REFINING PRESENTATION DOCUMENTS WITH PRESENTATION SCHEMA

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ABSTRACT

Presentation is one of the important activities in research to publish research results. When we create presentation documents (P-documents for short), it is important to compose presentation structure (P-structure for short) that represents what to present and how to sequence the contents. To create proper P-documents, we need to learn how to create P-documents in the lab. In our previous work, we have helped unskilled researchers with presentation schema (P-schema for short), which is represented as an all-inclusive P-structure of P-documents accumulated in the lab. It allowed unskilled researchers to create proper P-documents. But, some learners could not properly segment research contents into slides. To solve this problem, this paper describes refinement of P-schema. This paper also reports a case study whose purpose was to assess whether the refined P-schema could promote segmentation by comparing P-documents and P-structure composed with the refined P-schema and composed with the original P-schema.

1. INTRODUCTION

Among research activities, presentation is very important for publishing research results. In general, presentation is conducted under several restrictions such as time, place, audience, etc. It is necessary to consider such restrictions to create presentation documents (P-documents for short). There are accordingly many books about the ideas of presentation (Duarte 2008, Reynolds 2011). In order to create P-documents suitable for research contents, in addition, it is important to compose presentation structure (P-structure for short) that represents what to present and how to sequence the contents (Hasegawa and Kashihara 2013). The P-structure composition needs two tasks, which are segmentation and sequencing. Segmentation is to divide research contents into slides. Sequencing is to make a sequence of the slides. In order to properly carry out these tasks, it is necessary for researchers to have a lot of experience in creating P-documents.

On the other hand, unskilled researchers have fewer experiences in composing P-structure to create P-documents (Tanida 2008). They accordingly need to learn as learners how to create P-documents in lab, where they should have an apprentice role together with expert, and more skilled researchers (Collins 1988). From this apprenticeship point of view, we have addressed the issue how to improve their skills in composing P-structure by means of presentation schema (P-schema for short) as a scaffold that we have designed as an all-inclusive P-structure to be commonly used in lab. P-schema represents heuristics for creating P-documents in lab, which allows unskilled learners to properly compose P-structure and create P-documents. In addition, skills in composing P-structure could be improved due to P-schema (Shibata 2012, Shibata 2013).

We have conducted a number of case studies with P-schema in our lab to confirm so far that P-schema allows unskilled learners to create more proper P-documents. In addition, we also found some learners who could not properly segment research contents into slides with P-schema. Their P-documents included some slides with more than one topic, and missed some slides to be presented. There seem two reasons for this. First, P-schema could not represent P-structure as a suitable scaffold for segmenting research contents into slides. Second, unskilled researchers could not properly use P-schema as scaffold to segment.

Towards resolving these problems, this paper describes refinement of P-schema designed for our lab. The refined P-schema expects unskilled learners to improve segmenting their research contents into slides to create more proper P-documents. It is also expected to make clearer the heuristics for creating P-documents in lab.

This paper also reports a case study whose purpose was to assess whether the refined P-schema could promote proper P-structure composition and P-document creation. The results suggest that it allows unskilled learners to create more proper P-documents.

2. PRESENTATION DOCUMENTS

Research presentation requires the following three skills at least (Shibata 2013):

- Skill in composing P-structure for P-documents
- Skill in designing the contents of slides, and
- Skill in oral and gesture for presentation.

In this work, we focus on skill in composing P-structure. Let us here explain P-structure and P-schema in detail.

2.1 Presentation Structure

In creating P-documents suitable for research contents, it is very important to consider what to present and how to sequence the presented contents, which corresponds to P-structure. We represent P-structure with the following four metadata of P-documents (Tanida 2008):

- *Slide metadata*: Slide metadata shows the contents or role of each slide,
- *Segment metadata*: Segment metadata represents the role in which a sequence of several slides plays such as *Cover, Introduction, Research Goal and Approach, Theory and Model, System, Case Study*, and *Conclusion*,
- *Relation metadata*: Relation metadata represents the relationships between specific slides, such as *cause-problem*, *problem-solution*, *solution-implementation*, *implementation-functions*, and *solution-evaluation*, and
- *File metadata*: File metadata represents a context of presentation such as *presenter, conference type, place of presentation*, and *time limit*.

