Asian Journal *of* Distance Education

http://www.AsianJDE.org

ISSN 1347-9008 Asian J D E 2008 vol 6, no 1, pp 27 - 38

Distance Education in Rural China achieves Inter-School Collaboration and Increased Access to Education

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ABSTRACT :

Interscholastic collaborative learning could not only develop student integrated skills but could also promote sharing of teaching ideas and methods among schools. The purpose of this study was to design and use scaffold strategies to conduct a cross-regional collaborative learning activity among secondary schools in China. The three thematic learning activities - 'Olympics in My Eyes', 'Athletic Sport & Culture in My Hometown', and 'Regional Athletic Sport & Culture Website' - under the theme of Athletic Sport & Culture were designed for online collaborative learning. The 45 specific scaffold strategies within an eight-stage system of scaffolding were designed to encourage effective online collaborative experiences for all participants. The eight-stage system of scaffolding consisted of ;- purpose clarification, content, group tasks, collaboration skills, data collection, data processing, outcome presentations, and evaluation. Thirty-six secondary schools, which ranged across the most educationally-developed to the least educationally-developed areas in China, were selected and participated in the study. After completing the study, the effectiveness of the 45 scaffold strategies within the eight stages was evaluated by participating teachers in the 36 schools. The study found that systematic scaffold strategies were essential for a variety of students to have effective cross-regional online collaborative learning experiences. The authors suggest that educational scaffold strategies should not only be used at the beginning of learning, but should also be provided at each stage of collaborative learning as a system. It is expected that the findings of this study could be valuable for educators and practitioners to use information and communication technology in enhancing and facilitating cross-regional collaborative learning.

1. INTRODUCTION :

Collaborative learning could promote higher-level reasoning, creative thinking, greater transfer of what is learned within one situation to another, better interpersonal relationships, greater cognitive and affective perspective taking, and higher levels of self-esteem (Johnson, & Johnson, 1994). In China, one of the educational challenges is how to narrow the great education gap between the developed eastern and disadvantaged western areas, and between rural and urban schools. The education gap lies in resource, teaching ideas and methods, infrastructure, and the ability to integrate information and communication technology (ICT) in teaching and learning. Online interscholastic collaborative learning could be a helpful way, not only to develop students' basic skills, but also to bridge the education gap by: promoting communication and exchange between different schools, widening the visual field of rural teachers and students, renewing teaching principles and methods for rural teachers, and developing skills of collaborative learning and use of ICT. Therefore, collaborative learning has been adopted as one of the basic objectives of school education in China.

However, traditional education in China is teacher-centered and competitively-based learning. Teachers and students are unacquainted with collaborative learning, especially those in rural schools. Teachers lack skills in organizing and conducting collaborative learning while students lack experience of how to learn with others online. Therefore, sufficient and appropriate scaffold strategies for both teachers and students are needed as a prerequisite of a successful online interscholastic collaborative learning experience.

Table 1 : Three Types of Scaffold Strategies in Different Learning Environments

Learning Environment	Scaffold Strategies (from the literature)
Traditional classroom teaching and learning	(from McKenzie, 1999) 1 providing clear direction and reducing students' confusion 2 clarifying purpose 3 keeping students on task by providing structure through scaffold lessons or projects 4 clarifying expectations and incorporating assessment and feedback 5 directing students to worthy sources to reduce confusion and frustration 6 reducing uncertainty and disappointment 7 delivering efficiency 8 creating momentum (from Hogan & Presley, 1997) 1 modeling of desired behaviors 2 offering explanations 3 inviting student participation 4 verifying and clarifying student understandings 5 inviting students to contribute clues
Inquiry learning	(from Dodge, 2000) 1 reception 2 transformation 3 production
Computer-supported collaborative learning (CSCL)	(from Ma, Ke & Cao, 2005) 1 establishing subjects 2 analyzing subject and forming sub-subjects 3 forming groups 4 collecting data 5 data analyzing and processing 6 creating research report 7 evaluating learning process and production 8 recording activity log

The concept of scaffolding has been popularly used as an instructional strategy in classroom learning and computer-supported collaborative learning (CSCL). Vygotsky defined scaffold instruction as the "role of teachers and others in supporting the learner's development and providing support structures to get to that next stage or level" (Raymond, 2000). Scaffolding in educational settings describes the support offered to learners to help them achieve learning outcomes. Prior knowledge provided by mentors helps learners by providing a set of pre-arranged stepping stones, learning advice or learning aids for acquiring new knowledge (Christie, et al., 2004). Scaffolds include models, cues, prompts, hints, partial solutions, think-aloud modeling and direct instruction (Hartman, 2002). Other forms of commonly used scaffolds also include lists of steps, questions, examples, suggestions, guides, charts, explanations, dialogues, and so on.

