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An Experiment on Presentation Effectiveness of Texts and Summaries*[1]

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This paper concerns the effectiveness of various methods of presentation, which include overhead projector transparencies, printed materials and verbal instructions. Two courses (namely Japanese History and World Geography) were studied in this experiment. The effects of different types of visual patterns on the students' understanding were also analyzed. Sentence patterns were compared with important key-word patterns. The results showed that the most effective type of presentation was when key-words were presented using an OHP, supplemented by the use of a pointer, together with verbal instructions. The lowest scores were seen for verbal-only presentations.

Key words: presentation, educational presentations, audiovisual education, audiovisual equipment, printed materials, Learning effectiveness

1. INTRODUCTION

The presentation of information is the most important process in education. Generally, a teacher conducts the class by presenting the information using a black board or an overhead projector (OHP), referring to the textbook and printed materials, and providing verbal explanation. The variously presented information is accepted, recognized and memorized by the student. Therefore, if the presentation was not appropriate, students could not understand nor memorize the information.

The information presentation methods in the education have been extensively researched (Suetake, 1992). From research on the understanding process involved in passage-reading, it was found that the representation of the summary was easier to memorize than that of the text (Koyazu, 1985). It was also reported that the scores of tests taken immediately after university classes which used summaries of the text were significantly higher than the scores of classes using the text itself (Reder and Anderson, 1980).

These suggest that effective summaries promote learner understanding of text content. The summarizing of content by a learner had a beneficial effect on text-understanding (Kiriki *et al.*, 1981). Audio explanation together with the use of a pointer, during visual presentation, generally used in the class, are understood to have beneficial effect on learning. Takai (1989) reported there was little difference between visual and auditory presentation on memory effectiveness. But the effect of these modalities when combined and interacting has not been discussed sufficiently.

This paper describes the effectiveness of various methods of presentation and the interactions mentioned above. The purposes of this study are as follows.

(1) Examining the effect of visual presentation methods on memory, particularly between printed material and presentation using OHP.

(2) Comparing the recall rates of visual-only, auditory-only and audio-visual presentations.

(3) Measuring the effect of pointer indication in OHP presentation.

(4) Comparing the recall rates of text- and summary-presentation.

For these purposes, the scores of recall tests were used in examining the effects of the various presentations.

2. EXPERIMENTAL METHOD

2.1 Presentation Content

In this study, content was obtained from 2 sources, namely high school textbooks for Japanese

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history and geography. The content was easily understood, without prior knowledge, and also keywords from the content were easily memorized. Content that the subjects were assumed to be ignorant of was selected for presentation. Because the amount of content that subjects had known before the experiment was only 3% all the data was analyzed in this paper.

Examples of the text, summary pattern, and recall test are shown in Fig. 1 (a)-(c) and 2 (a)-(c). Figure 1 shows a Japanese history task, and Figure 2 shows a world geography task. There were 11 tasks respectively, 22 tasks in total. The texts were usually coherent by themselves. The space between the lines were fixed, independent of the paragraph length.

The Figures 1 and 2 show that summary is not just the listing of keywords, but also with emphasis on structure. This is to simulate the usual pattern for OHP presentation in class. The recall test was made up of 5 questions on the presentation content (Figs. 1(c) and 2(c)). The subjects were required to write down key words in response to the questions.

2.2 *Experimental Conditions*

The experiments were carried out under the following conditions.

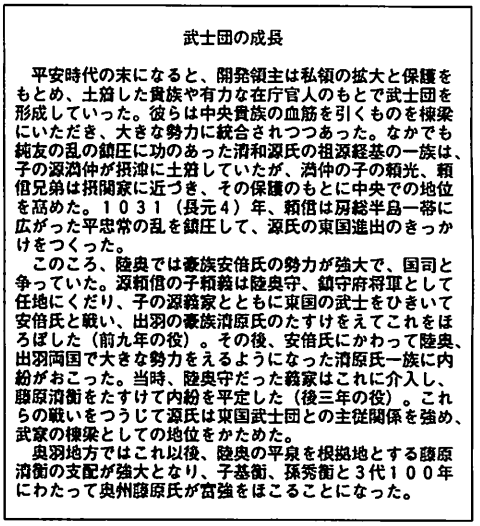
(1) Comparing the presentation effects of printed material and OHP. For printed material, photocopies of content, as per Fig. 1 (a) or Fig. 2 (a), were handed out to the subjects. For OHP presentation, the printed material was transferred onto a transparency and presented to the subjects through OHP.