Figure 1 shows an example of P-structure embedded in a P-document created in our lab. As shown in Figure 1, P-structure is composed of four metadata, which forms a hierarchy. Slide metadata has its own hierarchy, and the leaf metadata corresponds to each slide. For example, the slide metadata from Background to Domain connects with each other by means of is-a relation. Segment metadata represents the role of a sequence of several slide metadata. Relation metadata connects between specific slide metadata. File metadata is located at the root of P-structure, which shows a context of presentation.

2.2 Presentation Schema

P-documents accumulated in the same lab tend to have a similar P-structure. This means that heuristics for creating P-documents are shared in the lab. In our previous work, we systematically extracted P-schema from a set of P-documents accumulated in our lab by means of machine learning technique, which represents a common P-structure among the documents like a result of logical multiplication (Hasegawa and Kashihara 2013). However, this schema could not represent contents unique to each P-document. In this work, we have accordingly defined an all-inclusive P-structure to be commonly used in our lab as P-schema, which expert researchers extracted. Such P-schema represents heuristics for creating P-documents in our lab. We think each lab has its own P-schema.
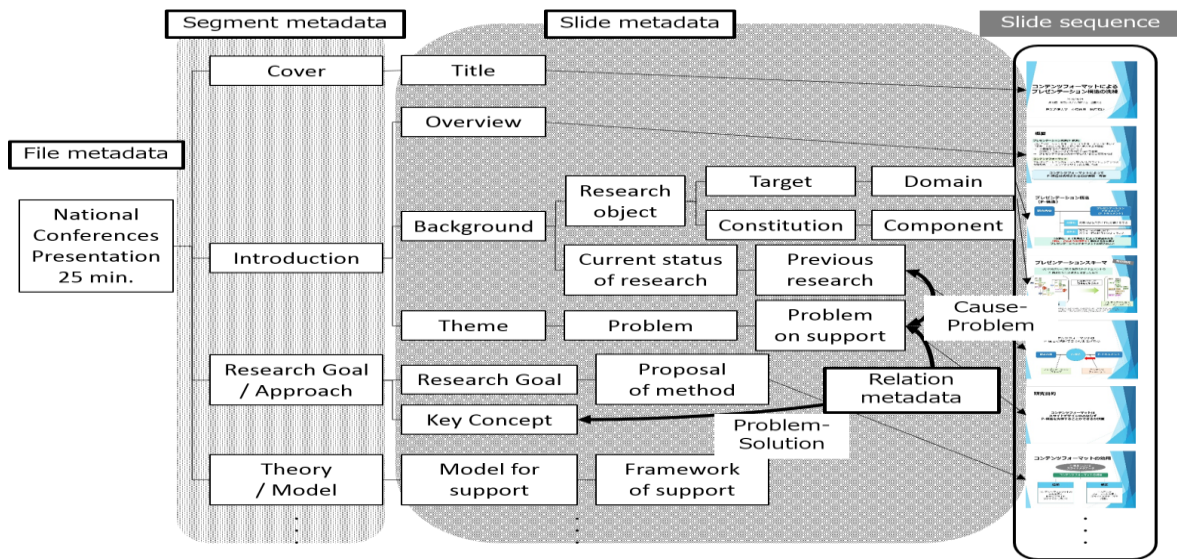
Figure 1. An example of presentation structure

3. SCAFFOLDING SYSTEM WITH PRESENTATION SCHEMA

We have developed a scaffolding system with P-schema as an add-in of Microsoft PowerPoint 2013. Figure 2 shows the user interface of this system. This system has two functions mainly, which are operable at the add-in tab in the upper part of the user interface shown in Figure 2.