When utilizing scaffold strategies in education, scholars have attempted to identify scaffold strategies in different educational circumstances. The literature review revealed that the existing studies on scaffolding could be categorized into three types based on learning environments, as shown in Table 1.

2. RESEARCH METHODOLOGY :

2.1 Method :

Action research was employed in this study. The teachers from participating schools acted as facilitators of online interscholastic collaborative learning. Four professional educational researchers from the Institute of Distance Education in Beijing Normal University were responsible for the research design and acted as mentors for the facilitators.

A questionnaire survey was used for evaluation in this study.

2.2 Sample :

Multi-staged stratified sampling was used to select the secondary schools based on the geographical, economic, and the academic levels, as well as on the school willingness. Forty-seven secondary schools in 25 provinces in China were selected and participated in the study, but only 36 of them completed the whole study. The other nine schools dropped out because of web technology problems or the teachers left the schools. Table 2 shows the distribution of participating schools.

Table 2 shows :

- 7 schools (19.4%) were from developed areas with high educational and economic level, covering six provinces and municipalities ;
- 12 schools (33.3%) were from areas with middle educational and economic level, covering eight provinces ; and
- seventeen schools (47.3%) were from underdeveloped areas with low educational and economic level, covering nine provinces in western areas.

Among the 36 participating schools, 7 (19.4%) were located in cities, 9 (25%) were located in towns, and 20 (55.6%) were located in rural areas.

2.3 Procedures :

The study was conducted from May 2006 to Feb. 2007 and the procedure included the following three main steps :

Step 1 : Design

Based on the results of the literature review, on the characteristics of e-learning collaboration, and on the Chinese context, an eight-stage system of scaffolds was designed by the team members.

Step 2 : Implementation

According to the eight-stage system of scaffolds and the project theme, 45 specific strategies were developed by the team members and validated by 5 online learning experts and 25 educational practitioners. Thirty-six secondary schools participated in this study, and the 45 scaffold strategies were used one by one systematically.

Step 3 : Evaluation

All teachers from the participating schools were invited to complete an evaluation questionnaire to rate the effectiveness of the scaffold strategies.

Table 2 : Distribution of Participating Schools

Location Areas	Educational and Economic Level	Number of Participating Schools		Number of Participating Provinces
		n	% of Total	
Eastern	High	4	11.1 %	3
North-eastern	High	3	8.3 %	3
Northern	Middle	5	13.9 %	3
Central	Middle	7	19.4 %	5
Western	Low	17	47.2 %	9
	Total	36	100 %	23

3. DESIGN OF THE SYSTEM OF SCAFFOLDS :

A needs analysis of scaffolding was conducted to design a system of scaffolds for interscholastic collaborative learning. The system of scaffolds included the following eight aspects according the process of online interscholastic collaborative learning.

Purpose Clarification Scaffold

Students need to understand the purpose and objectives of interscholastic collaborative learning, to know what to do and what to achieve through the collaborative learning process. Scaffolding is needed in this stage to motivate the learner's interest through purpose clarification.

Content Scaffold

Traditional education in China is teacher-centered and competitive learning. Students are unfamiliar with collaborative learning, especially those in rural schools. Hence, a detailed list of small steps (so-called Scripts) and timelines, as scaffolds, need to be supplied in order to provide stepping stones for students to learn collaboratively.

Group Task Scaffold

Interscholastic collaborative learning is the use of groups so that students work together to maximize their own and each other's learning. Therefore, scaffolding is needed to support students on how to form groups, how to assign roles and tasks among group members, how to assess the quality and quantity of each member's contributions, how to stimulate interaction, and how to process things as a group.

Collaboration Skill Scaffold

Students need to learn social skills, such as instructorship, decision-making, trust-building, communication, and conflict-management skills, among others, in order to realize team learning. Compared with urban students, rural students in China are poorer in social and collaborative skills. Scaffolding to drive collaborative skills was, therefore, especially emphasized for rural students.

