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Ambiguous tacit knowledge with a thematic focus based on Japanese social culture: An excellent source of qualitative data analysis and interpretation for systematic search of meaning

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ABSTRACT[1]

Based on the social culture of Japan and how educational trends of the 1980s became the prototype for the organizational culture of schools, some schools have rejected the formative assessments that flourished at the time and have consistently used complex assessments. The purpose of this study is to explore the nature of children's learning from individualized narrative data. In this paper, we use data from a record of integrated learning at Ina Elementary School in Nagano, Japan, which documents the learning of a single child, with peer group dynamics and teacher support, to examine how teachers perceive children's learning from children's statements. The method of analysis of this data was conducted using NVIVO, a qualitative analysis tool, based on a frame grounded in the concept of "relationship" (*kankei* in Japanese). The data were categorized from the children's statements (narratives), and the learning records were coded and interpreted for meaning. To visualize, at various levels (individual, peer, classroom), we used Peter Senge's learning organization. The results show that children at Ina Elementary School learn directly from learning resources. And teachers work together with them toward the learning resources. In this form of learning, the teacher nurtures the competencies that are invisible and difficult to measure in children, with the teacher's tacit knowledge. Therefore, it is very difficult to visualize children's learning. For this reason, we can approach the essence of children's learning.

Keywords: learning organization, individualized narrative data, integrated learning, tacit knowledge, relationship

1. INTRODUCTION

With accelerated globalization and a faster rate of technological development, a new era is upon us, and the direction of education in the future is extremely uncertain and unpredictable [1]. The discussion about how most appropriate learning is for a child to survive in the future, and what role of teachers is a confusing topic. A paradigm shift in assessment has been advocated worldwide, and formative assessment has been one of the central topics [2]. Even in such a situation, Ina Elementary School in Nagano, Japan has consistently used complex assessments. This school has no report card, which is quite rare in Japan. However, parents seldom complain about their children's learning progress. One of the reasons for this is that the teachers (see NOTE 1)) pay close attention to the children's learning, and the children grow freely. For evidence of this, some Japanese elementary schools (including Ina Elementary School) have recorded the individualized narrative data traditionally. In some schools, teachers themselves document narrative data. This data from Ina Elementary School is the same case. Teachers observe children's learning in detail and record it to demonstrate their practice to the public. Such meticulousness is one of the unique features of Japanese classroom research. This act, that is, to record the practices is itself connected to assessment. However, teachers do not use the technical terms that researchers use in the academic field to delve into the details. Even though they have documented their knowledge and skills of teaching and observing in detail, they have yet to conceptualize and convey them. The issue is that their practical and tacit knowledge is not very clear. Therefore, there is a need for researchers or other third parties to represent their practical and tacit knowledge in an abstract form. In this paper, to interpret this individualized narrative data, it was analyzed using NVIVO, which is a qualitative data analysis software. When analyzing qualitative data, the main task is coding. Coding is to classify or categorize something. It is a process that permits data to be divided, grouped, recognized, and linked in order to consolidate meaning and develop explanation [3]. Coding is not a precise science; it is primarily an interpretive act [4]. A code in qualitative analysis is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data [4].

[1] We would like to express our sincere gratitude to Dr. Ian Clark for peer editing.

Although this paper did not reach a perfect theorization, this data can be explained by Peter Senge's five disciplines. These are five key learning elements that all learning organizations have in common. The perfect learning organization is not an attainable goal, but rather a desirable and useful set of guiding ideas and principles for people and organizations to aspire towards [5].

2. RESEARCH QUESTIONS

i. How is it to explore the nature of children's learning from individualized narrative data.

ii. How teachers perceive children's learning from children's statements.

3. RESULTS

Children's scholastic ability

The children's learning from data on the integrated learning at Ina Elementary School was coded (using NVIVO) and interpreted. First, it was clarified what aspects of children's learning would be analyzed. According to Prof. Kazuyasu Azegami in his lecture [6], children's scholastic abilities can be divided into two main categories. In other words, there are two types of learning: learning (learning outcomes) that can be easily quantified and learning that cannot be easily quantified. He defined the children's scholastic ability as shown in Fig. 1. "Learning that is difficult to quantify" has five activities. These five activities are expressed in the Japanese language. See NOTE 2)-6) for explanations of these words.