The system first provides the function of displaying P-schema. P-schema is saved as an XML file, and it is inputted from the file and displayed at the left pane of the user interface when it is activated. P-schema is displayed as a hierarchy of metadata. When a mouse pointer is placed over slide metadata displayed in P-schema, a caption of the metadata will appear on the mouse pointer. The system second provides the function of composing P-structure, which allows learners to compose P-structure by referring to P-schema at the middle pane of the user interface. In generating and designing slides with PPT functionality, they could use P-schema as a scaffold for composing P-structure. In particular, they are expected to select and double-click metadata corresponding to the slides in the left pane (P-schema) to drop in the middle pane for composing P-structure.
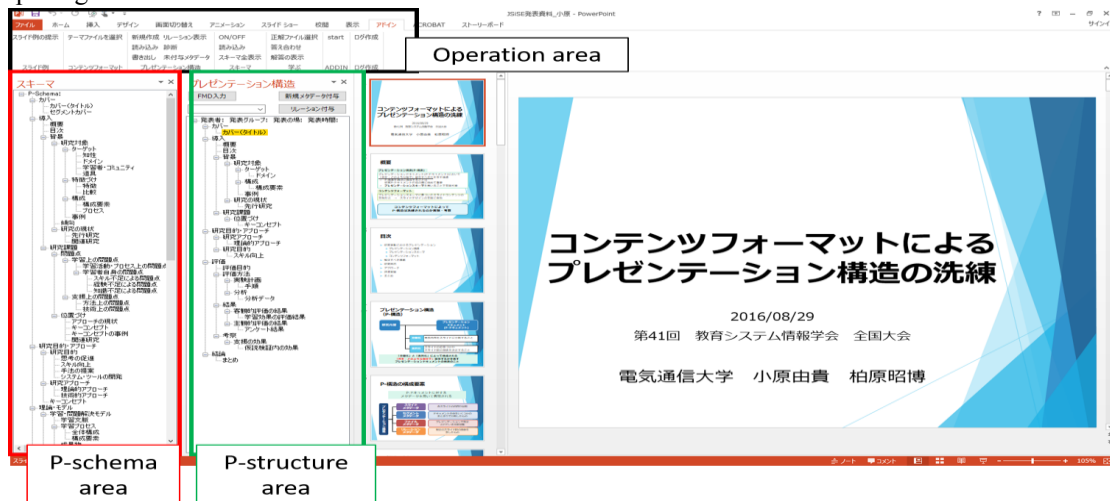

Figure 2. User interface of scaffolding system with P-schema

4. REFINEMENT OF PRESENTATION SCHEMA

4.1 Purpose

In our previous work, unskilled researchers were able to create proper P-documents using P-schema as a scaffold. On the other hand, P-documents created by unskilled researchers were not always improved. There are two reasons why these P-documents were insufficient. First, P-schema could not represent P-structure as a suitable scaffold. P-schema in the previous work was designed as an all-inclusive P-structure, but it was still inadequate. Second, unskilled researchers could not use P-schema properly as scaffold to segment. This shows that we should modify P-schema particularly words used for metadata. Towards these problems, we addressed refinement of P-schema.

4.2 Procedure

We first gathered P-documents that were accumulated in our lab, and selected 24 P-documents used in the final presentation for Master's thesis held in our university. The reason why we selected these P-documents for refining P-schema was that these were checked several times via presentation rehearsals and were sophisticated sufficiently. After the selection, we analyzed the P-structure embedded in these documents with the current P-schema and the scaffolding system, and then refined P-schema.

In analyzing the P-structure in the P-documents, we second followed the current P-schema to classify the slides for each segment metadata. Table 1 shows the results of the classification, which presents (a) the number and percentage of slide metadata per segment used in the P-structure, and (b) the number and percentage of slide metadata per segment in the P-schema. In (b), the percentages of slide metadata in "Introduction", "Theory / Model", and "Evaluation" segments are relatively high. It means that our lab emphasizes these contents as the presentation heuristics. Compared with (b), in addition, the usage percentage of slide metadata in "Research Goal / Approach" segment in (a) was high, and the usage percentages of slide metadata in "Theory / Model" segment was reversely low. These results suggest the possibility that the slide metadata in these segments are not used as expected. Particularly focusing on the segments "Research Goal / Approach" and "Theory / Model", we have reconsidered and subdivided slide metadata in P-schema in more detail to refine.