(2) Comparing the presentation effects of visual and auditory presentation. For auditory presentation, an audio tape of the content (recorded beforehand) is played aloud to the subject during the experiment. Also the subject is given printed material, showing only the title of the text to subjects.

(3) The pointer effect on OHP presentation. For OHP presentation, the experimenter uses a pointer for text presentation, the pointer is used that it follows the part of the text being read out. For summary presentation, the pointer is pointed at the place being read out.

(4) Comparing the effect of summary and text. The presentation content was either the text itself or the keyword-summary of the text. The subject might not understand the content if showed only key words, so the summary was presented with voice narration.

The experiment was planned according to the


武士団の成長

平安時代の末になると、開発領主は私領の拡大と保護をもとめ、土着した貴族や有力な在庁官人のもとで武士団を形成していった。彼らは中央貴族の血筋を引くものを棟梁にいただき、大きな勢力に統合されつつあった。なかでも純友の乱の鎮圧に功のあった清和源氏の祖源経基の一族は、子の源満仲が摂津に土着していたが、満仲の子の頼光、頼信兄弟は摂関家に近づき、その保護のもとに中央での地位を高めた。１０３１（長元４）年、頼信は房総半島一帯に広がった平忠常の乱を鎮圧して、源氏の東国進出のきっかけをつくった。

このころ、陸奥では豪族安倍氏の勢力が強大で、国司と争っていた。源頼信の子頼義は陸奥守、鎮守府将軍として任地にくだり、子の源義家とともに東国の武士をひきいて安倍氏と戦い、出羽の豪族清原氏のたすけをえてこれをほろぼした（前九年の役）。その後、安倍氏にかわって陸奥、出羽両国で大きな勢力をえるようになった清原氏一族に内紛がおこった。当時、陸奥守だった義家はこれに介入し、藤原清衡をたすけて内紛を平定した（後三年の役）。これらの戦いをつうじて源氏は東国武士団との主従関係を強め、武家の棟梁としての地位をかためた。

奥羽地方ではこれ以後、陸奥の平泉を根拠地とする藤原清衡の支配が強大となり、子基衡、孫秀衡と３代１００年にわたって奥州藤原氏が富強をほこることになった。

Fig. 1(a). A sample visual aid for texts presentation (Japanese history).

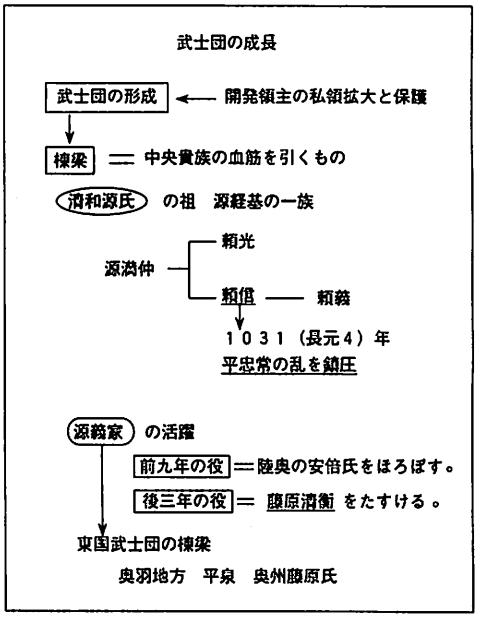


Fig. 1(b). A sample visual aid for summary presentation (Japanese history).

1.武士団の中では中央貴族の血筋を引くものをリーダーとしましたが、それを何といいますか。

2.清和源氏の祖は誰ですか。

3.源頼信が鎮圧した乱は何という乱ですか。

4.前九年の役で滅ぼされた人は誰ですか。

5.後三年の役で源義家が助けた人物は誰ですか。

Fig. 1(c). A sample recall test (Japanese history).