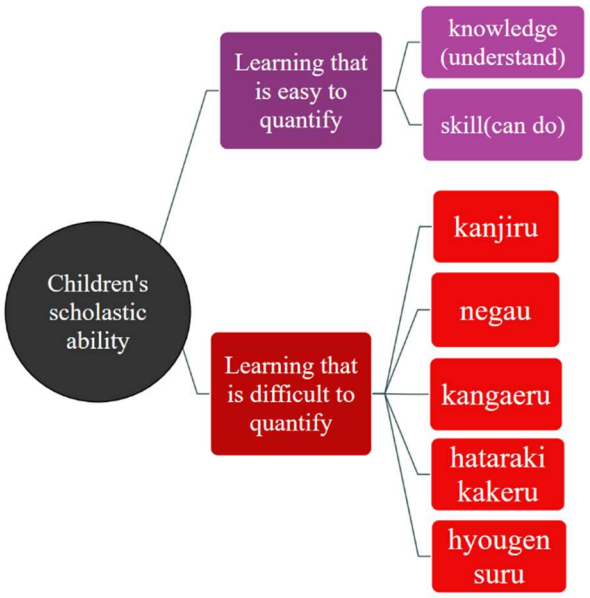

Fig. 1. Children's scholastic ability [6].

Many subject education curriculums focus on learning that is easy to quantify and learning that is difficult to quantify is often treated as an adjunct. However, in Japanese integrated learning, the focus is on learning that is difficult to quantify. This is because integrated learning is intended to utilize the ideas of each subject education, grasp the subject from a bird's eye view, and continue to question one's own way of life through inquiry [7].

Learning resources

In Japanese integrated learning, schools often use their own learning resources. Learning resources play an important role in supporting learning that is difficult to quantify. Learning resources are defined as follows; "any resource – including print and non-print materials and online/open-access resources – which supports and enhances, directly or indirectly, learning and teaching. Typically, the use of a learning resource in the classroom is subject to a process of evaluation and approval at the school, local or national level. Evaluation criteria may include relevance to the curriculum and expectations for learning, social considerations, and age or developmental appropriateness" [8]. Ina Elementary School students have been dealing with the *Tenryu* River (This river flows near Ina Elementary School.) as a learning resource for many years. Other than that, the learning resources are very diverse, such as raising pigs, goats, lambs, and horses, maintaining the pond environment, making "Anko" (traditional Japanese sweet bean paste), growing flowers, and making flowers arrangements, etc.

The relationship between these activities

In this paper, five activities of learning that are difficult to quantify are coded from the individualized narrative data. In the process of coding, the relationship between these five codes became apparent. It is as shown in Fig.2. The coding includes not only statements but also actions and facial expressions.

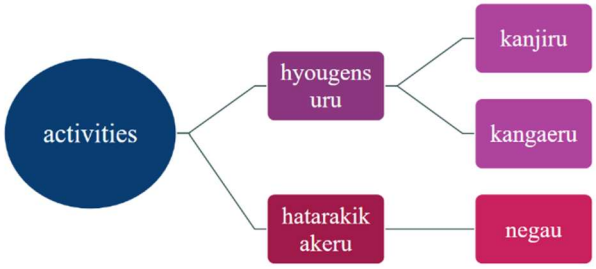

Fig. 2. The relationship between these five codes.

Coding

This paper focuses on an example of integrated learning using flowers as a learning resource for 6th-grade elementary school students. The children plant and grow

flowers of their own choice and use them to create flower arrangements. TABLE I shows the activities of the individual child, the peers around him or her, and the children in the classroom (see NOTE 7)), coded at each level. These codes used in this analysis represent the learning that is difficult to quantify, which were referred to as those presented by Prof. Kazuyasu Azegami.