Table 1. Results of classifying slides and slide metadata in P-documents

Segment metadata	(a) Slide metadata in P-structure		(b) Slide metadata in P-schema	
	Number	Percentage	Number	Percentage
Cover	25	5.1	2	2.4
Introduction	118	23.9	21	25.3
Research Goal / Approach	50	10.1	5	6
Theory / Model	70	14.2	19	22.9
System	64	13	12	14.5
Evaluation	115	23.3	20	24.1
Conclusion	51	10.3	4	4.8
Total	493		83	

4.3 Refined Presentation Schema

Let us here compare P-schema and refined P-schema (called reP-Schema). There are two main differences between the P-schemata, which are slide metadata and hierarchy of slide metadata. Table 2 shows the number of slide metadata in the P-schema and reP-schema, and the rate of change and increase in slide metadata. In this table, let the total number of slide metadata in the P-schema be N_{old}, and the total number of slide metadata in the reP-schema be N_{new}. N_{new} includes newly added metadata (n_{new}), metadata partially-changed (n_{pc}), and metadata with no change (n_{nc}). The rate of change is calculated as $(n_{new} + n_{pc}) / N_{new}$. The rate of increase is also calculated as $(N_{new} - N_{old}) / N_{old}$.

As shown in Table 2, more than half of the metadata in the reP-schema have been changed in total. In particular, the rates of change in "Introduction", "Research Goal / Approach", and "Theory / Model" segments are high. The total rate of increase has been more than 30%. The rates in "Introduction" and "Research Goal / Approach" segments have been significantly increased.

As for the second difference between the P-schemata about hierarchy of slide metadata, Table 3 shows the number of slide metadata used in each depth of the hierarchy. In "Introduction" segment, the slide metadata are subdivided into deeper level in the refined P-schema. In "Research Goal / Approach" and "Evaluation" segments, the slide metadata increase at the deepest level in the reP-schema.

Table 2. Comparison between P-schema and reP-schema

Segment metadata	N_{old}	The number of slide metadata in the reP-schema					The rate of increase $(N_{new} - N_{old})/N_{old}$
		N_{new}	New (n_{new})	Partially-changed (n_{pc})	No change (n_{nc})	The rate of change $(n_{new} + n_{pc})/N_{new}$	
Cover	2	2	0	0	2	0	0
Introduction	21	36	22	6	8	0.78	0.71
Research Goal / Approach	5	9	4	2	3	0.67	0.8
Theory / Model	19	21	4	13	4	0.81	0.11
System	12	12	0	2	10	0.17	0
Evaluation	20	27	9	1	17	0.37	0.35
Conclusion	4	4	0	0	4	0	0
Total	83	111	39	24	48	0.57	0.34

Table 3. Hierarchies of slide metadata in P-schema and refined P-schema

Segment metadata	P-schema	The depth of the hierarchy				
		2	3	4	5	6
Introduction	P-schema	4	9	8	0	0
	reP-schema	4	5	12	12	3
Research Goal / Approach	P-schema	3	2	0	0	0
	reP-schema	3	6	0	0	0
Theory / Model	P-schema	4	8	7	0	0
	reP-schema	4	10	7	0	0
System	P-schema	3	4	5	0	0
	reP-schema	2	5	5	0	0
Evaluation	P-schema	5	6	9	0	0
	reP-schema	5	8	14	0	0

4.4 Expected Effects

We think there are two expected effects to be obtained from the P-schema refinement. In creating a P-document, unskilled researchers first tend to make a slide with a lot of information including different contents. Such slide causes the audience some difficulties in understanding the presentation. This is due to insufficient segmentation of contents. The reP-schema is expected to promote segmentation to improve making slides. Second, it is quite important for research lab to build up and share heuristics for continuing and developing research activities. It requires a lot of experience in carrying out the research activities, which also needs a lot of time. The reP-schema makes the heuristics for creating P-documents clearer. As a result, it could promote sharing the heuristics among the lab members, and improving P-documents creation.