Data Collection Scaffolds

In the process of data collection, it would be hard for some students to search for useful and relevant information on the Internet, and to collect information through interviews or on-site investigations. It would also be especially difficult for rural teachers to give the necessary support to their students. Therefore, scaffolding on data collection is needed to direct students to collect data and reduce confusion and frustration.

Data Process Scaffolds

Scaffolding on data processing is also required to support students on processing the collected information and converting it into text, picture, music, or other representational forms.

Outcome Presentation Scaffolds.

Production is an important process in interscholastic collaborative learning, whereby students need to present their collaborative learning outcomes. In this project, participants are also required to build a theme website and present their project outcomes. Scaffolding is needed to help students present their research processes and results online.

Evaluation Scaffold.

Evaluation includes self-evaluation, mutual evaluation, and group evaluation. At the evaluation stage, online forms and tables should be supplied in order to let students conduct evaluation efficiently. Scaffolds are needed in order to let students know when, what and how to evaluate.

Table 3 summarizes the system of scaffolds designed for interscholastic collaborative learning.

4. IMPLEMENTATION OF THE SCAFFOLD STRATEGIES :

4.1 Participants :

This project was implemented from May 2006 to Feb. 2007. Thirty-six schools completed the interscholastic collaborative learning project. In these 36 schools, 550 students participated in the activities from October 2006 to February 2007, with 106 teachers acting as facilitators.

4.2 Learning Themes :

The project theme 'Athletic Sport and Culture' was designed by the research team members. There were three collaborative learning activities within this theme :

- The 'Olympics in My Eyes' activity, in which students worked in interscholastic groups, researched and elected the 'Olympic Heroes' and 'Olympic Events' in their eyes, and drew pictures for the Olympics ;

Table 3 : A System of Scaffolds for Interscholastic Collaborative Learning

Scaffold	Main Content
Purpose Clarification Scaffold	Clarifies subject, purpose and expectation of task
Content Scaffold	Provides clear direction and explains structure and content arrangement in detail
Group Task Scaffold	Helps in forming groups, making collaborative plans, assigning tasks, and the like
Collaboration Skill Scaffold	Fosters collaborative and communication skills
Data collection Scaffold	Guides students to collect, organize and record relevant resources
Data Process Scaffold	Assists students to process and analyze collected data using text, tables, figures, and so on
Outcome Presentation Scaffold	Helps students present their project outcomes
Evaluation Scaffold	Clarifies evaluation standards and helps assess the process and production of group collaboration

- The 'Athletic Sport & Culture in My Hometown' activity, in which students researched the traditional athletic sports and culture of their hometown ; and
- The 'Regional Athletic Sport & Culture Website' activity, in which schools in the same province collaborated to integrate their research materials and build a regional website for sharing with counterparts in other provinces.

4.3 Implementation :

According to the eight-stage system of scaffolds and the theme of this project, 45 specific scaffold strategies were developed by the research team.

The total of 45 specific scaffold strategies are shown in Table 4, and these were used one by one as learning scaffolds in the implementation of this project. For example, at the beginning of the project, an ice-breaking activity was undertaken to introduce objectives, content, and procedures to give all participating teachers and students a sense of what was forthcoming, as well as self-introduction from representatives of participating schools through web-conferencing, as shown in Figure 1.

The details of the processes in the implementation of this project can be viewed at: http://research.mspil.edu.cn.

Table 4 : The Scaffold Strategies for Interscholastic Collaborative Learning

Scaffold	Strategy for Collaborative Learning
Purpose Clarification Scaffold (3 strategies)	1 Activity Guides : introduce objectives, content, and procedures 2 Glossaries : define and explain the collaborative learning theme and related glossaries 3 Concept map of athletic sport & culture : illustrate the subject and concept through a mind map
Content Scaffold (2 strategies)	4 Scripts : give detailed operational instructions in small steps for collaborative learning activity 5 Timelines : give a schedule and deadline for each stage of the collaborative learning activity
Group Task Scaffold (10 strategies)	6 Functional explanation of leading interscholastic groups : introduce functions and roles of leaders in each cross-regional interscholastic group 7 Grouping for cross-regional interscholastic collaboration : gives the grouping list of schools in each cross-regional interscholastic group in the 'Olympics in My Eyes' activity 8 Assignment of cross-regional interscholastic groups : clarifies the assignment of each cross-regional interscholastic group in the 'Olympics in My Eyes' activity 9 Roles of teachers : introduces different roles of teachers in each participating school 10 Address list template : gives a template for each interscholastic group to make their own address list in the 'Olympics in My Eyes' activity

