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ACTIVITY REPORT

# Research Practices for Managing Group Work Settings with Participant Groups Including Hearing-Impaired Students

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## ABSTRACT

This study aimed to assess different methods for managing group work scenarios in actual seminar classes at higher education institutions, utilizing action research techniques and accounting for hearing-impaired students, so that all types of students may progress smoothly. In reviewing participants' reflections, we found that the speed of group work tasks fell as a result of research team intervention, causing hearing-impaired students to feel more at ease psychologically and other participants to feel constrained by the discussion restrictions and rules. However, participants' burdens gradually became more intertwined, with other participants becoming more accustomed to the burdens of hearing-impaired students, suggesting that we were moving towards a universal environment.

< Key-words >

Hearing-Impaired Students, Group Work, Action Research

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## I. Introduction

The inability to adequately participate in learning environments integrating verbal input from multiple individuals, such as situations involving group work (hereafter, “GW”), is a widely recognized issue facing hearing-impaired students enrolled in higher education institutions – one raised by these students as well<sup>1)</sup>. Tertiary education often nurtures environments that cultivate problem discovery and resolution skills in students, which could consist of traditional classroom settings or lively discussions in which voices often overlap, making it difficult to distinguish between speakers or an individual’s position in the space. Although many hearing-impaired students receive support in the form of text-based or sign language interpretation, the use of such methods may lack the spontaneity required for discussion. FM microphones or other devices may help to bridge the gap, but associated equipment or audibility concerns could arise. Such difficulties with GW also include company meetings<sup>2)</sup> occurring after work hours. many cases of early turnover among hearing-impaired employees have been observed due to similar problems.

Therefore, it was necessary in this study to control the progression of GW scenarios and assess different management methods to facilitate sufficient comprehension by hearing-impaired individuals from their perspectives. Considering the impact of resulting changes on the auxiliary participants of the study was also crucial as it maintained the quality of discussions during GW. Hearing-impaired students are often too aware of their receiving support, and only receive more superficial elements of the discussion, it was especially important to avoid redundancy and obtain consent from participants in this study of hearing-impaired students conducted together with other students. In this way, we hope to balance the quality of discussions in GW with inclusion.

The present study aimed to assess different methods for managing GW scenarios in actual seminar classes at higher education institutions, utilizing action research techniques and accounting for hearing-impaired students, so that all types of students may progress smoothly.

## II. Methods

### 1. Action Research

The concept of action research (hereafter, “AR”) was proposed by the social psychologist, Lewin, in the 1950s. It sought to realize a better society through collaborative social practices between researchers and research subjects. This study was conducted in a manner similar to the ‘mutual approach’ method involving the participation of researchers and research subjects from equal positions<sup>3)</sup>. The researchers participated in seminar-style classes containing hearing-impaired students who were asked for their opinions on the management of GW methods. After study participants had been briefed on the general

intent and purpose of the study, they all approached the research with the mindset of working to improve each other's shared circumstances. After each time the end, we were allowed to describe their impressions and improvements of group work on paper to all participants.

## 2. Research Subjects

This study involved students enrolled in a seminar-style class containing 5 hearing-impaired students (2 undergraduate, 3 graduate), 7 non-disability students (4 undergraduate, 3 graduate), 1 instructor, and 2 support staff providing computer-based captioning. Sessions lasted approximately 90 minutes. Participants sat so as to form an enclosure. The captioning was occurring during the use of the cushion ball. Groups of two participants each presented the topic for discussion on a rotating basis. The discussion that followed was moderated by the seminar instructor.

## 3. Research Cycle

Study procedures were structured according to Kemmis and McTaggart's model<sup>4</sup>: ① Plan → ② Act → ③ Observe → ④ Reflect → ⑤ Re-planning. Each step was performed by members of the research team. Actual tasks performed as part of GW comprised Step ②, which included input from research subjects. The study was conducted between July and December 201x.

## 4. Assessment

Assessments were conducted based on three modes of data collection: filling out of reflection sheets (A5-sized paper/free-answer format) by participants after each seminar session, subjective evaluations by participants of their mental workload (Card-Sort TLX), and group interviews held with study participants.

## 5. Card-Sort TLX

Card-Sort TLX<sup>5</sup> is a 6-tiered scale, structure-based method for measuring subjective mental workload with respect to mental and physical demands, temporal demand, performance, effort, and frustration. Study participants rated their subjective burdens on a scale of 1–100, then weighted their ratings between scales, and finally, calculated their overall weighted workload (WWL). The NASA-TLX variant used in the present study, a system based on the NASA-developed NASA-TLX scale, assumes the paired comparison of ranking scales. Card-Sort TLX weights the scales in order and applies that order as a factor multiplied by the raw score from each scale. Because the sum total of the weighted factors is then divided, the burden attributable to each subject is minimal. Additionally, the scale's sensitivity is favorable and comparable to the conventional NASA-TLX scale. Given that the present study utilized an AR approach, with a single implementation occurring over a long period of time, and because the nature of the experiment, being

controlled, differs, we were not limited to measuring participants' burdens in a linear fashion. Rather, we were able to compare these scores to qualitative data such as participants' self-reflections, to be used as an index for improving GW in such environments.