5. CASE STUDY

We have conducted a case study whose purpose was to ascertain what kind of changes were seen in P-documents and P-structure composed with the reP-schema compared to the ones with the P-schema.

5.1 Preparation and Procedure

The participants were 9 graduate and undergraduate students (our lab students) in science and engineering. They were first asked to create P-documents and compose P-structure for their research contents with the P-schema. We then asked them to use the reP-schema, and to re-compose P-structure and modify their P-documents if necessary. We expected that the reP-schema allowed the participants to complement the contents missed and to subdivide the contents included in one slide into more slides and also to refine P-structure embedded in their P-documents. After the use of the reP-schema, we asked them to refer to their refined P-documents to answer a questionnaire including the question as follows:

Did you think whether your P-document was refined? (Yes or No)

5.2 Results

We evaluated P-structure and P-documents composed/modified by the participants. As for P-structure, we counted the number of changes in slide metadata before and after using the reP-schema, and analyzed how many new/partially-changed metadata defined in the reP-schema were used. As for P-documents, we counted the number of slides before and after using the reP-schema. Moreover, we evaluated the appropriateness of the slide metadata attached to each slide by the participants with three grades which were appropriate, partially appropriate, and inappropriate. "Appropriate" means the metadata represents the slide content. "Partially appropriate" means the metadata partially represents the slide contents. "Inappropriate" means the metadata does not represent the slide contents.

Table 4 shows the number of changes in metadata before and after using the reP-schema, the usage rate of the new/partially-changed metadata and its appropriateness, and the rate of "appropriate" and "partially appropriate". According to Table 4, the average rate of using new metadata exceeded 80%. Moreover, the total rate of "appropriate" and "partially appropriate" exceeds 80%, although the rates of participants E and G were lower. Table 5 shows the number of slides before and after using the reP-schema, its increase/decrease, and types/appropriateness of metadata attached to the increased slides. According to this table, 7 participants increased the number of slides, one did not change, and one decreased. 4 of the 7 participants also used new/partially-changed metadata, and most of them added the slides with appropriate metadata. As for the result of the questionnaire, all participants answered "Yes" to the question.

From the case study, the participants used new/partially-changed metadata positively and its usage was appropriate. This suggests that the reP-schema is appropriate for our lab, and properly represents our lab heuristics. In addition, most participants increased the number of slides and the slides were added with appropriate metadata. This suggests that segmentation is promoted by the reP-schema. In addition, we think it could contribute to refinement of the contents of P-documents.

Table 4. Number of changes in metadata before and after using the reP-schema, the usage rate of new/partially changed metadata, its appropriateness and rate of appropriate and partially appropriate

| Participants | Number of changes | Types of metadata | | | Usage rate of new /partially-changed metadata | Appropriateness of new metadata used | | | Rate of appropriate and partially appropriate |
		New	Partially-changed	Total		Appropriate	Partially appropriate	Inappropriate	
A	17	5	8	13	0.76	9	2	2	0.85
B	21	9	6	15	0.71	13	2	0	1
C	28	18	8	26	0.93	26	0	0	1
D	7	4	3	7	1	6	1	0	1
E	16	8	6	14	0.88	6	3	5	0.64
F	25	18	1	19	0.76	13	3	3	0.84
G	15	11	4	15	1	6	3	6	0.6
H	19	8	8	16	0.84	7	7	2	0.88
I	19	14	2	16	0.84	12	3	1	0.94
Average	18.6	10.6	5.1	15.7	0.84	10.9	2.7	2.1	0.87

Table 5. Number of slides before and after using the reP-schema, its increase/decrease, and types/appropriateness of metadata attached to the increased slide

