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Educational Effect of Externalization of Know-how Information for Care Planning Processes

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1. Introduction

Since April 2000, with the establishment of the Long-Term Care Insurance System in Japan, duty-of-care planning has been imposed. It is aimed at improving the quality of long-term care services. However, since there are many simplified and stereotyped plans, it has become apparent that the genuine care needs of clients are not being satisfied. The main factor involves care managers' lack of experience. To solve the problems stemming from such insufficient experience, we must establish a method of care manager training.

There are four important processes in care management: screening the person requiring care, assessment, making a care plan, and carrying out care plan, management. Care planning is a process that perceives care needs precisely from the result of care assessment, and includes plans from basic care guidelines to concrete care service. This process is the most important for improvement in the quality of care service. In order to improve the quality of care service, know-how information externalization, sharing, and transfer for grasping a care client's true care needs are important elements. We aim at development of an educational support system oriented to knowledge management, sharing, and transfer in care management. This system supports the process that perceives a care client's assessment result in care planning. As a method, we considered how to make a beginner notice the difference in a skillful person. Making the difference noticeable is one method of externalizing know-how information. Although there have been studies emphasizing the difference between a skillful person and a beginner in the field of care (Benner, 2001), (Herbig, 2001), there is no study on making a beginner strongly notice the difference. In this paper, we report that the know-how information sharing support system (KISS) has been developed, and the effectiveness of know-how information externalization has been confirmed from the result of trial at care service site.

2. Method of know-how information externalization, sharing, and transfer

We consider that externalization, sharing, and transfer of know-how information are performed through repeating of observing, imitating, comparing and practice. In care

planning, these observation, imitation and comparison are performed more efficiently by using a computer that shows a skillful person's care plan in various forms.

2.1 Definition of know-how information

Know-how information is tacit knowledge. It is said that there are two kinds of human knowledge: explicit knowledge, which is knowledge expressed verbally; and tacit knowledge, which is knowledge expressed non-verbally (Polanyi, 1966). A lot of knowledge is tacit knowledge and this is considered to be a very important element in group behavior (Nonaka & Takeuchi, 1995).

In recent years in the field of business administration, much attention has been paid to the role knowledge management plays in company strategy. There are a lot of studies about method to externalize, share (Desouza, 2003), (Choudrie,2005), and transfer (Leonard & Swap, 2005) tacit knowledge. Know-how information has mainly been studied as part of knowledge management. Recently, research on knowledge management has also been conducted in the medical treatment and nursing fields (Welsh & Lyons, 2001), (Abidi et al., 2005). Many studies have focused on applying ICT (Information and Communications Technology) to record, accumulate and share a skillful person's know-how information. These are the systems that a skillful person in externalizing know-how information by himself.

Tacit knowledge in care management is knowledge that depends strongly on a context or situation, and is based on advanced cognitive power, judgment, insight, and powers of observation. In this study, we are concerned with information that involves perception of care needs from the result of care assessment. The targets of perception are excavation of care needs and prediction of a serial change of a care client with a grasp of the care client's global image. Here, we define know-how information as information that assists the understanding of a client's daily life. Such know-how information includes heuristic information, cases experienced in the past, sequences for perceiving assessment results, and how to determine a viewpoint. Concretely, know-how information grasps relevance among assessment items, especially information that shows the strength of that relevance. That is, it is the information that is needed in order to make advanced recognition and judgment.

2.2 KOMI Radar Chart and KOMI Chart

KOMI(Kanai Original Modern Instrument) is a graphical recoding sheet (Kanai, 2002). As shown in Figure 1, the result of having carried out assessment of the care client is expressed on the circular chart of the Radar Chart and KOMI Chart.

(a) KOMI Radar Chart

The KOMI Radar Chart is designed to record physical information about the client. It enables cares to understand at a glance the client's physical condition at that point in time, using 16 checkpoints. Each checkpoint has a scale to reflect the level of that particular condition so that caregivers can perceive the client's current situation. Such a normal state is shown close to the perimeter of a circle.

(b) KOMI Chart

The KOMI Chart is designed to help judge the cognitive and behavioral aspects of client. The KOMI Chart consists of 15 heading, each of which includes 5 checkpoints, making 77 cognitive checkpoints, and 78 behavioral checkpoints. The result of the checks are marked

using three different shading patterns for cognitive aspect, and five shading patterns for the behavioral aspect. The shading patterns are: "Can be understood or performed by client", "Cannot be understood or performed by client", Unknown (Needs observation)", "Carried out with specialist's support", "Carried out with family member's support". Thus, the KOMI Chart makes a client's global image easy to grasp by visualizing the result of assessment. The result of care assessment is standardized by carrying out assessment of the care client using the KOMI Chart. That is, since it is visualized by expressing the result of assessment on a chart and a result can be given to anyone, standardization is further promoted. For example, in a KOMI radar chart, a physical condition can be condensed and transmitted into the information of a "form." With the KOMI Chart, both the missing abilities and operative abilities of a client can be condensed and transmitted into the information of a "color" and a "position." Thus, since the ambiguity of judgment by language can be eliminated by transposing the information of a care client's assessment result into the information on a "form", "color", and "position", it can judge anyone and transmitting becomes easy. Thereby, the sharing as a result of assessment becomes easy. In this meaning, the KOMI Chart can be considered as media for a kind of information sharing.

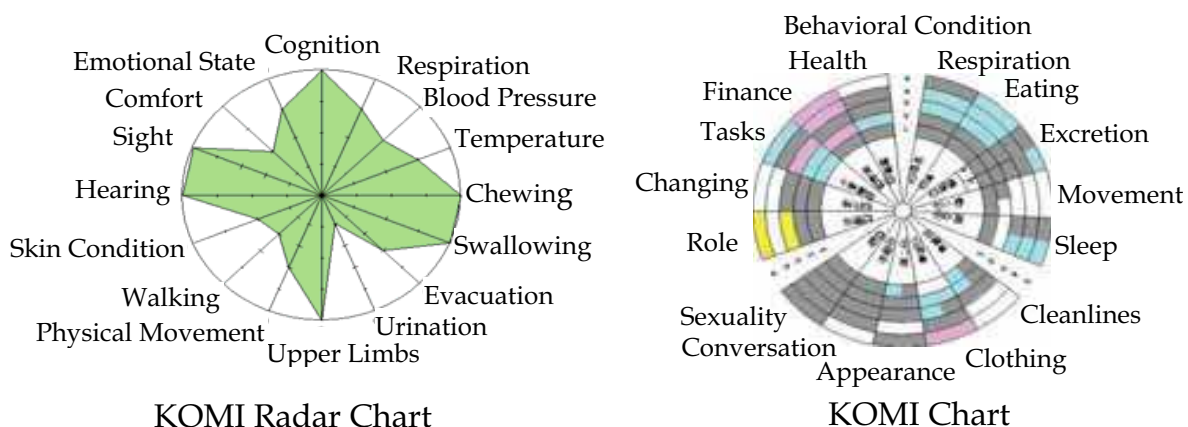


Fig. 1. KOMI Radar Chart & KOMI Chart

2.3 Difference between a skillful person and a beginner

We visited a hospital, welfare facilities, a home nursing station, a home care support center, a university, a nursing school, etc. which are performing care plan decisions using the KOMI Chart, and perceive and investigated the needs and the present condition regarding computer support in care management to the administrator, the educational person in charge, the practicing caregivers, and the educator. The following has been confirmed from the result.

