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Enhancing Throat Singing Skills THROUGH Traditional Breathing Exercises: Field-Based Observations OF Student Practice

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Abstract
This study investigates how traditional breathing exercises impact the development of breath control in khöömii (throat singing) among students at the Mongolian National University of Arts and Culture (MNUAC). Field-based training sessions were conducted in natural environments to promote embodied vocal learning. The authors tested the claim that the length of breathing will be greater after training in the countryside, when compared to training in the classroom. Testing involved the use of two exercises "Counting White Bottles" and "Counting Bowls" to assess their effects on students' breath endurance and capacity. Changes in the number of syllables vocalized in a single breath and the duration of exhalation were measured using a chronometric method. The findings revealed no major difference in these factors, between the two locations. However, a significant improvement in students' breath control, vocal strength, and timbre was observed by all three Instructors. Field training exercises may instead, have an important, significant effect on improving khöömii performance.
Keywords: *Human-nature relations, Mongolian throat singing, pedagogy of "khöömii," professional khöömii, breath control.*

INTRODUCTION

In Mongolia, "Khöömii is a specialized vocal art that is considered to be about creating the sound of musical instruments with the voice (khöömiilökh), rather than about singing. Also, a distinctive vocal art that demands a high level of breath and resonance control, enabling the simultaneous production of multiple harmonic tones. Although khöömii has involved more formal training in Mongolia for the past 20 years, the training process and outcomes have not been thoroughly studied; as a result, much of the available information and reference material relies heavily on oral history. Musicologist Tsedeng-Ish (2009) has summarized the origins and development of khöömii training, while musicologists Gantsetseg (2008) and Zulsetseg (2014) have talked about challenges and innovations within existing training programs. However, empirical data on how such practices concretely affect students' technical progress remains limited.

At the Mongolian National University of Arts and Culture (MNUAC), its 'Mongolian Khöömii' degree program began to be offered in 2004, marking a pioneering step in ensuring its continuance in Mongolia and globally. In establishing this education and training program, Instructor B.Odsuren designed the professional khöömii undergraduate curriculum and training plan, based on his knowledge and experience, which was rooted in traditional methodologies. (Author1, Author3, Author4 2024) French Ethnomusicologist Dr. Johanni Curtet has addressed the influence of MNUAC's urban training, on rural instruction. With the introduction of formal khöömii training at MNUAC, rural khöömii performers soon started to excessively imitate Ulaanbaatar performers' khöömii style. Curtet (2018) suggested that attention should be paid to the fact that the original characteristics of training are disappearing. Thus, in order to retain the richness of traditional training of, and ethnic diversity in khöömii practice, MNUAC is attempting to maintain its training practices. He has in 2011, a course on 'Production Practice' was added to the curriculum, and a second 'Field Practice' course was added in 2012.

Initially, field practice took place around the capital city of Ulaanbaatar; in the Bogd Mountains at its southern edge, and on hills in the peri-urban ger districts to the north (Curtet 2020). Since 2014, MNUAC established the 'Egshiglen' eco-camp in a nearby location in the Mongolian countryside, facilitating practical training sessions not only in khöömii but in the associated traditional arts as well. The field training exercises (See Table 1) courses offered within the "National Traditional Arts" program at the Mongolian National University of Arts and Culture (MNUAC) emphasize the embodied connection between nature, the human body, and sound.
TABLE 1 HERE
These outdoor sessions are considered essential for fostering a deep awareness of environmental resonance and vocal sensitivity. Initially, intended for second-year students only, field practice has, over the past three years, been open to students of all levels who choose to participate. In order to provide the best possible training environment and techniques to maintain and improve this traditional Mongolian cultural singing practice, it was necessary to first collect baseline information. The mastery of khöömii performance extends beyond auditory perception and tonal placement, relying heavily on precise physiological coordination-particularly the development of breath control skills. This study aims to examine the effectiveness of two traditional breathing exercises, "Counting White Bottles" and "Counting Bowls," on length of breathing, as implemented in natural field settings, compared to classroom settings. The authors argue that the length of breathing will be greater after training in the countryside, when compared to training in the classroom..

