpose of this study aims to develop a workshop in which student teachers can share and change their individual practical knowledge referring to Argyris & Schön's work and trialing it during the workshop.

Theoretical Framework

Theories of Action: Theory-in-use and Espoused Theory

The theoretical framework for developing the workshop was the Theory of Action proposed by Argyris & Schön (1974), which indicates that there is a distinction between an individual's "espoused theory", i.e. what they say, and their "theory-in-use", i.e. what they actually do. Argyris (1980) highlights that this is an important aspect of the theory. They explained the distinction:

> When someone is asked how he would behave under certain circumstances, the answer he usually gives is his espoused theory of action for that situation. This is the theory of action to which he gives allegiance, and which, upon request, he communicates to others. However, the theory that actually governs his actions is his theory-in-use.

Argyris & Schön assert that people have mental maps with regard to how to act in certain situations. This involves how to plan, implement and review their actions. Furthermore, they assert that these maps guide people's actions rather than the theories they explicitly espouse. Few people are aware of the maps they use to take action.

To clarify, this is not merely the difference between what people say and do. Argyris & Schön suggest that there is a theory consistent with what people say and a theory consistent with what they do. Therefore the distinction is not between "theory and action but between two different "theories of action"" (Argyris, Putnam & McLain Smith, 1985). Those concepts are "espoused theory" and "theory-in-use". Espoused theory is the values and assumptions people believe their behaviour is based on. Theory-in-use is the values and assumptions implied by their behaviour, or the mental maps they use to take action. To reiterate, people are unaware of the theories that drive their action (theory-in-use). If this is so, how can people effectively manage their behavior? Argyris &

Schön developed models which seek to explain the processes that create and maintain people's theory-in-use. Their model explaining theory-in-use is shown in Figure 1 below.

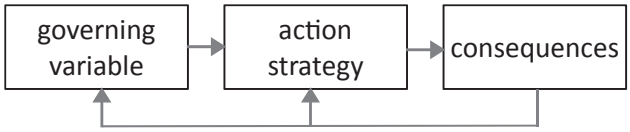

Figure 1 Model explaining the process of developing theory-in-use

Governing variables are values and assumptions that people try to keep within some acceptable range. People have many kinds of governing variables. Action strategies are those used by people to keep their governing variables within an acceptable range. Consequences are the result(s) of an action. These can include both intended and unintended results. Even if the consequences are not those intended, people rarely change their governing variable. Instead, they usually change their action strategy in order to achieve a satisfactory consequence.

Single-loop and Double-loop Learning

It is suggested that the first response to this mismatch between intention and outcome is to search for another strategy which will satisfy the governing variables (Argyris, Putnam & McLain Smith, 1985). The new action strategy is used to satisfy the existing governing variable. The change is only in the action, not in the governing variable itself. Such a process is called single-loop learning, as shown in Figure 2 below.

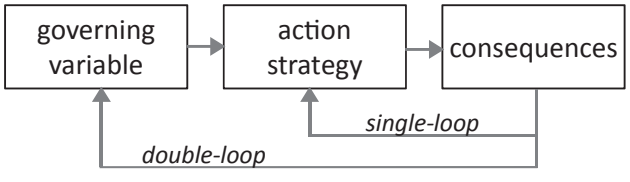

Figure 2 Single- and double-loop learning

Another possible response would be to examine and change the governing variables themselves. For example, a person might choose to critically examine the governing variable of suppressing conflict. This may lead to discarding this value and substituting a new value and assumption such as an inquiry. The associated action strategy might be to discuss the issue openly. Therefore, in this case, both the governing variable and the action strategy have changed. This would constitute double-loop learning (Figure 2).

The student teachers' practical knowledge was based on their theory-in-use. In single-loop learning, people modify their action strategies according to the difference between expected and reached outcomes. Conversely, in double-loop learning, people change not only their action strategies but also their governing variables, which are frameworks for their operating values and assumptions. Their assumptions underlying current views should be questioned and hypotheses about their behavior should also be examined openly with others during the workshop. The workshop therefore had to be designed to implement both single- and double-loop learning and was expected to change the student teachers' practical knowledge.