- The process that perceives a care client's assessment result in the care plan creation by the KOMI Chart is the most important, and is difficult work for a beginner.
- The difference between a skillful person and beginner appears clearly in this perceived document.
- The difference mainly appears in the difference in viewpoint, and the difference in the view of the KOMI Chart.

2.3.1 Difference in a viewpoint

A viewpoint affects performance assessment. A skillful person understands and explains a phenomenon with the terminological (concept) related structure of explaining the item and phenomenon of assessment. On the other hand, a beginner understands and explains only from a concept. That is, a skillful person is looking at structure well, but a beginner is fixated on the evaluation for every item.

2.3.2 Difference in the view of the KOMI Chart

A skillful person looks at the whole KOMI Chart first. Next, black or white (“Can be understood or performed by client”, “Cannot be understood or performed by client”) balance is seen. Then, cognitive aspect and behavior aspect are seen. That is, it sees details (where a cell is smaller) from the whole (where the cell of a chart is larger). After all, the skillful person has a certain unique pattern, and sees and goes along with it. On the contrary, a beginner is considered to have the tendency to observe each item as a result of assessment too strongly, and cannot see the whole.

2.4 Externalizing and sharing of know-how information

We thought that know-how information could be externalized by paying attention to the difference between a skillful person and a beginner. The method of know-how information externalization, sharing, and transfer, which emphasized the difference between a skillful person and a beginner in the perceiving of a document about the assessment result, is described. A skillful person’s documents are a mix of general knowledge, which refers to explicit knowledge such as theories and rules, and specific knowledge, which refers to tacit knowledge based on experiences such as original viewpoints, original patterned knowledge, and conceptualization. The externalization of know-how information involves separating specific and general knowledge. The method for separating general and specific knowledge involves creating differences between a beginner’s and a skillful person’s documents using repetitions that involve items such as operations, classifying the document for every viewpoint change using a concept-base, visualizing, and presenting the results. Furthermore, our method uses the KOMI Chart, which represents the origins of a document. That is, both qualitative data (the document) and quantitative data (the KOMI Chart) are shown, and differences are highlighted by combining both data sets. We believe that these differences trigger separation. This is stated in detail below.

- (a) A user refers to the statistical values of an original idea or the KOMI Chart and then changes the viewpoints.
- (b) Based on these viewpoint changes, the user moves vertically and horizontally in the hierarchy of a concept-base and calculates the degree of similarity each time.
- (c) The system then classifies the document from the calculation results.
- (d) Next, the system visualizes the classification results in a two-dimensional document space displayed on computer.
- (d) By clicking on the document number based on its classification, the KOMI Chart that originates the document is shown.
- (e) Finally, the user records, accumulates, and names what has been noticed.

By seeing many documents with a high degree of similarity, the difference between oneself and others can be seen and know-how information can be accumulated. These differences

separate the specific and general knowledge used as the basis of documents. This separated specific knowledge is considered know-how information. This separation process, which is considered the method of externalizing know-how information, is shown in Figure 2.

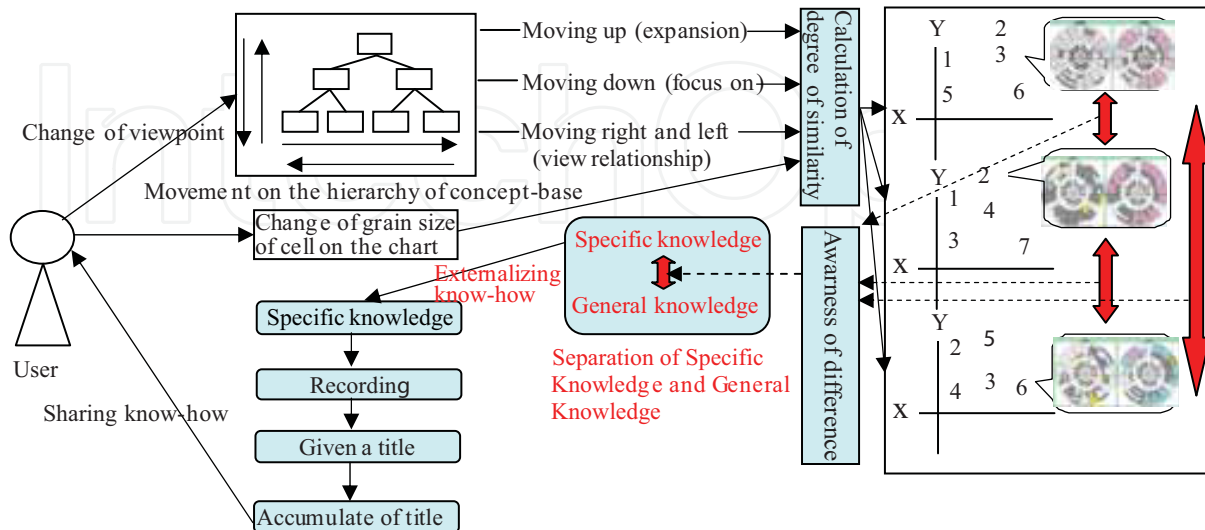


Fig. 2. Model for externalizing and sharing the know-how information

3. Development of Know-how Information Sharing System

After compiling and examining the system's needs from the nurses and care-workers of the hospitals, welfare facilities, home-visit nursing care stations, and in-home care support centers, the following three points were determined to constitute the basic development policy.

- A computer is not relied on for advanced decision-making like Intelligent Tutoring System (ITS), but a support system is positioned for decision-making on care management, externalization, and sharing know-how.
- The system does not stop at the research stage, but system development is performed for actual utilization.
- Concerning system specifications and function, the needs of the facility are fully investigated, analyzed, and determined. How much it has responded to the needs of the facility is crucial, as well as system evaluation.