METHODOLOGY

This study utilized a mixed-method approach, combining structured and naturalistic observation with time-based performance analysis, to assess the development of students' throat singing (*khöömii*) techniques and respiratory capacity. Field-based training sessions were conducted over five consecutive days as part of the Mongolian National University of Arts and Culture's "National Folk Art" curriculum. Daily observations focused on key indicators, including session duration, students' breath control, vocalization strategies, instructor interventions, and student engagement.

To evaluate respiratory development, two traditional breathing exercises-*Counting White Bottles* and *Counting Bowls*-were employed, specifically within the context of *shakhaa khöömii* (pressured style) and *kharkhiraa khöömii* (growling style). These exercises measure the duration and steadiness of sound production on a single breath. Timed performances were recorded on the first and final day using mobile-based chronometric tools, and compared to training hours and environmental factors such as location, altitude, and terrain, logged via a mobile application.

In addition to performance metrics, students' subjective reflections and experiential responses were collected through semi-structured interviews to gain insight into how they perceived changes in their own breathing and technique. These qualitative data provided contextual understanding of the physiological and psychological dimensions of the learning process.

Sampling and participants

In this study, participants were not pre-selected. Data from some of the students were cross verified through interviews to confirm observational findings. The field training cohort consisted of 9 undergraduate students (8 male, 1 female) and 3 instructors (all male). One male participant withdrew on the third day due to personal reasons, and another male participant joined the group for additional exercises on the fourth and fifth days. Therefore, the results of the observations and research are reported based on the data from the remaining 7 students (6 male, 1 female) Participants in this study were not pre-selected; instead, the research was conducted with students who were already enrolled in the training program during the field study period. To enhance the reliability of observational data, selected findings were cross-validated through follow-up interviews with several student participants.

The field training cohort initially comprised nine undergraduate students (8 male, 1 female) and three male instructors. However, the participant composition changed slightly over the course of the training. One male student withdrew from the program on the third day due to personal reasons. Conversely, another male student joined the group for additional training sessions on the fourth and fifth days.

As a result of these adjustments, the final analysis and findings presented in this study are based on seven students (6 male, 1 female) who consistently participated throughout the observation period.

Exercises

- Counting white Bottles and counting bowls: These two methods derive from Mongolian traditional, oral cultural games played by countryside children; they improve the child's lung capacity as they imitate each other during play:
  - Counting white Bottles (*tsagaan lonkh*): Participants say the Mongolian words for 'white bottles,' using the *shakhaa khöömii* technique, a type of overtone singing, progressing from "1 white bottle, 2 white bottles, 3 white bottles..." up to "32 white bottles, 33 white bottles..." until their breath is exhausted.
  - Counting bowls (*khul)*: Participants say this Mongolian word (for the special bowls used to drink airag - fermented mare's milk) using the *kharkhiraa khöömii* technique, progressing from '1 bowls, 2 bowls, 3 bowls...' up to '24 bowls, 25 bowls...' until their breath is exhausted, utilizing the *kharhiraa* style of throat singing.
- Participants practice phrases containing a high degree of vowel and consonant involvement, such as "*Luvsanperenlei," "Dondogperenlei," "Bumbug buurunkhii," "gulgur gulchgur gulum," "khonkhor khotgor gazar," "Gongor," "Khongor,"* etc., utilizing the *khöömii* style of throat singing.
- Imitating Motorcycle and Car Sounds: Participants will produce sounds imitating motorcycles and cars (such as a prolonged "*trrrrrrrr*" by vibrating their tongues to relax the tongue muscles).
- Lifting Stones While Throat Singing (*khöömii*): Participants lift stones weighing between 5 to 25 kg while throat singing, performing this exercise on an incline of approximately 15 to 20 meters.
- Throat Singing While Walking Long Distances: Participants perform throat singing while walking at a leisurely pace for 3 to 4 hours, covering 8 to 10 km across flat terrain and rolling hills, incorporating throat singing exercises during the ascent and descent (Author1 2025).
- Throat Singing While Ascending Mountains: Participants perform throat singing while hiking on unevenly elevated terrain, navigating the summits of hills and mountains, and executing throat singing exercises during both the ascent and descent.
- Throat Singing While Lying on an Incline: Participants lie on sloped surfaces, such as those found on the sides of mountains or riverbanks, while practicing throat singing. Depending on the exercise position, they keep their heads and feet elevated from the ground and execute the exercises in various ways.
- Throat Singing While Listening to Distant Sounds: Participants stand in groups of 2 to 3 at 3 to 4 different elevations, practicing throat singing while listening for distant sounds that travel between the heights.
- Throat Singing Barefoot on River Stones: Participants will walk barefoot in a circular formation on warm, smooth stones along the riverbank while practicing throat singing.
- Blowing Air into Flowing Water: Participants immerse their nose and mouth in flowing water while lying down, blowing air until their breath is exhausted.
- Throat Singing with Water in the Mouth: Participants hold a small amount of water in their mouths while tilting their heads slightly backward, practicing prolonged throat singing.
- Throat Singing Against the Wind: Participants practice throat singing while walking at high elevations or long distances, utilizing both the throat singing (*khöömii*) and isgeree styles against the wind currents.
- Other[1]

