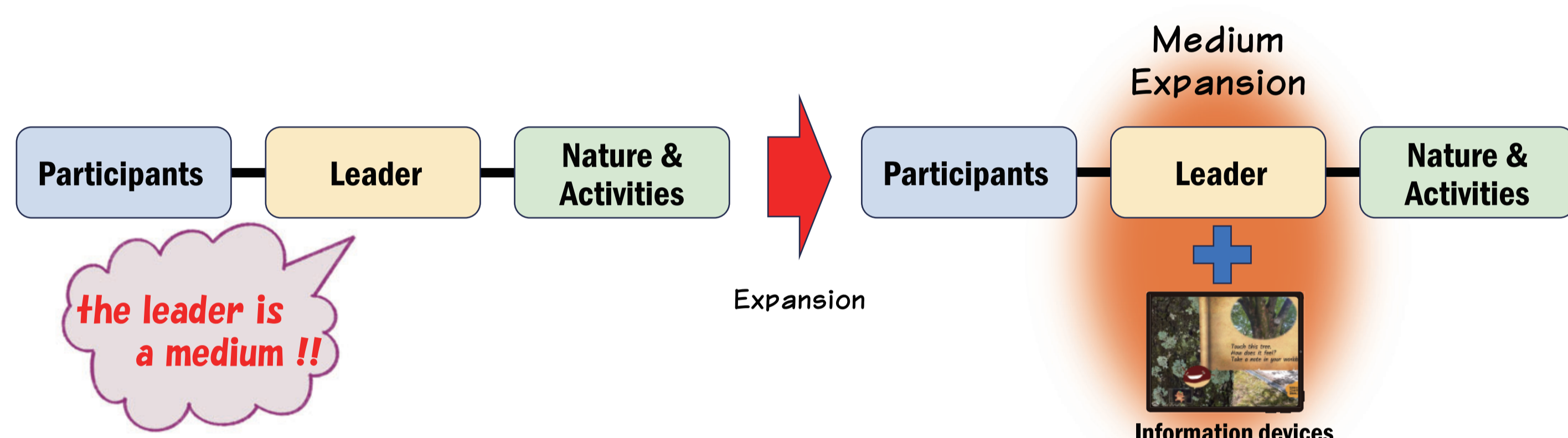


Can Digital Technology Replace Leaders in Outdoor Education?

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Intorduction

In outdoor education, the 'leader' invites the 'participants' to 'nature and activities'. In this relationship, the 'leader' is the medium between the two. In the perspective that 'the leader is a medium', there have been non-human medium such as tags with the names of trees and written instructions for activities. However, these medium only provide one-way information, and unless the 'participants' are very interested, they cannot convey anything more than that, which is insufficient in terms of providing a rich experience. On the other hand, the development of information devices in recent years suggests that they can play a role as a media between 'participants' and 'nature and activities', without relying on people. With information devices, it is easy to create multiple layers of information and to arouse the interest of 'participants'. In other words, the use of information devices does not limit the media to 'people' alone, but can be extended to 'people + information devices'. An attempt at this extension is the aim of this study. This attempt also encourages a reconsideration of the role of the instructor and may provide some insight into the 'lack of instructors' and 'lack of training time' that have become problems in Japan in recent years.



Method

In this study, a nature rally using information devices was proposed for this experiment. Specifically, an Augmented Reality (AR) system was created in which illustrations were posted at the points set up in the activity areas to be rounded, and these illustrations were used as markers to activate the system. The AR activated at each point was superimposed with the facility's character 'Tochibo' and textual information encouraging the participants to carry out the task, with sound added to the textual information. The applications were evaluated by having the participating children and teachers of the Hyogo Prefectural Nature School experience the applications and by using a questionnaires. This research was conducted with the approval of the research ethics review of the Institute of Advanced Media Arts and Sciences.

Results and Discussion

The survey and analysis covered the three schools listed below, with a total of 186 children (162 valid responses) and 9 teachers (average age 38 ± 13.7 years, average years of teaching experience 12.6 ± 9.33). Note that the activities were conducted in the Amagasaki City Memorial Park in all schools.