Furthermore, in order not to apply too much burden to a user so that it may be used in the care facility, it tries to attain the purpose by the simplest possible function.

3.1 System Architecture

KISS is constituted by the module and interface using a database as shown in Figure 3.

The user makes a new care plan using our "Care-designer" software. The system extracts documents from the database of the "Care-designer", analyzes them with morphological analysis software, and extracts keywords from the analysis results. The system calculates the distance between an skillful person's documents and the beginner's new documents, chooses the three cases that most resemble the new case, and determines the coordinates of the new case by the distances and coordinates of the three cases. The system performs such calculation whenever a viewpoint is changed. The system displays calculation results on

two dimensions. When users click on the number of documents on a display, the system displays a chart that originates the document. In a text file, users can describe freely what they have noticed. Furthermore, a user can search and refer to a document that other users noticed. User's operation history is recorded. The circumstances and thinking process noticed by users can be traced by analyzing this history.

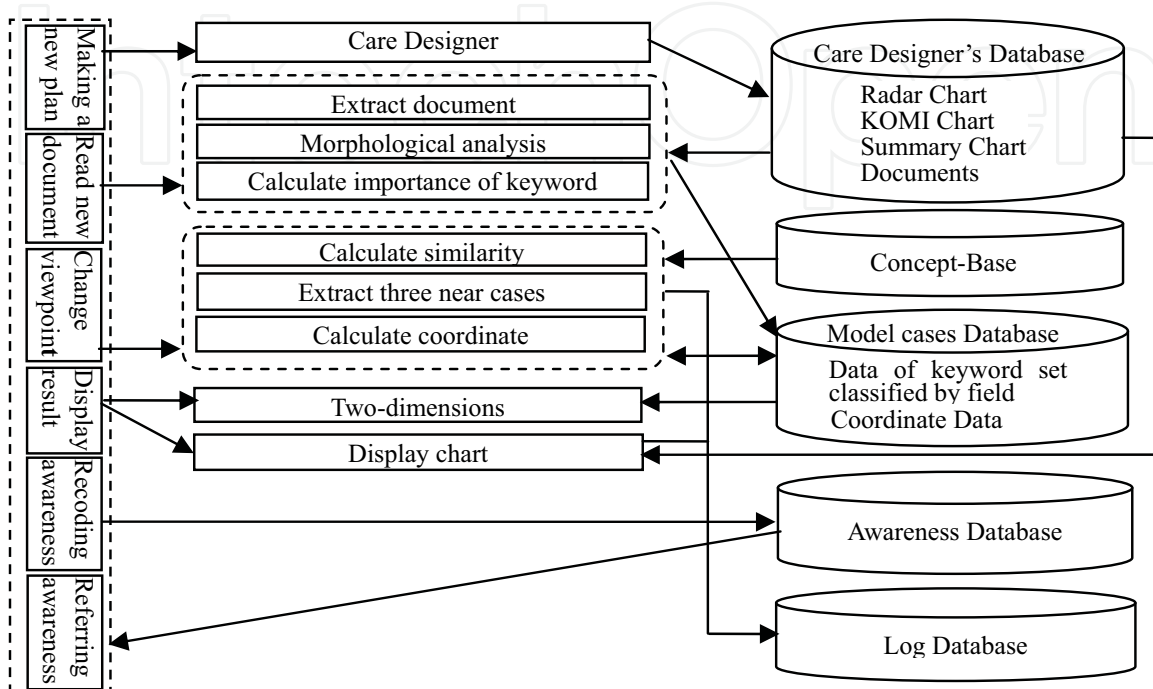


Fig. 3. System configuration

3.2 Modules

The main modules that constitute KISS are explained. The modules which constitute KISS are care planning, extraction of a keyword, calculation of the degree of similar between documents, coordinates calculation of a new case, a care designer database, a concept database, a model case database, a awareness database, a log database. Here, the main modules are explained.

3.2.1 Model cases

We collected about 1,500 cases from hospitals, welfare facilities, home nursing stations, home care support centers, etc. Two nursing and care experts verified whether an example was suitable as a model. 106 cases were selected from the result as a model case. As shown in Table 1, the cases of the 106 models were classified into four types: an acute term, term escaped from an acute term, convalescence, and stabilized term. The conditions of a model case were classified by color for clear and immediate comprehension. If a new case is applied to four states, then the effect is expected to simplify the comparison of model cases.

No.	Condition	Color	Number
1	Acute term	Gray	8
2	Term escaped from an acute term	Red	37
3	Convalescence	Green	53
4	Stabilized term	Blue	8

Table 1. Color mapping of a client’s condition

3.2.2 Concept-base for the nursing and caring fields

A concept-base is a knowledge base that expresses concepts with its own and other conceptual sets. In this study, we constructed a specialized concept base for the nursing and caring fields. It has a tree structure with six levels and is constructed by a thesaurus. Viewpoints are changed by moving up and down its levels.

(1) Extracting concepts:

The concept-base contains about 6,300 terms. Since priority was given to use in the field of care, it extracted from the assessment item of the KOMI Chart, the model example of a care plan, the textbook relevant to the KOMI Chart, etc.

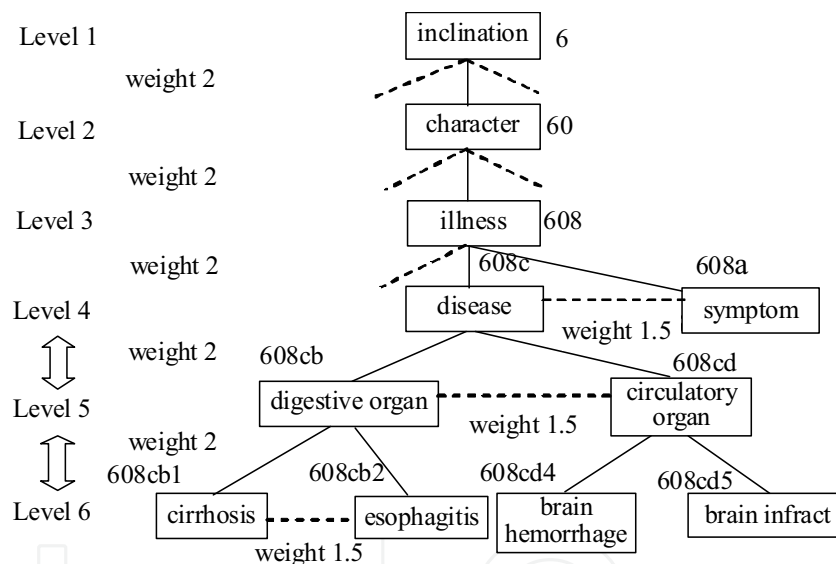


Fig. 4. Hierarchic structure of concept-base and encoding

(2) Coding of a concept

It becomes unnecessary to build the tree structure of a concept base on a computer by coding of a concept. Extracted keywords were encoded based on a Japanese language thesaurus. Keywords that did not exist in the thesaurus, such as disease names, were encoded in our own system. The code is used to identify the concept base’s position on the hierarchy. Digit length denotes the level on the hierarchy. For example, as shown in Figure 4, the "disposition" of a level 1 is a concept and a horizontal number "6" is a code. Whenever a level falls, the number of beams of a code increases one by one with "60" of "character" from "6." If the number of the digit is the same, it will become the concept of the same level. That is, whatever figure of the branch of the tree structure of a concept base and a code is the same correspond.