continued -

Group Task Scaffold (10 strategies) - continued	11	Research scheme template : gives a template and an example for each interscholastic group to make their research scheme in the 'Olympics in My Eyes' activity, such as expected outcomes, role and assignment of each school, schedule, how to collaborate in an online forum, and so on
	12	Group collaboration template : gives a template and an example for each student group to make their collaborative plan inside their group, such as their expected outcomes, roles and assignment of group members, and schedule
	13	Mind map of group collaboration plan : clarifies the role and assignment of each group member through a mind map
	14	Grouping and assignment of regional groups: introduces the group list and assignment of regional groups in the 'Regional Athletic Sport & Culture Theme Website' activity
	15	Address list of regional groups: gives the address list of teachers and students of each school in each regional group
Collaboration Skill Scaffold (4 strategies)	16	Self-introduction template : gives a template for students to introduce themselves to their pals in other schools and to help them get acquainted with one another
	17	Brain-storming guide : gives a guide on brain-storming strategy, and encourages students to give clues on making interscholastic research scheme for 'Olympics in My Eyes' activity
	18	Round table guide : gives a guide on round table strategy, and encourages students to give clues on designing their paintings for 'Olympics in My Eyes' activity
	19	Tower-building guide : gives a guide on tower building strategy, helps students taste collaboration, and creates group collectivism with group members building a tower together using matches
Data Collection Scaffold (6 strategies)	20	References of school introduction : give links to online introduction of participating schools, helps schools to get acquainted with one another
	21	Examples of Olympic drawings : give some examples of drawings and pictures about the Olympic games, and offer students some references for drawing and painting in the 'Olympics in My Eyes' activity
	22	References to Olympic websites : guide students to related websites about the Olympic games
	23	References of athletic sport & culture: guide students to related websites about athletic sport and culture
	24	Examples of website logos: give some examples of website logos, and offer references for students to design a logo for their own website
	25	Research and investigation guide: offers a PowerPoint guide for teachers to teach students the methods and tips for collecting information about athletic sport and culture

continued -

Data Process Scaffold (5 strategies)	26	References to material processing : guides students to useful websites, teaching them how to process text, audio, picture, video, or those offering materials for processing
	27	Interview charts : help students to clarify their interview questions, to organize their interview records, and to reflect on their findings in those interviews
	28	On-site investigation charts : help students to clarify their investigation outlines, to organize their investigation records, and to reflect on their findings in on-site investigations
	29	Online search charts : help students to clarify their aims and range of online searches, and to organize their online search findings
	30	Processing framework : guides students to organize the requirements and results of text, picture, audio, and video processing
Outcome Presentation Scaffold (10 strategies)	31	Document submission guide : guides students on how to submit related documents during the course of collaboration to the platform
	32	'Olympic Heroes' & 'Olympic Events' submission guide : suggests how to represent their outcomes of the 'Olympics in My Eyes' activity, and guides students on how to submit their results to the platform
	33	Drawing submission guide : suggests how to produce eligible works of drawings and paintings for the Olympics, and guides students on how to submit their work to the platform
	34	Logo design suggestion : suggestions for students on designing a logo for their website
	35	Representation suggestion : suggests how to organize the contents for the website and how to present these contents with multimedia
	36	Website-building guide : gives a PowerPoint guide and a flash to teach students how to build a website using a template
	37	Website-design guide : guides the students on how to design a website
	38	'Olympic Hero' framework : offers a framework for students to organize the information on their 'Olympic Hero', which is researched and elected by their interscholastic group
	39	'Olympic Event' framework : offers a framework for students to organize the information of the 'Olympic Event', which is researched and elected by their interscholastic group
	40	'Regional Athletic Sport & Culture' website template : helps students to build a complete website with an interactive template
Evaluation Scaffold (5 strategies)	41	Website rubric : gives criteria for evaluation on the theme websites of 'Regional Athletic Sport & Culture'

continued -

Evaluation Scaffold (5 strategies) - continued	42	Collaboration rubric : gives criteria for evaluation on the collaborative contribution of participating schools, students, and teachers
	43	School mutual-evaluation template : offers a template for schools to mutually evaluate their group members
	44	Teacher/student mutual-evaluation template : offers a template for teachers / students to mutually evaluate their group members
	45	Teacher / student self-evaluation template : offers a template for each teacher / student to self-evaluate himself / herself