TABLE I. CODING 5 CATEGORIES

category	each level		
	individual	peer	classroom
kanjiru	2	1	2
negau	7	0	2
kangaeru	6	0	0
hatarakikakeru	2	0	6
hyougensuru	12	2	3

The findings from this coding process are described below. It shows that individual children are learning directly through learning resources. Children's interactions with peers also play an important role in the learning organization. The classroom can be seen to be moving the flow of learning through "*hatarakikakeru*", for example, they suggest that they show the outside teacher their flower arrangement. The peer and teacher consider and rejoice, and so on with the individual child. However, there is a different attitude between the peer and the teacher. The peer is reacting to what the individual child has achieved, while the teacher is looking at the process of achieving. Also, the teacher is observing not only the individual verbal expression, but also the details of their activity, facial expressions, and emotional conflicts.

Nevertheless, the role of peers is also important to the individual child. In this data, there is peer assessment. This assessment is the task feedback [9] to the individual child. For example, the following statement "It would look better if the Italian whites (see NOTE 8)) were a little higher up.", "I think it would be better if the Italian white was higher and the spray carnation (see NOTE 8)) was lower." were recorded. Regarding feedback, the connection between cybernetics and the education field has been noted in previous years [10].

Teacher's action

This data is a record of class practice; however, it shows that there are very few descriptions of the teacher's actions (see TABLEII). The actions are not instructing or teaching at all. However, detailed observations of the child are being conducted, and these are actions taken to understand the children's learning.

TABLE II. CATEGORIES OF TEACHER'S ACTION

teacher's action	frequency
consider together	1
ask the reason	3
empathize	1
Make suggestions	1

The results of the above analysis indicate that the form of learning differs between conventional integrated learning and that of Ina Elementary School. In conventional integrated learning, as shown in Fig.3, the teacher first interprets the learning resource and then teaches it to the children in the classroom.

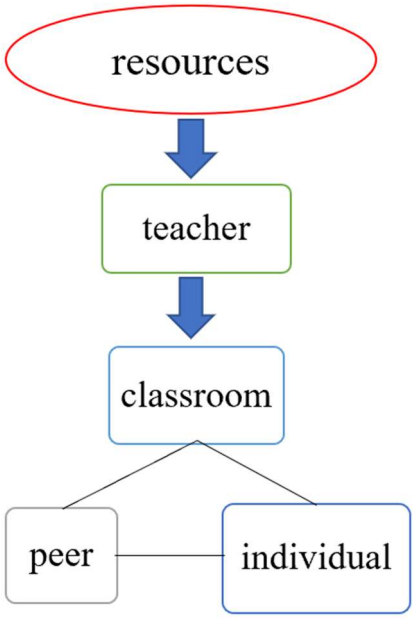

Fig. 3. The conventional learning form of an integrated learning.

However, In the learning form shown in Fig.4, a learning community is created as indicated by the green circle. At Ina Elementary School, each child (individual child) is the central actor in this form of learning, working with peers, the classroom members, and the teacher toward the learning resources (see Fig.4). The learning community that each child perceives is individual and each one perceives it differently. In other words, each children's learning is personalized.

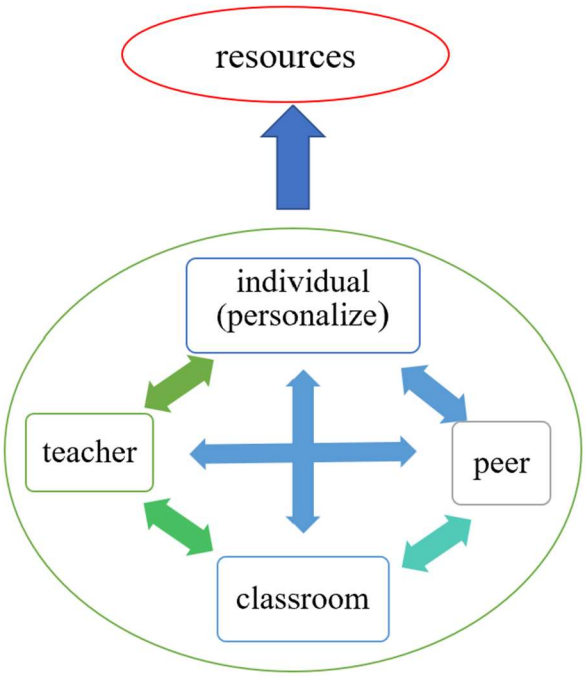

Fig. 4. The learning form of integrated learning in Ina Elementary School.