3.3 Support function for externalization

To perform externalization of know-how information, the following support functions are considered.

3.3.1 Calculation of Degrees of Similarity and Visualization

We considered how to make a beginner notice the difference by visualizing and showing the degree of similarity between the documents with which the skillful person perceived the result of assessment.

(a) Calculation of Degrees of Similarity between Documents

Although methods such as a thesaurus and a vector space model are proposed for the method of calculating the degree of similarity between documents, we define the degree of similarity between documents as follows, in order to calculate the degree of similarity by change of a flexible viewpoint. The system extracts keywords from each document. The distance between keywords is determined by the nearness of the concept between keywords. We consider sibling relationships (adjacent keywords on the same level) in the thesaurus to be nearer than child-parent relationships (hierarchical relationships). Moreover, a class considers it as a thing with a nearer deeper thing also by equal sibling relationship. The distance between documents is measured by the distance between a keyword set. It visualizes by mapping the distance relation between documents to two-dimensions.

(1) Similarities between keywords

The distance between keywords is defined as the sum of the weight of the branch of the node that reaches other keywords from one keyword. The weight of the branch of the node of a parent-child relationship in the tree is set to 2, and the sibling relationship is set to 1.5. For example, as shown in Figure 5, since the three figures are identical if the code of cirrhosis and disease is seen, it returns to level 4 and the weight of each level is totaled; the distance is $2 + 2 = 4$. Therefore, the distance between keywords changes when the viewpoint changes.

The distance between keywords a and b in viewpoint L is expressed as $d(a, b | L)$.

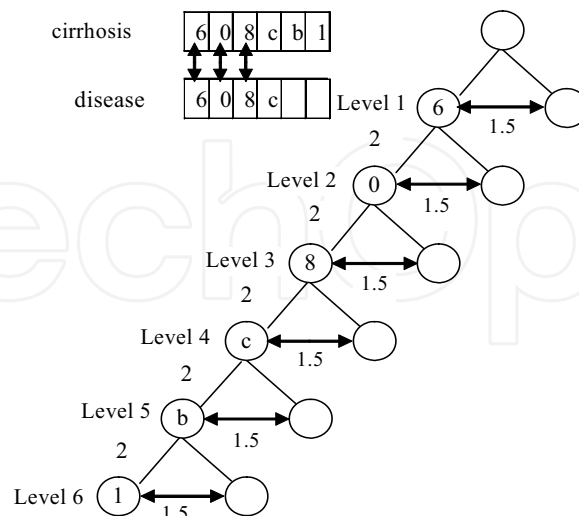


Fig. 5. Weighting between keyword and same class and between classes

(2) Similarities between Documents

The distance between documents is determined by the distance between keyword sets. The keyword sets are extracted from the document. Let the viewpoint on the concept-base be L . Let the keyword set be A, B . The distance between $\forall a \in A$ and set B is defined by

$$D_w(a, B | L) = \min_{b \in B} \{d(a, b) | L\} \quad (1)$$

The distance $D(A \rightarrow B | L)$ from keyword set A to keyword set B in viewpoint L is defined by

$$D(A \rightarrow B | L) = \frac{1}{|A|} \sum_{a \in A} D_w(a, B | L) \quad (2)$$

where symbol $|A|$ stands for the elements of set A .

The distance $D(A, B | L)$ between keyword sets A and B in viewpoint L is defined by

$$D(A, B | L) = D(B, A | L) = \max\{D(A \rightarrow B | L), D(B \rightarrow A | L)\} \quad (3)$$

(b) Mapping the Documents into Two-dimensions

Even if the distance between keyword sets (document) is obtained as a numeric value, it is difficult to intuitively see differences between many documents. We considered mapping each document as a point on the display of a personal computer. In practice, we tried to map documents on a plane (a two-dimensional space) using Kruskal's method, which is specifically aimed at multidimensional scaling. The similarity between documents can be grasped intuitively from this function, and the structure of set of document can be seen. The result of having mapped on the two-dimensions degree of similarity between the documents of 106 examples of a model is shown in Figure 6. The number beside a dot is a document number. The state of 106 examples is expressed as four colors.

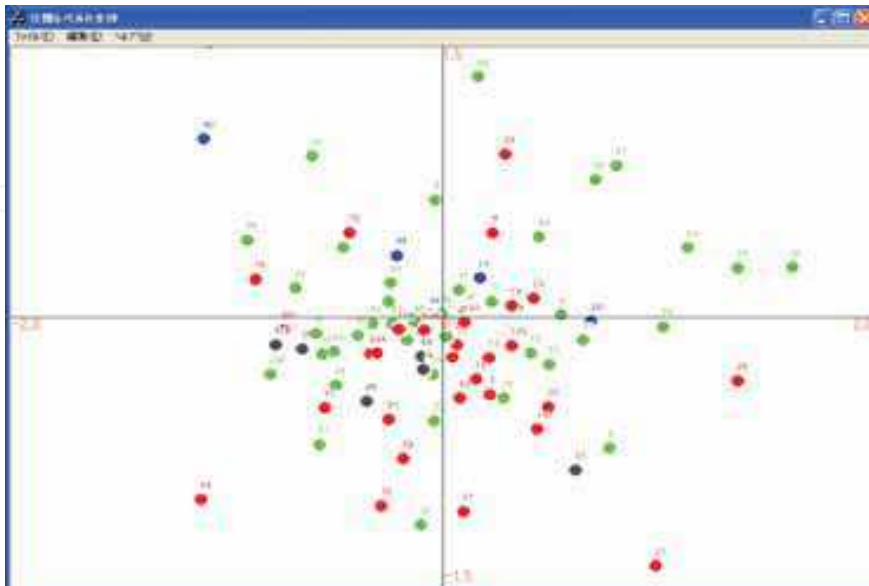


Fig. 6. Mapping documents of cases into two-dimensions

3.3.2 Referring to the original data of a perceiving document

All are shown as a result of assessment, such as the KOMI Radar Chart, which became the origin of a perceiving document, the KOMI Chart, and also basic information, to the question of why the far and near differences arose in the distance between perceiving documents. A user can find the factor and reason for the difference between a skillful person's perceiving documents by this function. Moreover, the factor and reason for the difference become awareness.