Reflection Worksheet

Firstly, the student teachers' practical knowledge is presented in the workshop. In the previous study (Sasaki, 2018a), the reflection worksheet procedure based on Schön's process of reflection was trialed in the workshop of a pre-nursery class. It found that it was useful and efficient to allow the student teachers to recognize their gains in practical knowledge. Thus, the workshop introduces the reflection worksheet in this study. The theoretical background referring to Schön and the procedure of the reflection worksheet is explained as follows.

Schön (1983) asserted concepts of "reflection-in-action" and "reflection-on-action" which demonstrated the ways of thinking and the relationship between actions. Reflection-in-action is to think, judge and act momentarily, interacting with the situation. Reflection-on-action is to think about action consciously after that action. Of the two concepts, the most important for the purpose of this paper is reflection-in-action. Teachers' professional competence depends on how appropriately they can judge and respond in the context of practice when

they encounter a problematic situation. However, it was difficult to assist in developing professional competence simply by encouraging direct reflection-in-action, which was performed instantly in the mind of each student teacher. Therefore, it became important to emphasize reflection-on-action after performance, as well as reflection-in-action during performance. The development of professional competence is defined as the practical knowledge which teachers gain through problem-solving through reflection-in-action and reflection-on-action. Sasaki (2018b) developed the procedure to fill in the reflection worksheet based on Schön's process of reflection. The worksheet assisted the student teachers to recognize their gains in practical knowledge during teaching practice (Sasaki, 2018b). The procedure consisted of the following three phases. Student teachers:

1. find episodes of reflection in their journals,
2. arrange their episodes of reflection according to the three steps for reflection, and
3. recognize their gains in practical knowledge.

Figure 3 below shows the reflection worksheet. In phase 1, the student teachers read their journals carefully, and find their episodes of reflection when they encountered a problematic situation during teaching practice. Once the student teacher finds the episode, he/she writes the date and period in the top row, and the subject and unit name in the second row.

In phase 2, he/she first fills in the third row detailing the problematic situation which he/she encountered. Next, he/she remembers the hypothesis used to solve the problem and the associated consequences, and writes these in the fourth row to explain the reflection-in-action. Then, in the fifth row, reflection-on-action, he/she reflects on what they tried to do to solve the problem. Next, he/she writes what they learned from the problem-solving experience in the sixth row, detailing practical knowledge.

In phase 3, he/she reviews the descriptions and recognizes their gains in practical knowledge. As a result of the introduction of this worksheet into the workshop, the student teachers have been