Participants	Number of slides before using the reP-schema	Number of slides after using the reP-schema	Increase or decrease of slides	Types of metadata attached to the increased slides			Appropriateness of metadata attached to the increased slides		
				New	Partially-changed	No change	Appropriate	Partially appropriate	Inappropriate
A	27	28	1	0	0	1	1	0	0
B	38	40	2	0	0	2	2	0	0
C	36	40	4	4	0	0	3	1	0
D	15	16	1	0	1	0	1	0	0
E	26	25	-1	-	-	-	-	-	-
F	33	35	2	0	1	1	1	0	1
G	30	30	0	-	-	-	-	-	-
H	30	32	2	0	0	2	2	0	0
I	34	35	1	0	1	0	1	0	0

5.3 Additional Study

We had an additional study after the case study. 6 out of 9 participants (from D to I) participated. After the case study in 5.2, all of them had rehearsal with the expert researcher and then conducted their thesis presentation in our university. In order to investigate to what extent these 6 participants could create proper P-documents using the scaffolding system, we compared their P-documents refined with the reP-schema in the case study described in 5.2, and the P-documents used in their thesis presentation.

We counted the number of slides that did not change in the two documents. Table 6 shows the results. According to this table, participants D and F greatly changed the slides between the two P-documents, but the other participants changed almost half of the slides. This suggests that the reP-schema contributes to creating appropriate P-documents that are usable for actual thesis presentation. In addition, we analyzed the number of slides that did not change in each segment whose results are shown in Table 7. According to this table, almost half of the slides did not change in "Introduction", "Research Goal / Approach" and "Theory / Model" segments. In "System" and "Evaluation" segment, on the other hand, most of the slides changed. This suggests a positive effect on the refinement of P-schema, since we particularly refined and subdivided metadata in "Introduction", "Research Goal / Approach", and "Theory / Model" segments in this work.

Table 6. Number of slides that did not change in two documents

Participants	Number of slides		Number of slides without changes from a to b (c)	Rate of the number of slides without changes	
	Case study (a)	Thesis presentation (b)		R_1 (c/a)	R_2 (c/b)
D	16	20	1	0.06	0.05
E	25	25	14	0.56	0.56
F	35	36	6	0.17	0.17
G	30	27	14	0.47	0.52
H	32	33	16	0.5	0.48
I	35	33	20	0.57	0.6

Table 7. Number of slides that did not change in each segment

Participants	Number of slides created in the case study (a)	Number of slides without changes (c)	Cover		Introduction		Research Goal / Approach		Theory / Model		System		Evaluation		Conclusion	
			a	c	a	c	a	c	a	c	a	c	a	c	a	c
D	16	1	1	1	5	0	2	0	3	0	3	0	0	0	2	0
E	25	14	1	1	6	4	2	0	7	7	2	2	5	0	2	0
F	35	6	1	1	13	2	2	1	2	0	7	1	8	0	2	1
G	30	14	1	1	8	5	5	3	3	2	3	0	8	1	2	2
H	32	16	1	1	6	5	1	1	9	3	3	2	9	2	3	2
I	35	20	1	1	12	9	2	2	2	0	8	3	8	3	2	2
Total	173	71	6	6	50	25	14	7	26	12	26	8	38	6	13	7

6. CONCLUSION

In this work, we have refined the P-schema developed in our previous work and verified whether the participants in our lab could create P-document properly by using the refined P-schema. As a result of the case study, the participants used metadata in refined P-schema appropriately and segmented research contents.—Moreover, according to the additional study, the participants could create proper P-documents, which could be used for thesis presentation with the refined P-schema. In summary, the refined P-schema represents our heuristics more properly, promotes segmentation of research contents, and is effective to make P-documents that can be used for actual presentations.

In future, we need to explore whether the refined P-schema is valid not only in P-documents creation but also in other scene of presentation such as rehearsal. If the refined P-schema is properly displayed during the rehearsal of the presentation, the presenter could become aware of the inappropriate metadata that they would not notice when creating their P-documents.

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