アジアの地形

アジアの面積は２７６０万平方ｋｍで、世界の約５分の１を占める。そのおよそ４分の１が高度２００ｍ以下の低平な土地だが、５００ｍ以下の土地は５０％未満で、南極大陸を除くと、これは大陸別にみて最も低い比率になっている。いっぽう３０００ｍ以上の土地は約７％を占めており、これは逆に最も高い比率となっている。この結果、アジアは大陸別の平均高度が９６０ｍで、南極大陸を除くと、最も高い大陸となっている。

アジアの地形の骨格は、大陸部はアルプス・ヒマラヤ造山帯、島嶼部は環太平洋造山帯がつくっている。アルプス・ヒマラヤ造山帯は、ほぼ東西に走り、「世界の屋根」といわれるパミール高原を中心に、ヒマラヤ山脈をはじめ世界的な山脈が四方にのびている。これらの大山脈はいずれも高峻で、海洋から吹く夏のモンスーンをさえぎり、モンスーンアジアと乾燥アジアの自然の境界をなしている。アジアの平野の多くは大河川の下流部に広がり、その多くが人口密集地域となっている。

大陸を花ずなのように飾る島々の多くは、地盤が不安定であり、山がちで平野が少なく、地震や火山の活動が活発である。

Fig. 2(a). A sample visual aid for texts presentation (Geography).

アジアの地形

面積 …… ２７６０万平方ｋｍ（世界の約５分の１）
高度２００ｍ以下の低平な土地（４分の１）
５００ｍ以下の土地（５０％未満）
（大陸の中で最も低い比率）
３０００ｍ以下の土地（約７％）
（大陸の中で最も低い比率）

＊平均高度９６０ｍ
（南極大陸を除くと最も高い大陸）

地形の骨格
島きょう部 …… 環太平洋造山帯
大陸部 …… アルプス・ヒマラヤ造山帯
パミール高原「世界の屋根」を中心
世界的な山が四方にのびている
モンスーンアジアと乾燥アジアの境界

平野
大河川の下流部
人口密集地域

島々
地盤不安定 ⟶ 地震や火山活動

Fig. 2(b). A sample visual aid for summary presentation (Geography).

1.アジアの面積は世界でどれくらいをしめていますか。

2.アジアは３０００ｍ以上の土地が大陸の中で最も高い比率をしめていますが、どれくらいの比率ですか。

3.アジアは南極大陸を除くと最も高い大陸といわれているが、平均高度は約何ｍですか。

4.大陸部を形づくっている造山帯は何ですか。

5.「世界の屋根」といわれる所は何ですか。

Fig. 2(c). A sample recall test (Geography).

above conditions. The following nine cases were conducted, while simulating actual class presentation.

(A) Printed material presentation
  1) Texts (printed material)
  2) Texts (printed material)＋Voice narration
  3) Summary (printed material)＋Voice narration
(B) OHP presentation
  4) Texts (OHP)
  5) Texts (OHP)＋Voice narration
  6) Summary (OHP)＋Voice narration
  7) Texts (OHP)＋Voice narration＋Pointer
  8) Summary (OHP)＋Voice narration＋Pointer
(C) Auditory presentation
  9) Voice narration

2.3 Presentation Method

The experiment was done in groups of 5 to 10 subjects. To ensure uniformity of results, all 9 conditions (for text- and summary-based patterns) were conducted on the subjects. However, the presentation contents were the same, due to the voice narrations.

The experiment was conducted in a normal lecture room. For OHP presentation, a tilted screen (1780×1800 mm) was used, hung from the ceiling. The subjects sat in 2 rows, about 2 m away from the screen. The voice narration was played at the speaking volume.

The presentation time for every case was the time taken by the voice narration. For the condition without voice narration, the presentation time was the same as those with narration. The subjects were asked not to take down notes and also to look at where the pointer was pointed at.

The recall test was conducted immediately after each presentation. The time limit for the recall test was not set, but it normally ended when most of the subjects had finished the test.

Thirty two subjects, undergraduate and postgraduate male students at a technological university, took part in this experiment. Two hours were needed for the whole experiment, so it was divided into two one hour sessions on separate days, one for the printed-material session and the other for the OHP session. The subjects for the printed-material session was grouped under "printed-material-presentation group", and the subjects for the OHP session was grouped under "OHP-presentation group". Table 1 shows the number of subjects for each experimental condition, for

Table 1. The number of subjects for each presentation condition

Presentation condition		Text	Text voice	Summary voice pointer	Text voice pointer	Summary voice	Voice only
Printed Material	No. of Exp.	(1)	(2)	(3)	—*	—*	(9)
	N of Ss	32	32	32	—	—	10
OHP Presentation	No. of Exp.	(4)	(5)	(6)	(7)	(8)	(9)
	N of Ss	32	10	10	32	32	32
Total of Ss		64	42	42	32	32	42

*In the printed material, the pointing could not be served.

the two groups.