3.3.3 Changing Viewpoints

Changing viewpoints refers to expanding and narrowing viewpoints to recognize degrees of relevance. Whenever a viewpoint is changed, the distance between documents is calculated, and the difference is made noticeable by visualizing the results. This function supports the externalization of differences from the viewpoints of skillful persons and beginners. We achieved this function by moving the level of the concept-base. A skillful person recognizes a phenomenon structurally. To recognize a phenomenon structurally like a skillful person, training that repeats abstraction and embodiment is important. This training is performed by moving change of a user's viewpoint on the hierarchy of a concept base. For example, a care client's illness is "liver cirrhosis" When a concept is enlarged, it is regarded as the illness of a "digestive organ." Specifically, whenever a viewpoint is changed, the distance between documents is calculated, the result is visualized, and the difference is made to be perceived. Externalization of the difference in the viewpoint of a skillful person and a beginner is supported by this function. Figure 7 shows the results of changing viewpoints. After changing to level 6 from the top of Figure 7, the result is that the next change is with levels 5 and 4. When numbers 40, 67, and 70 are looked at, the distance is changed by changing a viewpoint, and the display position also changes.

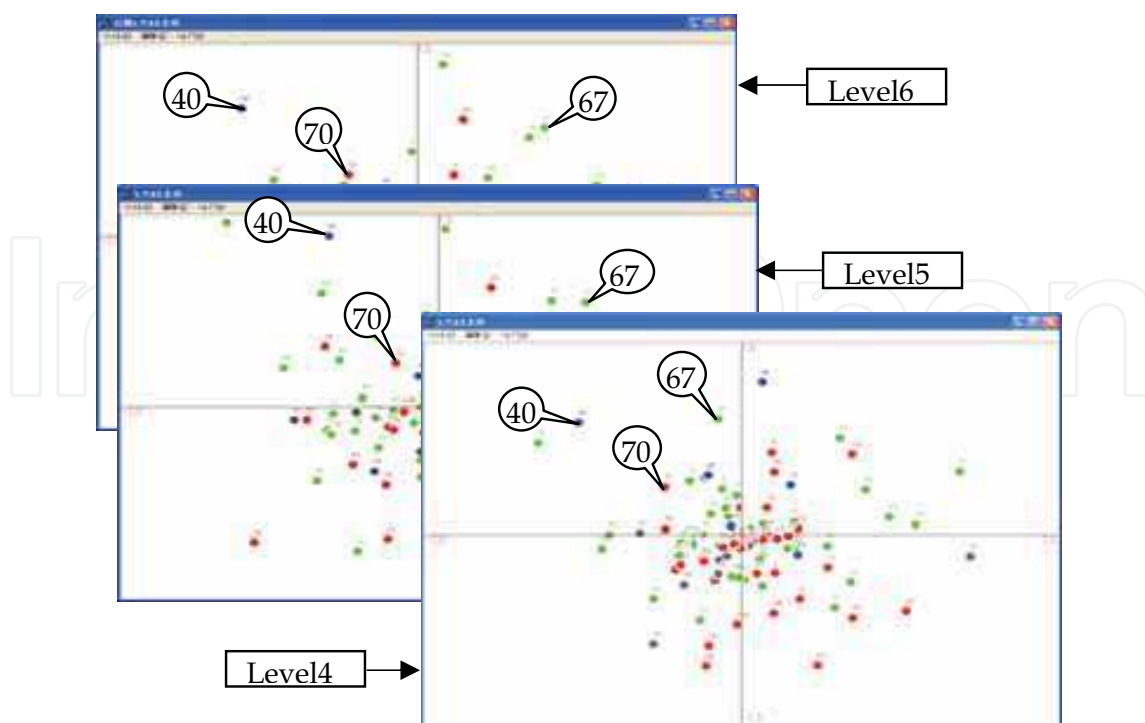


Fig. 7. Two-dimensional display of the model example by changing viewpoint

3.3.4 Experience of care planning

Externalization, sharing, and transfer of know-how information are difficult only by seeing or hearing it. When a user actually experiences care planning, noticing the difference from a skillful person is promoted. The care plan creation tool "Care Designer" which we developed, was built into this system, and this function is achieved.

3.3.5 Mapping the Documents of a New Plan into Two-dimensions

The documents of skillful person were previously mapped into two-dimension space by Kruskal's method. The new documents of beginner are mapped into the same space. We expected this function to highlight the effect that promoted awareness of the differences between beginners and skillful person.

3.3.6 Mapping several users' perceiving documents on two-dimension

Several nurses or care-workers assess one patient or client, and each draws up a care plan and can discuss care plan together. The similarity of several nurses' or care-worker's documents can be simultaneously displayed on two dimensions. Noticing a difference is promoted by carrying out comparison examination of this result. This function not only shows the difference in the viewpoint by the coworker of a place of work, or the difference in an occupational description, but sharing of information is achieved. Furthermore, the "Ba(field)" which is the context shared by the coworker of the field of work that mutually carries out an interaction is offered. The result of having mapped the new case at the same plane as model cases is shown in Figure 8. Yellow stars are new cases. On this screen, four persons' documents are in different position. In order to explore why they differ, the KOMI Chart is seen and compared here.

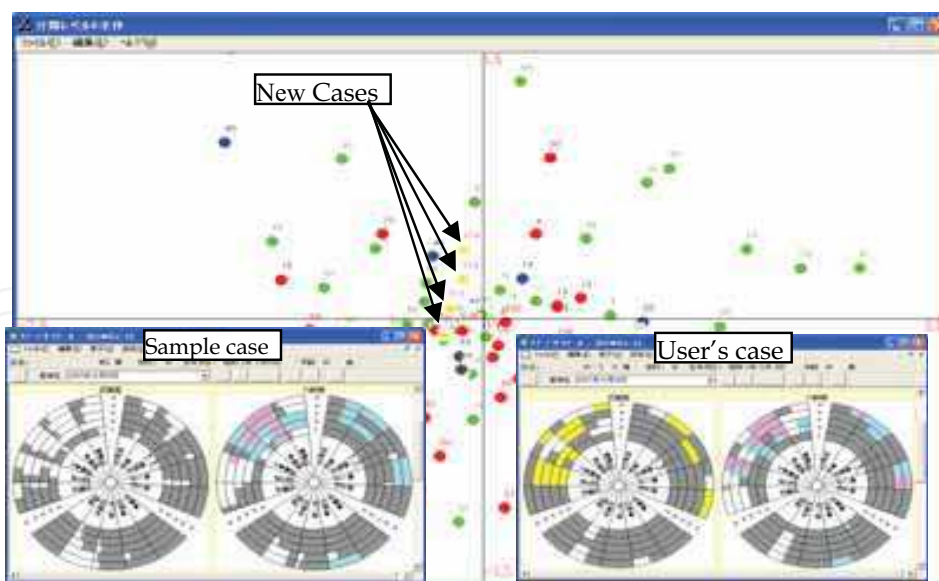


Fig. 8. Mapping into two-dimensions added several users' new cases and displaying chart