- School A Number of schoolchildren 42 with 2 groups, 2 teachers
Each session of 90 minutes 05 November 2021
- School B Number of schoolchildren 85 with 2 groups, 2 teachers
Each session of 90 minutes 19 November 2021
- School C Number of schoolchildren 59 with 2 groups, 5 teachers
Each session of 90 minutes 30 November 2021

The results of the survey are as follows. Table 1 shows the results of a five-point evaluation of whether the Nature Rally using AR was a good experience from the perspectives of 'overall rally', 'use of tablets', 'AR tricks' and 'content of tasks'. As shown in the table, the average score for each was over 4 points, which indicates that interestingness of the AR-based Nature Rally was high from all perspectives.

Table 2 shows the reasons for the answers in Table 1, analysed using the KHCoder. As can be seen from the table, the top three most frequently used words were 'fun', 'Good activity' and 'tablet', indicating that many children rated the Nature Rally using the information device highly as being 'fun' and 'good activity'. On the other hand, "tablet" was the third most common word used for the rally, and while there were many positive comments, there were

Table 1: Children's responses to the following questions (on a 5-point scale)
Q: For each of the following perspectives, please answer with a number between 5 and 1, considering '5' for interesting and '1' for not interesting.

	Average	Standard deviation
Overall NatureRally	4.50	± 0.70
use of tablets	4.36	± 0.91
AR tricks	4.63	± 0.70
content of tasks	4.36	± 0.84

also nine comments that it was "difficult to use" and four that it was "difficult to operate". When we checked the answers to Question 1, where the only response rated "1" was "use of the tablet", many of the reasons given were that "other members were using the tablet and I couldn't use it". Figure 1 shows the results of a more detailed question. The averages were calculated by rating the responses obtained in a

Table.2 Results of the analysis of the results of question 2 by KHCoder

	Extracted words	Number of occurrences	Percentage of occurrences
1	fun	83	51%
2	good activity	50	31%
3	tablet	47	29%
4	AR	25	15%
5	task	25	15%
6	tricks	23	14%
7	nature	22	14%
8	content of tasks	12	7%
9	overall naturerally	11	7%
10	difficult	9	6%

four-question method from the positive responses as 4, 3, 2 and 1. Looking at the results, the average score for each of these items is above 3, and the percentage of positive responses ('yes' and 'somewhat yes') is high for all of them. Furthermore, 74% gave a positive answer to the question "If you know how to make it, would you like to make your own AR app?". Fig. 2 shows the results of a survey using a questionnaire for the teachers. The average score is the same as above, but the average scores were all above 3, and all the surveyed teachers gave a positive evaluation. From the free-response statements, the teachers evaluated that the nature rally with the use of the information devices facilitated the children's learning about nature, that they would like to use it in the future, that it was useful for connecting the learning at school with the learning in the school, and that there were no problems with the time taken to carry out the rally or the operation of the information devices. The study was also conducted in the field of outdoor education in the study area.