Learning organization in Japanese sociocultural aspects

With respect to the organization, the Japanese social culture uses a philosophy called "*kaizen*" (the Japanese word), which means change for the better or improvement [11]. It is a belief that as one can never be perfect, one must continually work toward improvement [12]. In other words, the goal is not to become a perfect learning organization, but rather for teachers to think about how to become a better learning organization.

4. DISCUSSION

In the results part, children's learning, children's interactions with each other, and children's interactions with their teachers in integrated learning are visualized. To understand aspects of learning that are difficult to quantify, such as integrated learning, the ability and practice of "developing reflective dialogue," "cultivating aspirations," and "understanding complexity" need to be perceived in a balanced manner [13]. How to represent such complexity is a challenge for the future. Also, to reveal this complex tacit knowledge, the use of Ikujiro Nonaka's SECI model [14] is being considered. In addition, learning through resources is not limited to schools. The *Tenryu* River near Ina Elementary School is not only a learning resource for children's integrated learning but also a lifelong learning resource for residents to learn together. The relationship between learning resources and the lifelong learning of residents including children can also be represented by the SECI model.

5. LIMITATION

The relationship between the individual, peer, the classroom, and the teacher can be described as a learning organization. Although we have visualized a learning organization, we think that it can be represented by Peter Senge's five disciplines (see Fig.5). For each of the five disciplines, the narrative data from Ina Elementary School were derived.

Fig. 5. Five learning disciplines [5]

Shared Vision: This is the answer to the question, "What kind of children's learning do we hope to achieve?". The vision of Ina Elementary School is "Make progress from the inside of self". The teachers mutually agree with and share this vision. Teachers believe in the ability of children to grow and emerge spontaneously from the inside of themselves. They treat children not only while they are in school, but also after they graduate from school.

Mental Models: The teachers practice making children's mental models clearer for each other and challenging each other's assumptions to build shared understanding. By doing so, in the classroom "relationship" (*kankei* in Japanese) is formed. And it becomes a learning organization.

Personal Mastery: Personal mastery is achieved by confronting learning resources. And children understand "how much they know about themselves". For example, take the third-grade children's statement. The learning resource was a horse. One child had been bitten on the

back by a horse and was unable to approach the horse for a while. However, she continued to stare at the horse from a distance, felt it, and said, "I would like to find a “good distance” when I am quite ready to do so.

Team Learning: This was seen in all grades 1-6 at Ina Elementary School. The children and teachers consider together. This is possible because the teachers provide “Ba” [10] (Japanese word, see NOTE 9)) to encourage dialogue.

Systems Thinking: This is a framework for seeing inter-relationships that underlie complex situations and interactions. In this data, an individual child is surrounded by peers, classrooms, teachers, parents, outside teachers, and many others who influence him or her.

The above shows that the integrated learning at Ina Elementary School is a learning organization. Although the number of data is limited and cannot be theorized in this paper, it is our belief that integrated learning in Japanese elementary schools has already formed a learning organization.

Also, cybernetics, which essentially represents the connection between machines and living organisms, has recently been applied to social fields. This means that the view is that it can also be applied to the field of education, too (see NOTE 10)). Although it could not be conceptualized this time, we consider that systems thinking is like cybernetic. This is because the cybernetic viewpoint creates space (*Ba*) in which learning can occur. This is different from a topdown management approach [15] like the conventional learning form (like Fig.3) of integrated learning.