3.3.7 Writing what has been noticed

By writing what has been noticed, a user can externalize and be conscious of know-how

information. When writing out diligently what has been noticed, its time and file name are saved to a single directory. Search becomes possible by this function.

3.3.8 Referring to other's awareness documents

It is expected by referring to other's awareness documents that a new awareness is inspired. Moreover, although the awareness document is a user's subjective item, a certain similarity can be found by referring to many similar awareness documents. Thereby, its awareness partakes of objectivity. We think that sharing and transfer are attained from these phenomena. If they are the same department, since the same aspect of affairs is encountered in many cases, efficiently similar awareness can be looked for. Search is possible in a keyword and a user name. The result is shown in Figure 9. If you see awareness document, it understands where the user's viewpoint and concern are.

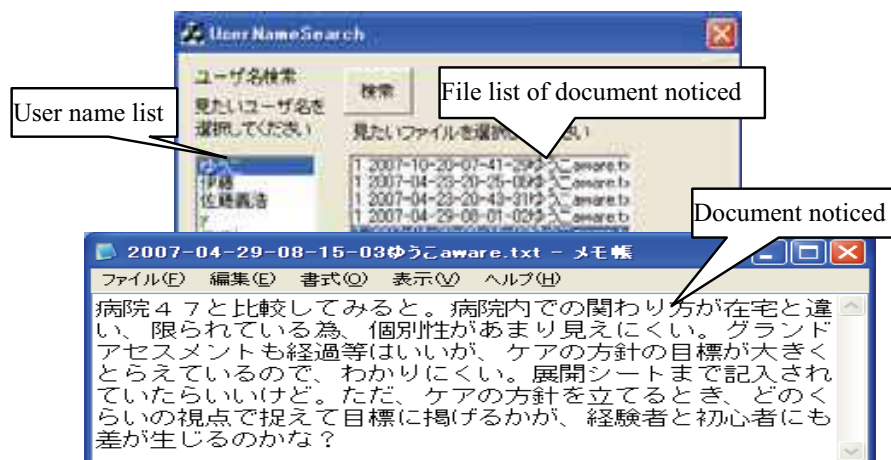


Fig. 9. Search results of document by user name

4. Evaluation

One target of this study is developing a system for actual use in nursing and caring situations. To evaluate the system's effectiveness, how requests of the facility are reflected is important. Therefore, we conducted a system evaluation in two steps. That is, they are evaluation by a skillful person, and evaluation by trial in the care facility.

4.1 Evaluation by skillful person

We are planning evaluation of the system in the care facility. In order to explore the possibility of effectively using the system in the facility, a preliminary experiment by a skillful person was conducted.

We conducted an evaluation by eight nurses and two caregivers to ensure that our system provides educational support before using it in a hospital. Three of the ten are teachers at a university and a school of nursing. The following comments were obtained in interviews with these experts.

- The results of mapping these documents into two-dimensions are appropriate.
- If what the beginner has noticed is written faithfully, know-how information can be extracted.

- (c) Sharing of know-how information creates new awareness in users.
- (d) Although documents are usually compiled from assessment results, in this system, improving assessment results has an educational effect on the classification results of the document.

From these expert comments, we concluded that this system can provide educational support in initial education.

4.2 Experiment Design

After the results of evaluation by skillful person, we have been continuously conducting this experiment for one year in nursing and care facilities to evaluate our system. The effectiveness of the know-how information externalization using KISS is evaluated.

4.2.1 Outline

The outline of the experiment is as follows.

- (a) There are five users (one nurse, two care workers, one care worker, one care giver).
- (b) The place of use is an in-home care support center.
- (c) The period of use is from April, 2007 to December, 2007.
- (d) The apparatus use is a notebook computer.

4.2.2 Method of evaluation

The concrete qualitative evaluation method employed interviews. Moreover, users' operation logs and records of observations are also analyzed.

Although trial of KISS in the facility should consider various ways, it was tried in the following three ways.

- (a) By looking at the KOMI Chart etc., user does comparison examination why the case was mapped into that particular position on two-dimensions.
- (b) A user draws up his new care plan and does a comparison examination with a model case.
- (c) Two or more care practice persons do assessment of the same care client, a care plan is drawn up and a comparison examination is carried out with a model case and each other's care plan.

4.3 Results of trial

We are analyzing the result of having actually used this system now. Therefore, a part of the result is shown below.

4.3.1 Documents of awareness

The documents of awareness are classified into three types. The typical documents are shown in Table 2.

- (a) The difference in environment that offers care service
Awareness about how to a care client to be concerned is conspicuous.
- (b) The difference arising from those who offer service
Awareness by the difference between an experienced person, a beginner, an occupational description, etc. is recorded.
- (c) Difference of aim to care

They have noticed the difference between the basic plans drawn from the assessment result. Thus, there are tendency that user's viewpoint moves to "Basic plan" from "Organization."

4.3.2 Users' operation logged data

A part of log of operation of KISS is shown below.

(a) Case that users referred to

All the members are referring to the example in which care service was received at home. It turns out that they are interested in the client of the same care environment as themselves. Moreover, the difference was looked at by the example referred to by occupational descriptions, such as a nurse and a care worker.

Difference	Contents
Organization	Care plan is incorporated in which direction of home care harnessed a client's individuality (for example, hobby etc.) more than the hospital.
Person	When making a care plan, differences appear between experienced persons and beginners in how fine viewpoint targets are held up.
Basic plan	Unless awareness of viewpoints in which care is denoted creatively, healthily, and firmly organizing everything in a person's daily life, care direction is not seen.

Table 2. Contents to notice

(b) Chart that users looked at

The difference has not appeared in the number of times of reference about the important basic information, the KOMI Radar Chart, the KOMI Chart, and grand assessment. It can be estimate that they have the knowledge what information important for care planning is, since this organization is holding the study meeting.