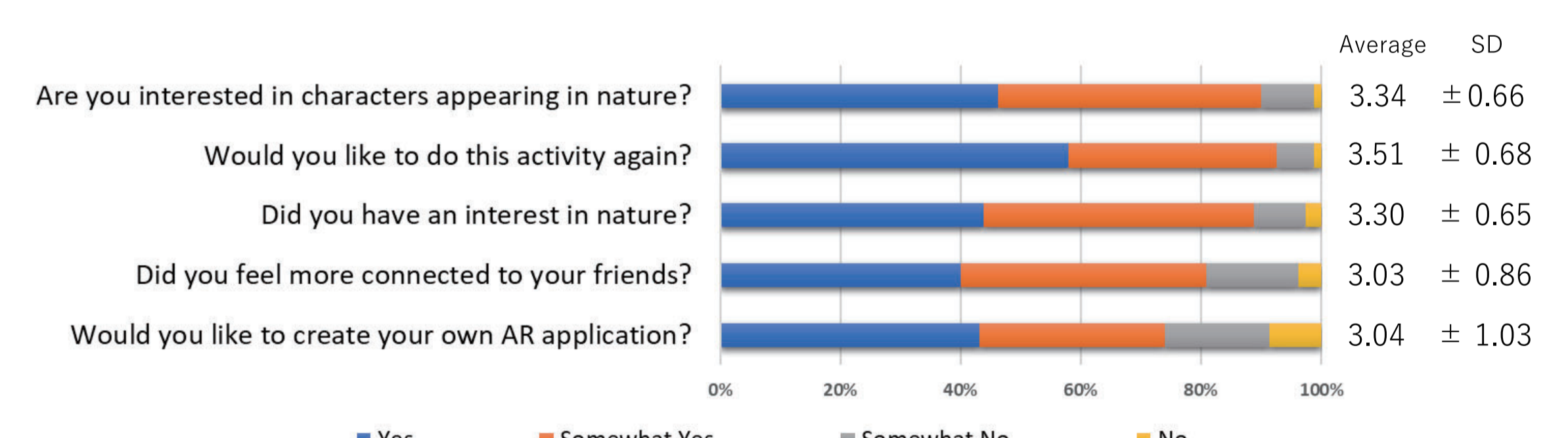


Figure.1 Responses of students to each question

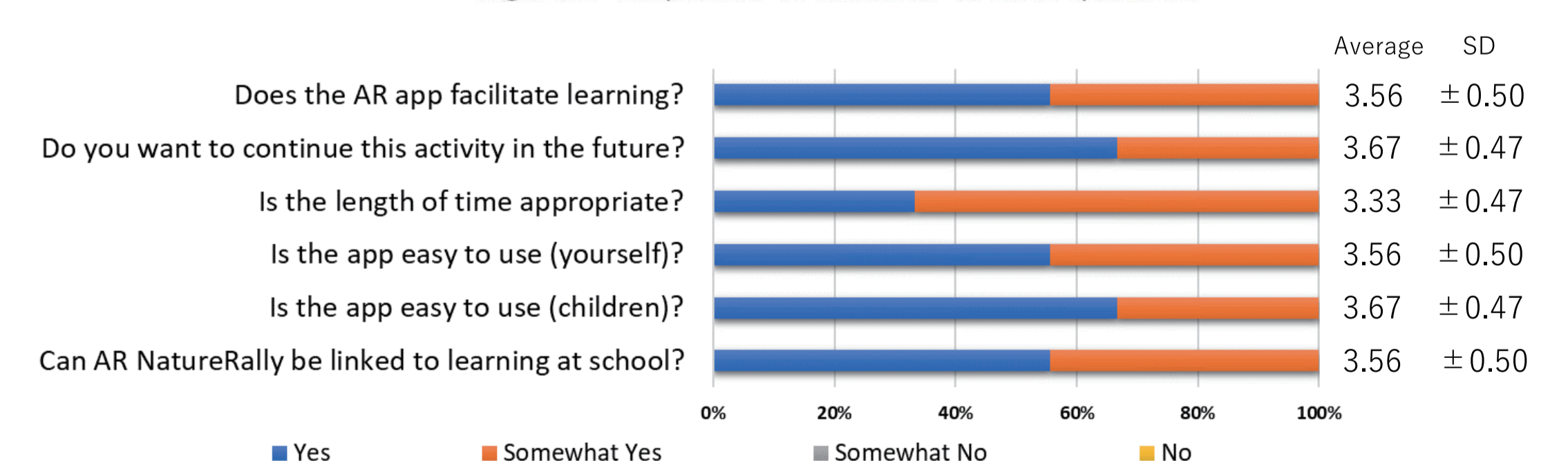


Figure2 Responses of teachers to each question

Conclusion

From the above, it is clear that the use of information devices in outdoor education in this study can be established without limiting the medium to 'people' alone. However, in this activity, too, 'information devices' were not used to reflect on the activity, and human intervention was still necessary. Therefore, an extension of the medium in the form of 'people + information devices' is considered best at present. This expansion would also complement the problems of 'lack of instructors' and 'lack of training time' that have been raised in Japan in recent years, and would serve as a supplementary tool for people.