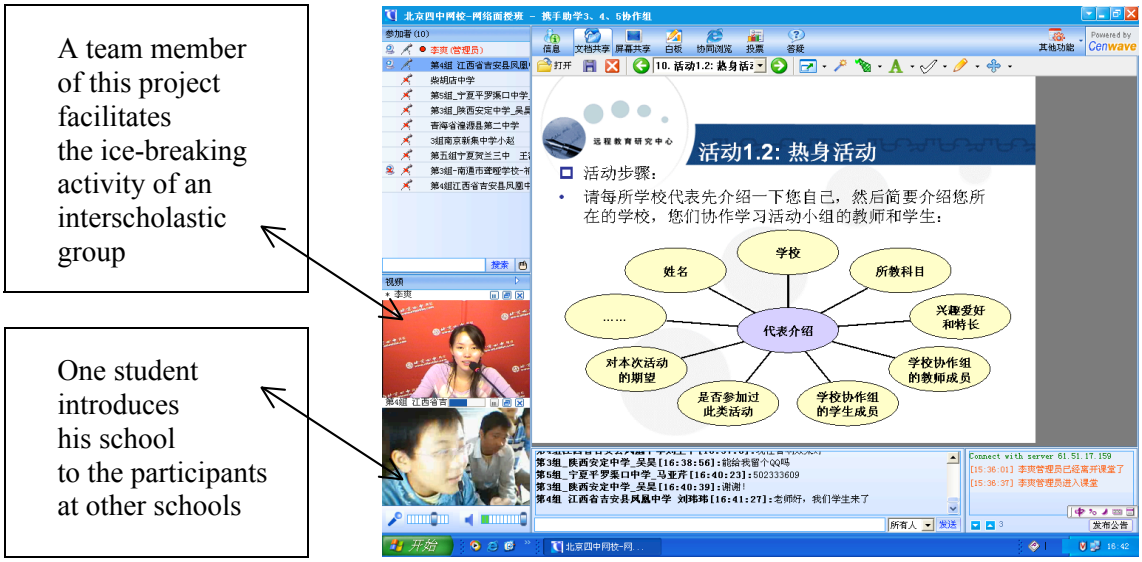

Figure 1 : The ice-breaking activity through web conferencing

5. EVALUATION OF SCAFFOLD STRATEGIES :

In order to examine the effectiveness of these scaffolds for interscholastic collaborative learning, a survey was conducted in February 2007 after the completion of the project. Online questionnaires were sent to all 106 participating teachers in the 36 schools. Of these, there were 69 completed and valid questionnaires were returned, giving a response rate of 65.1%.

The subjects were asked to evaluate the usefulness of the 45 strategic scaffolds based on their own experiences through participation in this project. Likert 5-point scales were used in five levels : strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). The statistical package, SPSS version 11.5, was used for statistical analysis. The results are summarized in Table 5.

This Table 5 shows a summary of the teacher evaluation based on the eight-stage scaffold system. Here it can be seen that the

Table 5 : Evaluation by the Teachers of the Usefulness of the Scaffold Strategies

Scaffold	Number of Strategies	Reported Usefulness of Each Scaffold			
		Strongly agree / Agree	Neutral	Disagree / Strongly disagree	Mean ±sd
Purpose Clarification Scaffold	3	94.7 %	5.3 %	0 %	4.51 ±0.59
Content Scaffold	2	96.4 %	2.2 %	1.4 %	4.66 ±0.63
Group Task Scaffold	10	80.6 %	14.3 %	5.1 %	4.23 ±0.89
Collaboration Skill Scaffold	4	79.7 %	15.9 %	4.4 %	4.14 ±0.84
Data Collection Scaffold	7	86.3 %	11.6 %	2.1 %	4.50 ±0.77
Data Process Scaffold	3	85.0 %	15.0 %	0 %	4.27 ±0.70
Outcome Presentation Scaffold	11	93.9 %	5.9 %	0.2 %	4.62 ±0.60
Evaluation Scaffold	5	88.0 %	10.8 %	1.2 %	4.46 ±0.73

scaffolds for all aspects of eight-stage scaffold system were regarded as very useful and supportive, in which the means ranged from 4.14 to 4.66, in online interscholastic collaborative learning.