The exercises were conducted in varied locations. For instance, at the beginning of the walking distance exercises, the Instructor provided brief instructions and then visited each participant during the exercise to offer advice and guidance. In contrast, exercises performed along riverbanks or on mountain slopes tended to be executed individually, with a tendency for participants to imitate one another. Naturally, the Instructor would address and correct any mistakes made by individual learners during the exercises. Field training typically lasted from 5 to 10 consecutive days. The Instructor adjusts the timing of exercises based on environmental conditions and the participants' workload. A notable characteristic of the training was the emphasis on

[1] In addition to these exercises, the "Cloud Chasing *khöömiilökh*" exercise may also be conducted during the field training (B. Odsuren, personal communication, 2024). This exercise, also known as "cloud splitting" or "cloud chasing," involves lying face up on the riverbank, listening to the soothing sound of running water, and focusing on a thin cloud floating in the sky. The goal is to measure the cloud with the breath and blow it in one breath until the cloud disintegrates. During this exercise, the legs should be in a comfortable position, with the hands placed on the abdomen to feel the breathing. (Örnö 2013). However, there was no opportunity to perform this exercise during the observation period in this study.

executing two to three actions simultaneously. For example, performing exercises in a supine position on sloped gravel areas near the riverbanks or mountain slopes was common, requiring participants to keep their feet and heads elevated from the ground and flowing water while monitoring breath control and distribution, as well as paying attention to the harmonics of *khöömiilökh* throat singing. Additionally, during long-distance walking or climbing, participants frequently experienced difficulties such as breathlessness and fatigue when practicing specific phrases or pitches in throat singing (B.Bayarbaatar, personal communication 2024). Furthermore, while lifting stones, the exercises were performed on sloped surfaces rather than flat ground. Observations during the sessions indicated that exercises requiring dual movements demanded greater endurance from the participants. These exercises were categorized into three main sections based on purpose, execution, and outcomes: breath control exercises; exercises for regulating the muscles of the tongue and lip; and exercises for enhancing musical tone and strength (see Table 2).

TABLE 2 HERE

To quantify how much time each student spent on daily exercises, a chronometric approach was used. Each exercise was performed for different durations: the long-distance walking exercise took 2-3 hours, the uphill hiking exercise required 35-45 minutes, and the barefoot walking exercise on river pebbles lasted 10-20 minutes. Some exercises required timing in minutes, while others needed precision in seconds; this is because breath control exercises, such as counting with a white bottle, counting with a stick, gargling water, and blowing air underwater, were typically completed in less than one minute.

RESULTS AND DISCUSSION

Although the field training lasted for six days, the exercises on the first and last days were conducted for only a few hours each, thus we aggregated them and considered them as one full day. (see Table 3).

TABLE 3 HERE

As seen in Table 3, on the second and fifth days, the training sessions lasted longer than on the other days. This is attributed to the completion of long-distance walking exercises of 8 and 10 km on those days, resulting in a relatively extended duration of training compared to the others. Although the Table includes information from 9 students, the third and tenth students were unable to fully participate in the training due to extenuating circumstances. Therefore, the results of the observations and research are reported based on the data from the remaining 7 students.

The minimum average time spent on exercises by a student in one day is 196 minutes (3.2 hours), while the maximum is 203 minutes (3.38 hours). Observations by the Instructor indicated that the vocal strength in throat singing had significantly improved, over the observation period, particularly among students who dedicated more time to daily training. However, it was also noted that some students, despite spending a long time on exercises, exhibited a decline in physical energy and motivation during the sessions. Although the Instructor attempted to balance the load of the exercises scheduled for the morning and afternoon, the health risks associated with each training session had to be carefully assessed between sessions. Other observations included the "Counting white bottles" and the "Counting bowls" exercises, performed at a fixed position without any movement after each daily session, allowing the monitoring of changes in respiratory capacity (see Table 4a, b).