(c) Changing viewpoint

The number of times a viewpoint changes varies greatly with people and sample cases. The difference was 1 to 12 times. Changing viewpoint has a tendency with more change of the item to perceive than up and down movement.

(d) New case

When adding the cases in which two or more persons did assessment of the same client and made a care plan, 11 cases were newly made and they were compared with the model cases. We have confirmed that mapping of this new case is appropriate (Eto, 2006).

(e) Mapping several users' new cases into two-dimensions

The comment that it involved the result of a display of two or more examples, and "having become like mini-study meeting" was able to be obtained from users. It was checked that KISS played the role of setting up the information sharing a "Ba(field)" (Eto, 2007).

4.3.3 Interview of users

We interviewed about the following items.

(a) Know-how information can be externalized.

(b) Know-how information externalization itself brought about educational effects.

(c) Is there any educational effect by use of KISS?

A part of the interview of a trial person is shown in Table 3.

The answer that it became the "trigger" of externalization of awareness or know-how information by use of KISS regarding externalization of know-how information has been obtained. This result is in agreement with the aim of development of KISS that externalization of know-how information is supported by promoting awareness. We think that know-how information was able to externalize from these answers "Know-how information is contained" and "know-how information is in a document". It is thought that it depends on the power of an organization etc. strongly further, and know-how information of such an answer from a user is effective in individual knowledge, capability, and KISS supporting know-how information externalization.

(b) Know-how information externalization itself brought about educational effects.

The educational effects of this system are shown in Figure 10.

Question	answer
Could know-how information be expressed using this system?	Since I can compare with other's care plans, it became the trigger to express what I think. Since it was comparable with the care plan of other care facilities by using this system, I have noticed that difference. This system became that trigger. I had seen and noticed other persons' care plans.
Do you think that know-how information is included in its document recorded notice?	Know-how information is contained. Know-how information is in the document recorded notice.

Table 3. Know-how information externalization

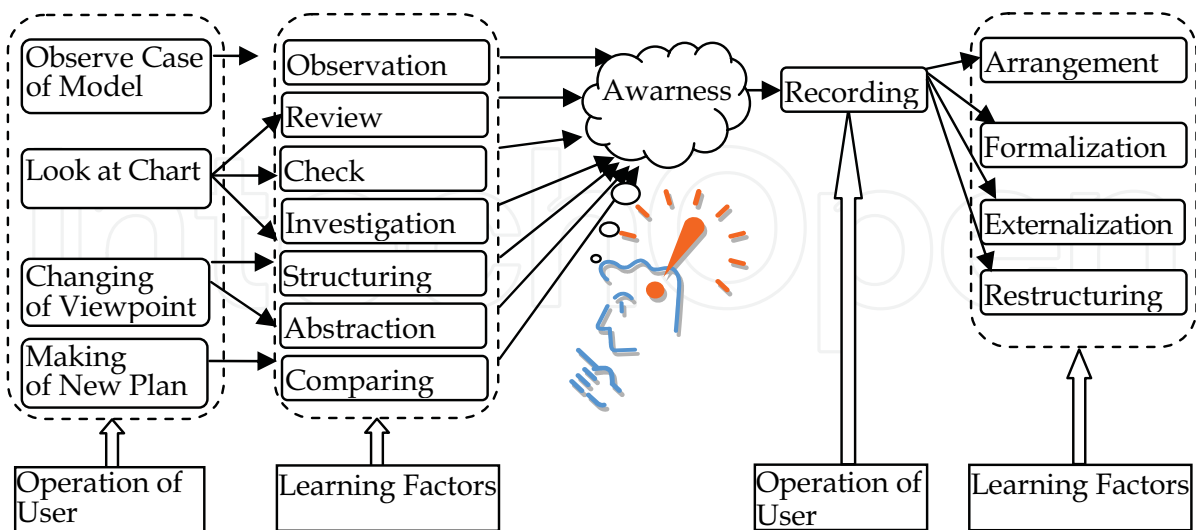


Fig. 10. Process and educational effect of externalizing know-how information

(1) The educational effect of noticing the difference from a skillful person

Using this system, user looks at a skillful person's model cases, changes a viewpoint, or also draws up a care plan and compares his plan with a skillful person's plan. In such a process of a series of operations, they come to notice by doing work like the item shown in Figure 10. We considered that an educational effect arose in this process. A part of answer to the interview to this effect is shown in Table 4.

Observation: They noticed the tendency of the method of observation, the difference in a viewpoint, or his viewpoint. Furthermore, the answer of "powers of observation having improved" and "it having been useful to observe deeply" was obtained. It is thought that it was useful for improvement in powers of observation to see the example of a skillful person, a coworker, etc. by use of KISS.

Review: Their weak points and strong points are reviewed by comparison with a skillful person, such as "returning to foundations is important", "you have to increase the viewpoint that prepares a life", and "continuing the view over a life." Furthermore, the action that improves its posture to a care client is also seen. From these results, imitation of KISS and a comparative function are considered to work effectively.

Check: By seeing information, such as the KOMI Chart that is other plan and its basis, it is checking that their viewpoint is not wrong. By seeing the example of a skillful person or a coworker using KISS, that it can check in this way will lead to confidence, and it will result in fulfillment.

Investigation: They investigate the assessment result about the care client of a coworker and one person, and it is acting based on the result.

Structuring: The answer, such as "which the relevance of the KOMI Radar Chart and the KOMI Chart came to understand to some extent", and "a cognitive aspect a behavioral aspect, and the physical condition not being considered separately", was obtained. From this answer, the relevance between the assessment items, which we defined as know-how information, is considered that it was able to acquire significant information.

Abstraction: The embodiment and abstraction by change of a viewpoint are performed, and the answer that KISS was useful was able to be obtained. "Change of a viewpoint" which is the function of KISS is considered to have been effective.

Comparing: They are comparing broadly from an assessment item with "seen paying attention to the potential abilities" to the behavioral aspect or the whole assessment result, and the result is interpreted for itself. It can be confirmed that imitation that is the fundamental method of KISS, and comparison are ensured from this result.

(2) Educational effect by recording awareness

As shown in Figure 10, a user can acquire an educational effect by recording by passing through processes, such as arranging, formalizing, externalizing and reconstructing one's awareness. A part of answer of the interview to this effect is shown in Table 5.

Arrangement: They have noticed the importance of writing "it was able to arrange", "by writing having shown the difference between me and other users clearly", etc.

Formalization: The posture that will be summarized and written briefly is a factor important for transfer and sharing of information.