## 6. Ethical Considerations

The present study was evaluated by and received the approval of the University of Tsukuba Research Ethics Committee. All participants received an explanation of the procedures of the study, and gave written informed consent.

## III. Results

### 1. Term 1 (baseline)

To ascertain the particular issues regarding management of seminar classes thus far, we arranged for 3 GW sessions to be conducted, with no intrusion by research staff, to serve as the baseline period. A review of participant reflections showed that hearing-impaired students "could not follow the flow of discussions" and "could not say anything even if they understood the content of the discussion, and just gave up." These responses coincided with previous research. By referencing the results of the Card-Sort TLX assessment (Figure 2) in all three baseline cases, we found that hearing-impaired students reported higher task burdens. Although the ranking scales used in the bar chart and for the assessment were 25% trimmed averages of all study participants, values for mental demand and effort were higher.

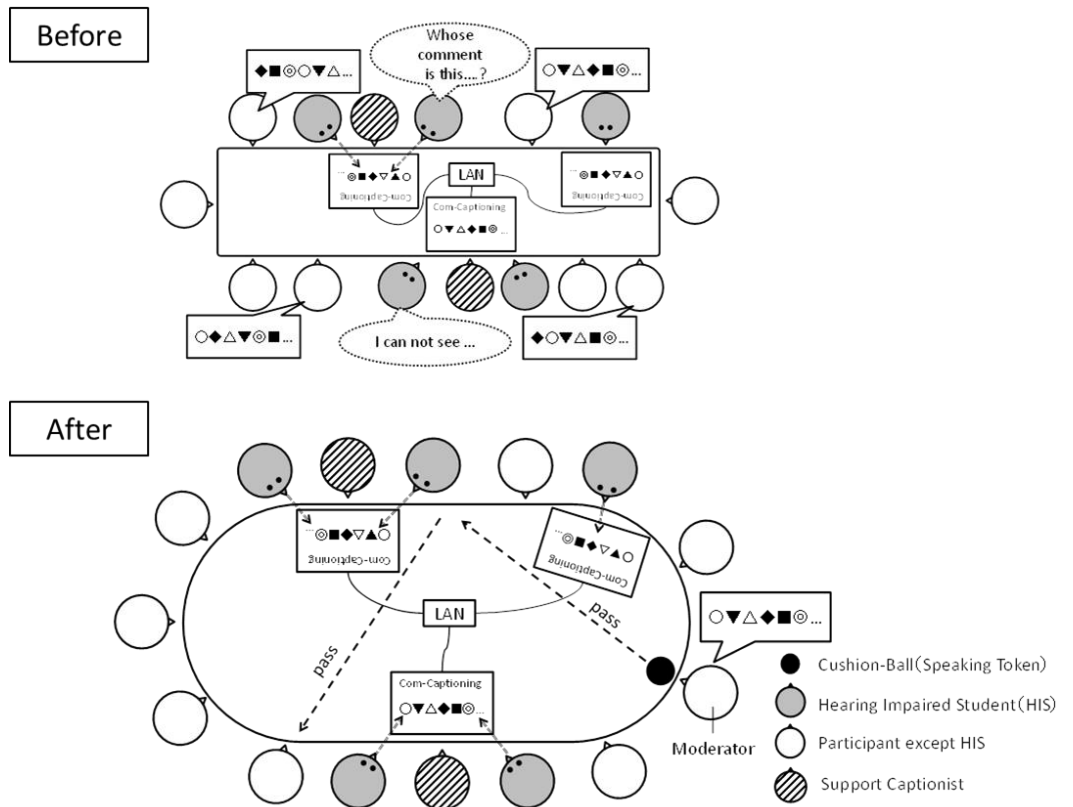
In accordance with these findings and the results of discussions with the research team, 3 changes related to GW were implemented up to that point:

[Management of Speaking Turns] Turns to speak were determined by passing a ball around (i.e., a cushion-ball manufactured by Hasbro), which clearly established whose turn it was to speak. In general, participants could not speak until they were holding the ball. Therefore, this was one way of dealing with comprehension concerns that hearing-impaired students had.

[Establishment of Moderators] A student was appointed as a moderator for each seminar class session. In addition to managing the aforementioned system, moderators warned participants of violation of discussion rules. Moderators could interject intentional delays into discussions, aid support staff in providing captions, and help hearing-impaired students in understanding the contents of discussions.