3. RESULTS

To determine the effectiveness of retention of the presentation, the success rates were compared for all 9 experimental conditions. Table 1 shows that the number of subjects are not same for all the conditions. Thus it was reasonable to suppose the raw data may be affected by individual cases. Therefore, the effectiveness was evaluated, using the normalized success rates which was obtained using the mean success rate of all 9 conditions rate by individuals. Henceforth, the normalized rate is called "success rate".

3.1 The Results for Printed Materials

The success rates were evaluated for experimental conditions (1)–(3) and (9) for "printed-materials group" (A). The results are shown in bar graph, Fig. 3. Figure 3 also shows the results for OHP presentation (B). The bars were sorted out in descending order of mean rates of (A) and (B). The "voice only" condition (9) was the control for both groups (A) and (B), and those are indicated in Fig. 3 respectively.

The success rates for text+voice (2) and summary+voice (3) were higher than that of text-only (1), and the voice-only (9) rates were the lowest.

Multiple comparison (Iwahara, 1957) was conducted on the four conditions, shown in Table 2. In Table 2, the conditions were sorted out in descending order of success rate, and a * mark was put where the result of comparison was significant at 5% level. It found there was a significant difference between voice-only (9) and the other three conditions (1)–(3). This result suggests the presentation with visual aid is easier to memorize than one without it. Also, the success rates for the presentation with voice narration were higher than those without it.

3.2 The Results for OHP Presentation

The success rates for OHP presentation were already shown in Fig. 3 for experimental conditions (4)–(8) and (9). The success rate for con-

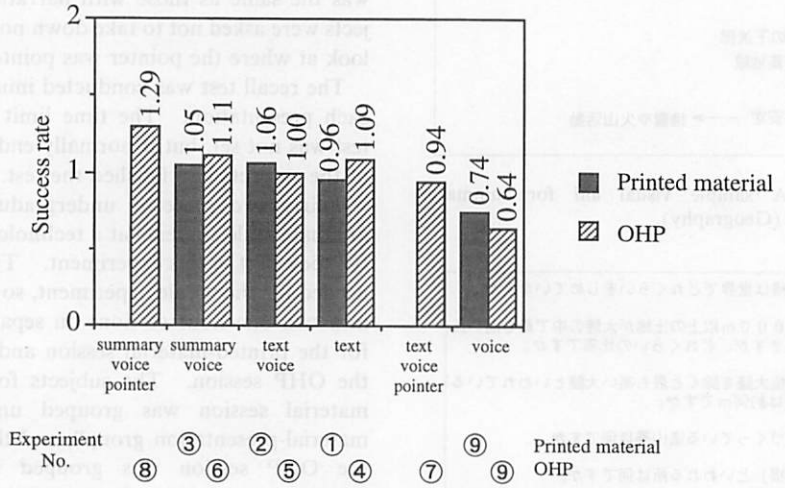


Fig. 3. Success rate of recall tests.

Table 2. Significant difference for printed-material-group

Exp. conditions	(2)	(3)	(1)	(9)	Success rate
(2) Text+voice				*	1.06
(3) Summary+voice				*	1.05
(1) Texts only				*	0.96
(9) Voice only					0.74

* : Significant level ($p<0.05$).

dition (8) (summary, voice-narration and pointer) was the highest and the rate for voice-only (9) was the lowest. Multiple comparison was conducted again, and the results are shown in Table 3. The conditions were sorted out in descending order of success rate, and a * mark was put where the result of comparison was significant at 5% level. There was a significant difference between summary-voice-with-pointer (8) and text-voice-with-pointer (7), and also between voice-only (9) and all the other conditions (4)–(8).

These results indicate that voice-only-presentation significantly lowers the success rate. It suggests that visual aid is important for any presentation.

3.3 *The Comparison of the Presentation Methods*

The results described above were for printed-material-group and OHP-presentation group. The differences between presentation methods are examined in this section for the same conditions. They are summary-and-voice narration (3) and (6), text-and-voice narration (2) and (5), and text-only (1) and (4).

This comparison is summarized in Fig. 4. It showed that there was little difference between printed-material and OHP-presentation. There was also no significant difference between two methods for the above 3 conditions.