Item	Answer
Observation	I thought that there were some tendencies in the method of observation. I thought that I also had a tendency. I could cultivate the power of observation. I found the habit of my viewpoint.
Review	I thought that it was important that get back to basics since it was found that I also have a biased tendency to conduce the result. I tried to speak to pull out the action of the care client who did not know until I saw other persons' care plan etc.
Check	Since the interpretation of results of assessment was the same as coworker, I confirmed that a client's condition could be grasped well. It has checked that the item with a first priority resembled my view closely, and I felt easy when its view was right. I have checked that the natural thing was not completed I checked that there were those who are writing finely, and those who are writing roughly.
Investigation	I compared the result together with the coworker. The spot became like a study meeting. We discussed to carry out such care services from now on. The chart is not created correctly and thought that it was a thing with many examples judged by force.
Structuring	I found some relevance between KOMI Radar Chart and KOMI Chart. I could grasp that recognition condition, a behavior condition, and the physical condition cannot be considered separately, Healthy body follows healthy recognition, and it is useless even if which is missing. It checked that the grand assessment written by I and a skillful person had been in agreement.
Abstraction	I could see finely, could see concretely, and can expand a viewpoint now. A difference with a specialist is felt. Those who can abstract are skillful persons.
Comparison	I compared paying attention to the potential abilities. I compared how grand assessment was drawn from the result of assessment. By comparing, showed objectively that I did not understand the care client.

Table 4. The educational effect in the process that noticed the difference

Externalization: The answer of "a certain grade was able to express", "what was considered having been externalized", etc. was obtained. The effectiveness of KISS was checked from this result.

Restructuring: "While writing it, I thought about various matters over again." From such an answer, it is shown that KISS is effective in reconstruction of an "idea."

Item	Answer
Arrangement	By writing, the difference of self and other persons became clearer. What I considered has been checked.
Formalization	I wrote what had been convinced. It tried to write briefly. It was going to summarize on the point.
Externalization	To some extent, what I noticed has been expressed. I wrote as I felt or considered.
Restructuring	While writing it, I thought about various matters over again. I can see a client's daily life while I will write it, by doing such work that goes out I remembered that I forgot it, or there was such a matter.

Table 5. Educational effect of recording

(c) Is there any educational effect by use of KISS

The answer to the educational effect of KISS is shown in Table 6.

Question	Answer
Is there any educational effect by using this system?	I could be aware of the bias of my view. I have noticed the difference of how to be concerned with a client. Comparing with others' care plan conduces to a good effect. It is effective that the degree of similarity of a document is shown visually. Since my weak point was found, there is an educational effect. Since I have noticed what is insufficient for self, I think that it is good for education. Having gotten to know the condition of the client which I do not know benefitted me
Is this system useful to personnel training?	This system is the tool that can carry out comparison examination on the assumption that the KOMI Chart is drawn. Since the difference from others document can be visually shown when teaching, this system is useful to user with to some extent fundamental knowledge as self-study. This system is applicable to reconfirmation and reeducation. It can be used for sharing of each other's viewpoint.

Table 6. Educational effect of KISS

(1) Is there any educational effect by using this system?

Comparison became easy by visualization at the answer to the educational effect of KISS, and there were some that have noticed the difference between others and a viewpoint.

(2) Is this system useful to personnel training?

It became a tool when teaching, since comparison becomes easy also by visualization at the answer about personal training, or that it is useful for self-study etc.

4.4 Discussion

We can discuss the result of trial of the system as follows from.

4.4.1 Documents of awareness

They have noticed the difference between the care of a hospital and in-home care whether to think the individuality of the care client is important. This is a view from the home support side, and is considered to be the know-how information from the place of work. In "a people difference", it can be said to be the know-how information about the difference in the method of observation, or how to catch a target. By the "basic plan", the condition of the care client is perceived, it is the scene developed to the statement of principles of care, and know-how information is surely written in clearly as awareness.

4.4.2 Users' operation logged data

Recording of operation of KISS shows that users fully understood the installed function and used it effectively. That the difference in an occupational description was looked at by the example referred to expresses the difference in the viewpoint by an occupational description.

4.4.3 Interview

(a) Is know-how information externalized?

All members have commented that the awareness arises by comparing with other persons' care plan by using KISS and the know-how information is included in the documents of awareness. This result coincides with the contents of the documents of awareness. As such, we considered that externalization of know-how information is possible by effective practical use of KISS.

(b) The educational effect of noticing the difference from a skillful person

An answer, such as "which the relevance of the KOMI Radar Chart and the KOMI Chart came to understand to extent", and "a cognitive aspect, an behavior aspect, and the physical condition not being considered separately", was obtained for structuring. From this answer, we considered that the relevance between the assessment items, which we defined as know-how information, was able to acquire significant information. Therefore, the educational effect of KISS was confirmed.

(c) The educational effect by recording awareness

The answer of "it was able to arrange", "it writing and awareness having become clear more", etc. was able to be obtained for arrangement. Moreover, the answer with the idea "various things were thought over, writing", "different the more, the more it writes" was able to be obtained for reconstruction. It is thought that the educational effect by recording was acquired from this result.

Thus, a user's capability not only improved according to the educational effect of externalization of know-how information, but it has checked having grown up also as an organization by sharing of know-how information. The important factor that brought about such an effect can consider to be hat comparison with a skillful person's care plan can be performed easily by visualizing and showing the degree of similarity between the documents that perceived the result of assessment.

(d) Is there any educational effect by use of KISS

It was confirmed that it is useful for the function of visualization of KISS comparing others' plan. An effect is expectable by using KISS for personal training from this result.

5. Conclusion and future works

As part of development of an educational support system oriented to knowledge management, sharing, and transfer in care management, we have developed KISS in the care planning process. A one-year trial was conducted in a care facility for evaluation of the system. Through these results, we confirmed that this system is useful for externalizing know-how information, and bringing about an educational support effect. From these results, it was suggested that KISS is a method of support by computer use in care management education. As future works, we will evaluate the effectiveness of the system in hospitals and nursing colleges. Improvement in individual ability and the activation of the organization will be evaluated through practical use.

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The education industry has obviously been influenced by the Internet revolution. Teaching and learning methods have changed significantly since the coming of the Web and it is very likely they will keep evolving many years to come thanks to it. A good example of this changing reality is the spectacular development of e-Learning. In a more particular way, the Web 2.0 has offered to the teaching industry a set of tools and practices that are modifying the learning systems and knowledge transmission methods. Teachers and students can use these tools in a variety of ways aimed to the general purpose of promoting collaborative work. The editor would like to thank the authors, who have committed so much effort to the publication of this work. She is sure that this volume will certainly be of great help for students, teachers and researchers. This was, at least, the main aim of the authors.

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