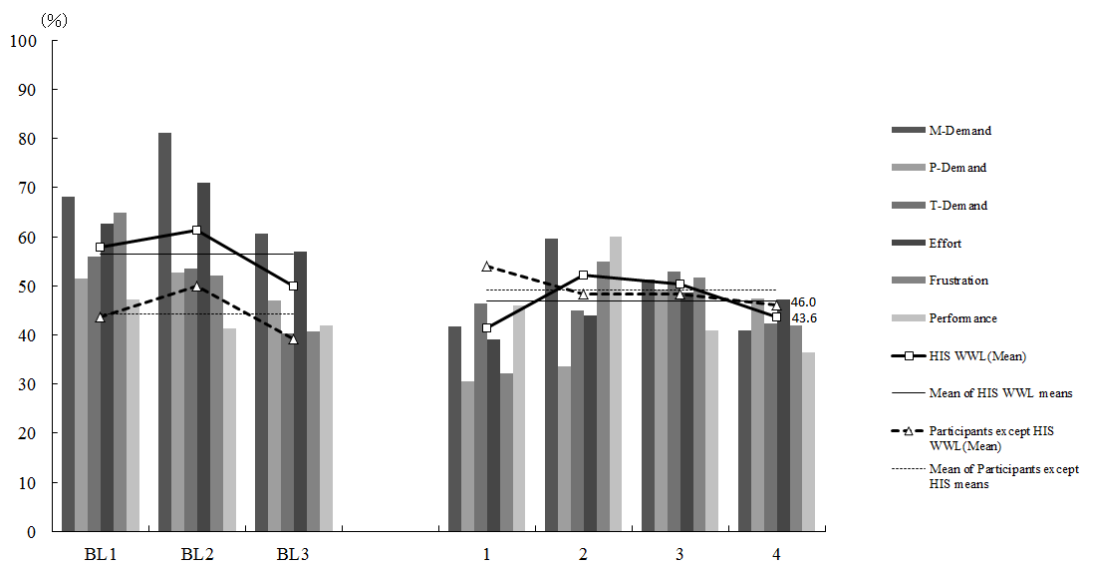
[Changes in Desks] We upgraded participants' seating arrangement to overlook one another from the previous oval-shaped desks.





NOTE: The majority of the support systems for hearing-impaired students in Japan are the real-time computer captioning by the software called IP-TALK(on Windows). In this study, the hearing-impaired students are getting text support via the captionists. Connecting multiple computers by LAN enables collaborated text entering. However, as the IP-TALK computer monitor works for both Support captionist's entering text and the student reading it, the student will be watching the monitor beside the Support captionist while he/she is typing all the time. Hence, there is an issue that hearing impaired students are not able to look at the speaker, and are not able to catch up with the proceedings of the discussion.

<Figure 1> Study Layout



<Figure 2> Result of Card-Sort TLX

## 2. Term 2

We conducted GW sessions inclusive of the aforementioned improvements gleaned from the previous 3 sessions. Hearing-impaired participant reflections indicated how they felt: e.g., “the pace of different speakers has become more relaxed, and there were fewer times when I could not understand the content of the discussion,” “students were able to participate with the help of the moderator’s guidance,” “this way of doing things allowed me to participate in discussions, too, and gave me confidence,” and “passing the ball made it easier to know who to focus on during conversations.” Comments from other participants were mixed: “it was easy to tell when someone’s turn to speak was over,” “there was not even one heated discussion,” “when someone’s turn to speak was over (and we forgot who’s turn it was), people would start to talk over each other,” and “I was not used to not being able to speak when I had something to say, and it was irritating.”

By referencing the results from the Card-Sort TLX assessment (Figure 2), we found that hearing-impaired and other students scored an average of 43.6 and 46.0, respectively, compared with the baseline, indicating that hearing-impaired students’ burdens were lower, while, conversely, other participants’ burdens were higher.

## IV. Discussion and Future Goals

In reviewing the Card-Sort TLX ranking scale, mental demand and effort values decreased while those for frustration increased. In reviewing participants’ reflections, we found that the speed of GW tasks fell as a result of research team intervention, causing hearing-impaired students to feel more at ease psychologically and other participants to feel constrained by the discussion restrictions and rules. However, participants’ burdens gradually became more intertwined, with other participants becoming more accustomed to the burdens of hearing-impaired students, suggesting that we were moving toward a universal environment. A limitation of this study is that the methodology for measuring group workload using the Card-Sort TLX requires further refinement of the study design.

Therefore, we would like to position this work as a pilot study for the scientific control of the multivariate field of GW. Because the study sought to improve upon the norm for conducting GW, results such as hearing-impaired students being “able to be confident” in discussions were achieved. Through such measures, and by establishing opportunities for trial and error, these students were able to cultivate basic skills relevant to career education as well. In the future, we will continue to conduct practical exercises and make quantitative evaluations, and would like to take an educational-technology perspective and consider ways to implement a holistic understanding of disability in inclusive education in school environments, while also aiming to build an environment in which all members can equally participate.

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