6. DISCUSSION :

With reference to the results above, we propose some new ideas and concepts of scaffold strategies in online interscholastic collaborative learning ;-

(1) Scaffold strategies should be provided through the whole process, rather than only being used at the beginning of learning as in existing learning theories, in an online interscholastic collaborative learning

In existing learning theories, the scaffolds facilitate a students' ability to build on prior knowledge and internalize new information. Therefore, the scaffolds are usually provided at the beginning of learning. This study indicated that a cross-regional online interscholastic collaborative learning project needed scaffolds in each stage of learning activities from purpose clarification to evaluation, not only for prior knowledge as needed in traditional classroom learning. By scaffolding students stage-by-stage in a systematic way, students could effectively accomplish the collaborative learning with their counterparts, and scaffolding especially allowed students from disadvantaged areas to go beyond what they would have been able to do alone.

(2) Student skills for the 21st century could be developed through systematic scaffold strategies in online interscholastic collaborative learning activities

The traditional education system in China emphasizes exams, which have been considered by most teachers and students as the goal and target of education. However, this idea has lagged far behind society's needs in the 21st century. Since the end of the last decade, the Chinese government has been paying attention to and has encouraged quality education which emphasizes the integrated development of students' abilities. However, with the existing exam system, teachers and students - especially those in rural areas and undeveloped regions - will still pursue high scores in exams rather than capability building. In a knowledge-based society, the basic skills for all people - including team work, data collection and processing, creative thinking, use of information and communication technology - have become more important than memorizing knowledge. This study found that the provision of systematic scaffold strategies in online interscholastic collaborative learning activities is an effective way to develop the skills needed for the 21st century.

(3) The advanced educational principles and methods could be shared through systematic scaffold strategies in online interscholastic collaborative learning

The sample of this research covered high, middle and low educational and economic levels in China, across eastern, northern, central and western areas. Half of participating schools were from undeveloped western and rural areas, while one-fifth or so were from developed eastern areas and cities. This cross-regional collaborative learning activity could widen the vision, influence attitudes and methods, and enhance computer and social skills for both teachers and students. Through this interscholastic collaboration, the schools recognized the gap among them and the advantages and disadvantages facing each school. For example, the interscholastic collaboration project offered rural schools a good chance to learn advanced teaching principles and methods from schools in developed areas. Many rural teachers expressed that after this project, they changed their teaching ideas from teacher-centered to student-centered. Some of them tried to use collaborative learning and interactive learning in their teaching. In addition, the teachers were confident and capable of integrating ICT into their subject teaching.

7. CONCLUSION :

This paper has reported the design and implementation of the first large-scale research project on cross-regional online learning collaboration in China. This study found that systematic scaffold strategies within each aspect of learning are needed to promote online learning collaboration effectively, including scaffold strategies for purpose clarification, content, group tasks, collaboration skills, data collection, data processing, outcome presentations, and evaluation respectively. In response to the challenges of knowledge–based society in China, the authors concluded that school education could develop and promote students' team skills, communication skills, computer skills, basic management skills, presentational skills, and creativity through online interscholastic collaborative learning when using systematic scaffold strategies based on a needs analysis of participants.

Acknowledgement :

This paper represents part of the sub-project entitled *Creative Integration of 100 network classrooms into Subject Teaching and Effective Mechanism of Resource Sharing* under the MOE-Microsoft (China) '*Partners-in-learning*' Project. The team members of this project include Prof. Li Chen, Ms. Xiaoying Feng, Prof. Weiyuan Zhang (adviser), Dr. Shuang Li, Ms. Wei Liu, Ms. Dilirela Keyimu, and Ms. Jie Liu. We would like to thank Dr Rex G. Sharman, HKU SPACE, for his constructive comments and editorial suggestions, and Ms. Keyimu for doing part of the data analysis.

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