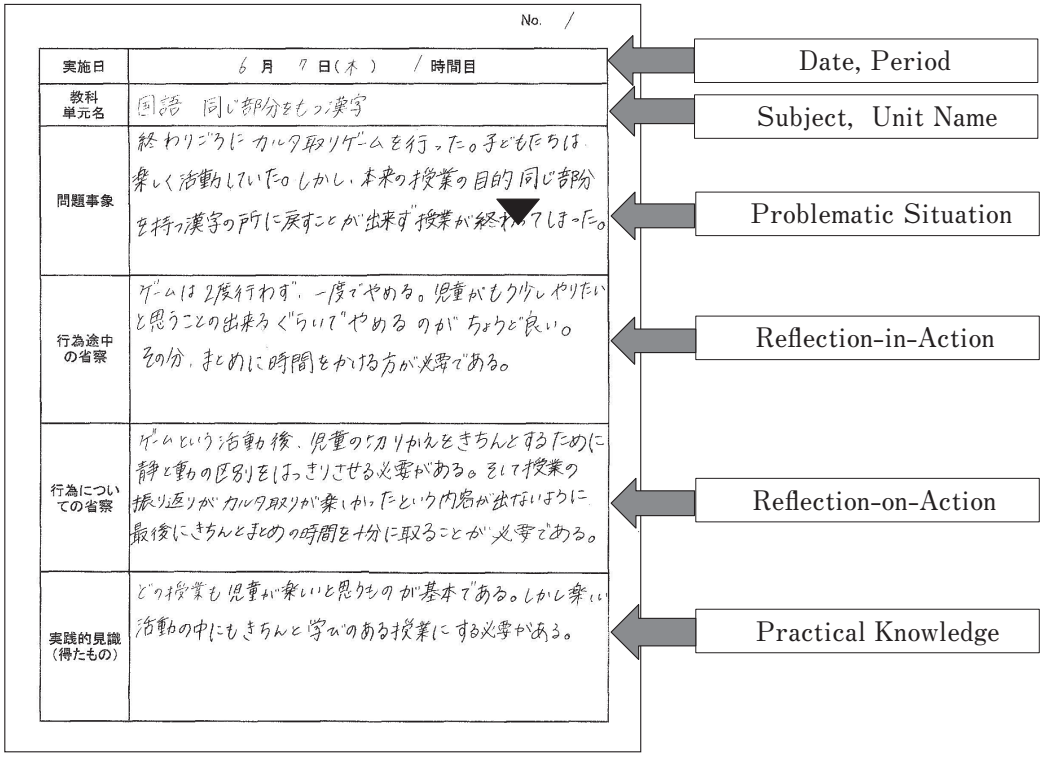

Figure 3 Reflection worksheet

better able to present their practical knowledge gains.

Research Question

The procedure of the reflection worksheet and theories of action are contrasted. When student teachers encountered a problematic situation, they produced an hypothesis and were challenged to solve the problem based on their espoused theory. However, the action of response might be practically based on theory-in-use. Therefore, as long as they reflect on their practice, their practical knowledge is merely a product from their theory-in-use. It is not certain that the student teachers are aware of their theory-in-use. So, the opportunity to share and explain their practical knowledge to other student teachers is needed. In addition, there is the opportunity for other student teachers to give comments and advice on how to respond to the problem if needed. After listening to a student teacher's theory-in-use and comments from other student teachers, if he/she has changed or modified their strategy, this would constitute learning. In the case that he/she retains their governing variable within the acceptable range and changes only their action strategy, this would constitute single-loop learning. Conversely, if they change their governing variable and action strategy, this would constitute double-loop learning. Changing the governing variable concerning the reframing of their concept would be regarded as professional development as a reflective practitioner.

Thus, the research question of this study is whether the developed workshop can constitute single-/double-loop learning to allow student teachers to share and change their individual practical knowledge.

Developing and Trialing the Workshop

Developing the Workshop

The goal of the workshop is to develop the pre-service nursery student teachers' professional competence. The development of professional competence is defined as the practical knowledge which student teachers gain through problem-solving with reflection. To achieve this, the workshop should be designed to constitute single-loop and double-loop learning to reflect on their problem-solving and to revise their practical knowledge.

The workshop was carried out in a 90-minutes nursery course lesson. The procedure of the workshop consisted of the following three phases. Student teachers:

1. find episodes of reflection and fill in the reflection worksheet (Figure 3), then
2. share their practical knowledge in a group and fill in the rethinking worksheet (Figure 4) and
3. reconsider their practical knowledge.

In phase 1, the reflection worksheet was handed out and the procedure described above for filling it in was explained by the facilitator. Then, the student teachers reflected on their practice by reading their journals of teaching practice and finding the episodes of reflection. Then, they filled in the reflection worksheet. Phase 1 was estimated to take about 20 minutes.

In phase 2, the rethinking worksheet was handed out and the student teachers were divided into small groups of four or five students. Then, firstly student #1 shared his/her practical knowledge and simultaneously the other students wrote their understanding of student #1's practical knowledge in the space shown in Figure 4.

Next, the other student teachers stated their understanding of student #1's practical knowledge. What the other student teachers stated was regarded as theory-in-use. Then, the other students gave comments or advice to student #1. This phase 2 procedure was repeated for each student in the group. Phase 2 was estimated to take about 50 minutes.

In phase 3, the student teacher considered his/her practical knowledge again, and if he/she had changed or modified it, they wrote their revised practical knowledge in the rethinking worksheet. Phase 3 was estimated to take about 20 minutes.