6. CONCLUSIONS

The results show that children at Ina Elementary School take learning resources seriously and learn directly from them. It was found that what teachers use to support learning is important to children and that teachers work together with them toward the learning resources. Children do not see the teacher as a "teacher who teaches" but rather as an "empathetic interaction partner". Parents are also cooperative and learn with their children. The children are not aware that the adults around them are teaching the children. It is clear that in this form of learning, the teacher maintains a large learning container and nurtures the academic skills and abilities that are invisible and difficult to measure in children. In this form of learning, children's learning is highly context-dependent. This is because each child's individuality emerges in the way he or she perceives learning even when learning the same material. Therefore, it is very difficult to visualize children's learning. However, it is precisely for this reason that we can approach the essence of children's learning. Also, perhaps this data of Ina Elementary School is the Japanese practical knowledge of documenting records, tacit knowledge made visible through feedback loops, layers, symbiosis, coexistence, and so on, which seems to have had a ripple effect on other schools today.

7. CONFLICT OF INTEREST

The authors declare no conflict of interest.

8. AUTHOR CONTRIBUTIONS

Conceptualization, T.K., and M.A.; Methodology, T.K.; Analysis, T.K.; Writing, T.K.; Visualization, T.K.; and Supervision, M.A.

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10. NOTE

1) In Japanese elementary schools, there is one teacher per classroom. He or she has all classes, eats lunch with their classroom children together, plays recreations together, and cleans up together. In other words, the children in the classroom spend the entire day with one teacher.

2) *Kanjiru*; To feel admiration for others, or to feel happy about the growth of animals, plants, etc.

3) *Negau*; To imagine what one would like others to do or what one would like to do, or to hope for the growth of animals, plants, etc.

4) *Kangaeru*; To consider current phenomena using the knowledge they have learned in the subject education or their own experiences until now.

5) *Hatarakikakeru*; To approach others by asking questions, seeking advice, and communicating one's intentions.

6) *Hyougensuru*; To express one's feelings and emotions through words, attitudes, and creations.

7) Japanese elementary school “classroom” consists of the same members who spend every day for one or two years. They take all classes and eat school lunches with the same members. “Classroom” members are not changed by class. Even school cleaning and recreation during recess are often done as a “classroom”.

8) The Italian whites and the spray carnation are names of kinds of flowers.

9) The "*Ba*" is the interactional occasion to support and facilitate knowledge creation in the school context. It is our hypothesis at this stage that this "Ba" is composed of the "Yamato *kotoba*". 5)-9) are the examples. It has been used mainly as a spoken language, and the "sound" itself often has its own meaning, apart from the Chinese characters that have been added later. This is one of its characteristics. The word "word" is derived from the word "*kotoba,*" which originated in the Nara period (710-794). Before that time, the word "*kotoba*" was used to express "*koto*. That is all. Koto" is included in things, matters, etc., also "*koto*" from ancient times. In those days, in Japan, both "words" and "events" were expressed by the same word, "*koto*. The reason why they are the same is due to the ancient Japanese belief in "*Kotodama* (words and spirits). The ancient Japanese believed that words uttered out loud or thoughts in one's heart would come true. Happy, joyful, unpleasant, sad, and so on. The divine power that resides in words moves actual things. It is in the Japanese language that we can learn the beautiful and delicate Yamato language, and that it can convey "*omoiyari*" (compassionate consideration for others/ anticipatory communication)" in a casual and thoughtful way.

10) We understand Cybernetics as a comparative study of the control and communication processes of organisms and machines. According to Kitao 1987 [16], Systems are "interlinked sets of components hierarchically organized into structural wholes which interact through time and space and are self-regulating yet capable of structural change" [17]. This means that if a complex phenomenon has a holistic property, the behavior of that phenomenon cannot bed is covered by analyzing the components separately. Knowledge about the interrelationships among components is also required. … Cybernetics models are the most dynamic for explaining changes in interactions. …(including) behavior that people regulate, alter, or maintain. …As for cultural variables, they vary much according to culture. … The study of this model would not be easy. However, researchers could use relatively new techniques such as interaction analysis or path analytic techniques to identify the different kinds of messages being employed, as well as their relationships with other components.

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