The analysis of variance was conducted, to determine the influence of presentation condition on the method. The result of ANOVA was shown in

Table 3. Significant difference for OHP-presentation-group

Exp. conditions	(8)	(6)	(4)	(5)	(7)	(9)	Success rate
(8) Summary+voice+pointer					*	*	1.29
(6) Summary+voice						*	1.11
(4) Text						*	1.09
(5) Text+voice						*	1.00
(7) Text+voice+pointer						*	0.94
(9) Voice only							0.65

* : Significant level ($p<0.05$).

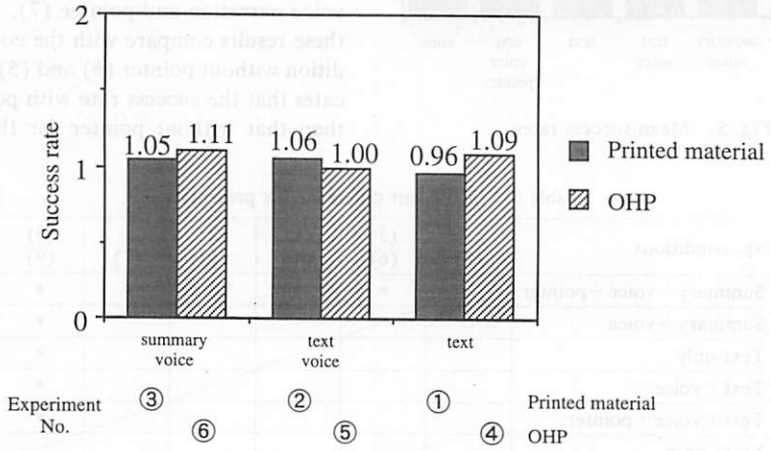


Fig. 4. Comparison of printed material and OHP.

Table 4. With respect to presentation method, experimental condition, and the interaction of the two, the differences were not significant. This indicates that the success rate was dependent on the experimental condition, and independent of presentation methods (either printed material or OHP).

This suggests two points. First, the results for presentation of printed material and OHP can be applied to either presentation method. Second, if it can be assumed that printed-material method and OHP-method are equivalent, OHP method is better because the teacher is face to face with the student.

Figure 5 indicates the success rates for experimental conditions, ignoring the presentation method. Table 5 also showed the results of multiple comparison for the success rates in Fig. 5. A

Table 4. ANOVA for the presentation method

Source	df	SS	V	F
Presentation method	1	0.05	0.05	0.54
Exp. condition	2	0.06	0.03	0.32
Interaction	2	0.17	0.08	0.91
Residual	142	13.02	0.09	

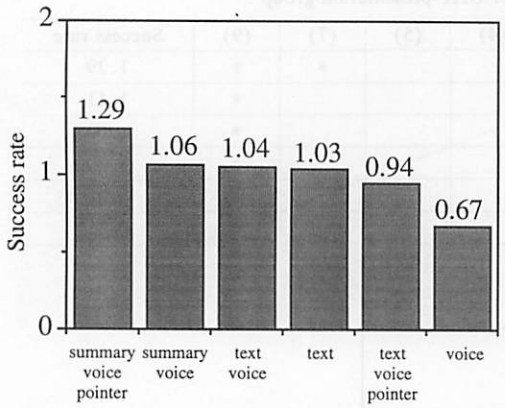


Fig. 5. Mean success rates.

∗ mark was put where there was a significant difference at 5% level. The summary-voice narration-and-pointer condition (8) produced the highest score. The voice-only condition (9) had the lowest score and there was a significant difference at 5% level with all other conditions (1)–(8).

3.4 Presentation Effect of Voice Narration

To determine the effect of voice narration (as an auditory presentation), the success rates of text-presentation with and without voice narration were compared, namely experimental condition (1) and (2) for printed-material-group, and (4) and (5) for OHP-presentation-group. The ANOVA was conducted on those rates. The results are shown in Table 6.

Table 6 indicates that the differences between voice narration and printed material/OHP group, and their interaction were not significant. This suggests voice narration has little effect, and little difference between printed-material-group and OHP presentation-group. When mean success rates of the text with or without voice narration for both presentation methods were compared, the presentation with voice narration was slightly higher, but there was no significant difference.

It can be concluded that text-presentation with voice narration prevents the subject from reading at his own pace, and hence there is no effect of voice narration on text-presentation.