Criteria of Learning

The reflection worksheets and the rethinking

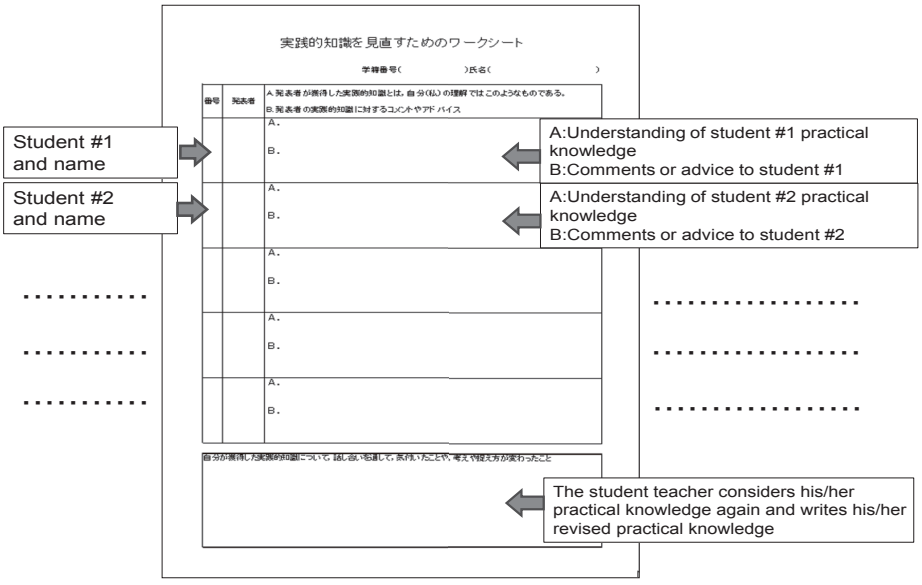

Figure 4 Rethinking the worksheet

worksheets were collected by the facilitator. The researchers who were charged with nursery education evaluated the student teachers' descriptions in the worksheets. If the revised practical knowledge was evaluated as the student teacher having changed their action strategy, this was regarded as single-loop learning. If the revised practical knowledge was evaluated as the student teacher having changed their governing strategy and action strategy, this was regarded as double-loop learning.

Trialing the Workshop

The trial of the workshop was implemented in the participating university in June 2019. There were 60 participants in the workshop who had experienced teaching practice in nursery schools in 2018. They were divided into 12 groups of four or five students. The author acted as facilitator. Firstly, the facilitator explained the procedure of the workshop. Next, the students reflected on their teaching practice in nursery schools by reading their journals and filling in their reflection worksheets. Then, they shared their practical knowledge and the other students wrote their understanding in the rethinking worksheet. The other students gave comments or advice to the student teacher. This procedure was repeated in turn for each student in the group. Then, the student teacher reconsidered their practical knowledge. In the case that they changed or modified it, they wrote their revised practical knowledge in the worksheet.

Results and Discussion

Table 1 below shows an excerpt from the worksheet which student teacher A wrote to student teacher C.

In one case, student teacher A was in charge of three and four year old children and encountered a problem when she played a game of tag. Though she explained the rules of the game, some children didn't understand it and kept running away, even if they were touched by the tagger. Her theory-in-use was "Nursery teachers shouldn't force the children to understand the rules but should change the rules to be easier, in order to give a fun experience to all the children". Her governing variable was considered to be "Nursery teachers should not force children do something". Under that governing variable, her action strategy was considered to be "Nursery teachers should change the rules to make it easier to give to all the children a fun experience". After sharing her practical knowledge and listening to other student teachers' advice, she modified her practical knowledge to "It is a flexible, good idea that the

Table 1 A excerpt of student teachers' reflections

Student Teacher	A	B	C
Age of children	Three and four years old	Three years old	One year old
Learning Area	Human Relationship	Human Relationship	Enviromental
Problematic Situation	When playing a game of tag outside, some children didn't understand the rules and kept running away even if he/she was touched by the tagger.	When playing at housekeeping, some children scrambled for the toys and a kid who got angry threw the toy and hit a classmate.	When playing in the sand barefoot outside, there were some children who didn't like the feel of the sand.
Theory-in-use	Teachers shouldn't force the children to understand the rules but make the rules easier to give fun to all the children.	Teacher should mediate the argument and listen to what they want to say and speak for another since it's difficult for children to express their feelings and solve the problem.	Teacher should accept the weak point and shouldn't force them to go into the sand. It's important to build the situation that children can take part in at their own pace.
Revised Practical Knowledge	That is a flexible, good idea that the teacher should not only change the rules but also propose the other play to the children. There is an option to set an opportunity that the children exchange their ideas. It is still important to make the rules easier.	Though it is difficult to enter into children's feeling, it would be possible if teachers and children built an interpersonal relationship. Everyday communication such as speaking what children are not good at saying to another builds relationships and gives them a sense of comfort.	It is important for a teacher to support children, not to force them to take part in, but to help them with watching to see how things go.
Single Loop	☑	☑	☐
Double Loop	☐	☑	☐

nursery teacher proposes a different game to the children instead of forcing them to understand something difficult. There is the option to make opportunities for the children to exchange their ideas. It is still important to modify the rules to make it easier". She noticed a new idea when a nursery teacher proposed a different game to the children and gave an opportunity for them to exchange their ideas. That meant that she changed her action strategy, i.e. proposing a different game and giving an opportunity for children to exchange their ideas, while retaining her governing variable that nursery teachers should not force children do something. Therefore her revised practical knowledge was evaluated as her having changed her action strategy, since she kept her governing variable within the acceptable range. Therefore, this was regarded as single-loop learning.

In another case, student teacher B was in charge of three year old children and encountered the problem that some children scrambled for the toys and one child who got angry threw a toy and hit a classmate when they were playing at housekeeping. Her theory-in-use was "Teachers should mediate the argument and listen to what they want to say and speak for another student because it is difficult for some to express their feelings and solve the problem". Her governing variable was that "Nursery teachers should listen carefully to what the children want to say and speak for those who cannot express themselves". Under the governing variable, her action strategy was that "Nursery teachers should act as a mediator because children are not good at expressing themselves". After sharing her practical knowledge and listening to the other student teachers' advice, she modified her practical knowledge to "Though it is difficult to get into the mind of children's feelings, it would be possible if teachers and children built an interpersonal relationship. Building relationships helps with everyday communication in expressing what they are not good at saying and it gives them a sense of comfort". She noticed the new idea of the importance of building an interpersonal relationship between nursery teachers and children. This meant that she changed or widened her governing variable to "Nursery teachers should build an interpersonal relationship and everyday communication assists in this goal". This

governing idea changed her action strategy that everyday communication contributes to building an interpersonal relationship. Therefore, her revised practical knowledge was evaluated as her having changed her governing variable beyond the acceptable range and also her action strategy. Therefore, this was regarded as double-loop learning.

In a third case, student teacher C was in charge of one year old children and encountered the problem that some children did not like to touch the sand when they were playing in the sand. Her theory-in-use was "Nursery teachers should accept each child's weak points and should not force them to go into the sand. It's important to prepare the situation whereby each child can take part at their own pace". Her governing variable was considered to be "Nursery teachers should not force children do something". Under the governing variable, her action strategy was "Nursery teachers should prepare the situation whereby each child can take part at their own pace". After sharing her practical knowledge and listening to the other student teachers' advice, her practical knowledge was "It is important for a teacher to support children and not to force them to take part, but to help them with watching to see how things go". That is almost the same as the first case, but she did not change her action strategy. Therefore, this was regarded as neither single- nor double-loop learning having taken place.

As a result, 18 student teachers who revised their practical knowledge were evaluated as having achieved single-loop learning and two who revised their practical knowledge were evaluated as achieving double-loop learning. It was suggested that the developed workshop could achieve double-loop learning for only a few student teachers and that single-loop learning occurred in only about one third of the participants.

Conclusion

The purpose of this study was to further develop an existing workshop by incorporating "theory of action" and to evaluate that workshop through a trial lesson. There is professional development value in developing a workshop to change student teachers' practical knowledge beyond their underlying values and assumptions. The workshop was designed to implement single-/double-loop learning and was expected to change the participants' practical knowledge. Thus, the research question was whether or not the developed workshop could modify their practical knowledge and change their cognitive frameworks beyond their underlying values and assumptions. The workshop was implemented in July 2019 with 60 student teachers who had experienced teaching practice in nursery schools the previous year. These were divided into 12 groups of four or five students. Their practical knowledge was discussed and examined during the workshop. The contribution and findings revealed that 18 students were evaluated to have achieved single-loop learning because they modified their action strategies, but only two student teachers were evaluated as having implemented double-loop learning by also changing their governing strategies. Therefore it was suggested that the developed workshop could achieve double-loop learning for only a very few student teachers and single-loop learning for about one third.

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