3.5 Pointer Effect in OHP Presentation

To make clear the importance of the pointer effect on the presentation of information, the effect of the pointer was thus examined. The pointer was used in the following two OHP conditions : summary-voice narration-and-pointer (8) and text-voice narration-and-pointer (7). Figure 6 shows these results compare with the corresponding condition without pointer (6) and (5). Figure 6 indicates that the success rate with pointer was higher than that without pointer for the summary-and-

Table 5. Significant difference for presentation

Exp. conditions		— (8)	(3) (6)	(1) (4)	(2) (5)	— (7)	(9) (9)	Success rate
— (8)	Summary+voice+pointer		*	*	*	*	*	1.29
(3) (6)	Summary+voice						*	1.11
(1) (4)	Text only						*	1.09
(2) (5)	Text+voice						*	1.00
— (7)	Text+voice+pointer						*	0.94
(9) (9)	Voice only							0.65

∗ : Significant level ($p<0.05$).

Table 6. ANOVA for voice narration

Source	df	SS	V	F
Presentation method	1	0.02	0.02	0.26
Voice narration	1	0.00	0.00	0.00
Interaction	1	0.17	0.17	1.78
Residual	102	9.48	0.09	

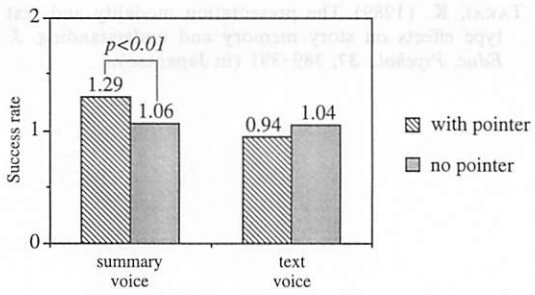


Fig. 6. Comparison of success rate (with and without pointer).

voice narration condition, but there was practically no difference between those for text-and-voice-narration condition. The t-test was conducted for all cases under both conditions, and there was a significant difference at 1% level for summary-and-voice-narration case only ($t(72)=3.25, p<0.01$).

The major effect of the pointer is the pointing out of where attention is due. In the text-and-voice narration-condition, the voice narration already indicates the position in the text, and this overlaps with the pointer's suggestion. It can be assumed that the pointer prevents the subject from reading at their own pace, even their re-reading. For the summary-and-voice narration condition, the pointer indicates clearly where the voice narration is explaining, and it suggests that the pointing has a significant effect for the success rate.

In general, the writing on the blackboard and OHP pattern usually displays keywords, and passages are hardly ever written out. Therefore, the results of this section confirms the effectiveness and importance of the pointer for visual presentation.

3.6 Presentation Effectiveness of Summary and Text

To determine the effect of summary presentation, the success rates of summary-presentation ((3) and(6)) and text-presentation ((2) and (5)) were compared under the voice-narration condition. The ANOVA was conducted, and the result is shown in Table 7.

Table 7 showed that all the cases were not significant in F-test. The success rate was compared between summary and text presentation, there was no significant difference. Although the rate of the summary-presentation was higher than the text-presentation, they were not significantly different.

Table 7. ANOVA for summary and text

Source	df	SS	V	F
Presentation method	1	0.00	0.00	0.00
Summary/text	1	0.04	0.04	0.40
Interaction	1	0.05	0.05	0.52
Residual	80	7.62	0.10	

When the text is presented, the subject bears and extra mental load in extracting the content from the text. The summary has to represent the content of the text clearly. If it was insufficient the subject has to put in extra effort to understand the summary. In this experiment, the success rate of summary-presentation was higher than that of the text-presentation, reflecting previous research, but no significant difference was found. The development of more effective summarizing method is a problem to be solved.

4. CONCLUSION

This paper describes the comparison of the success rates of recall test under various experimental presentation conditions to examine the effectiveness of the presentation and the pointer in presenting information to a class. The results are summarized below.

(1) The success rate of OHP presentation of summary with voice narration and pointer was the highest. This method has been recommended before, and this result supports the recommendation. On the other hand, the success rate of voice-narration-only method was the lowest.

(2) The result was the same for printed-material and OHP-presentation, therefore the effectiveness was independent of the presentation method.

(3) The pointer raised the success rate significantly, confirming the effectiveness of the pointer.

(4) The success rates of the summary- and the text-presentation with the voice narration were compared, and the result showed that the former was higher than the latter confirming previous research.

The problems to be examined are the investigation of the influence of content difficulty on the understanding of the text content and the summarizing of text.

This study was conducted while two of the authors were visiting researcher at CRADLE, Tokyo Institute of Technology. Two authors appreciate the Miyazaki prefectural board of education for giving them an occasion for research.

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