TABLE 4 HERE

Table 4 indicate that the 'Counting bowls' exercise requires a comparatively shorter duration than the 'Counting white bottles' exercise. This is likely due to the fact that during the execution of *kharkhiraa khöömii*, a greater volume of air is expelled relative to the execution of *shakhaa khöömii* (Author 1, Author 3, Author 4 2024), which was observed throughout the exercise sessions, resulting in a more rapid depletion of inhaled air. Further examination of the functionality of the vocal apparatus during the processes of *kharkhiraa* and *shakhaa*, as well as the ongoing respiratory mechanisms, have been noted in medical research findings (Tsagaankhuu, Ganchimeg, Byambasuren &Nyamdorj 2023).

A comparative analysis of the exercises conducted with the *shakhaa* and *kharkhiraa* throat singing techniques, is presented on Figure 1.

	Field	***Classroom***

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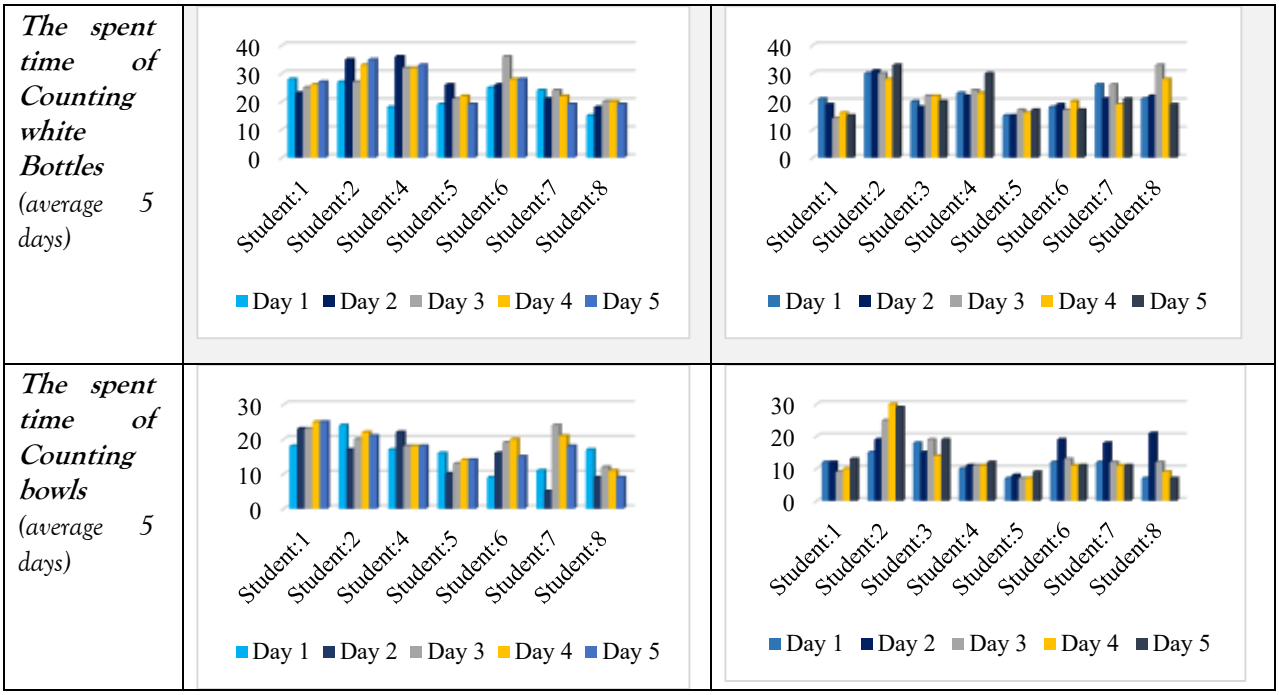

Figure 1. *A comparative analysis of the fluctuations in respiratory capacity in relation it the time it took to achieve the task for daily exercises is presented ("Counting white bottle" and "Counting bowls")*

The assessment of changes in breath capacity through the 'Counting white bottles' and 'Counting bowls' exercises over five days reveals an increase in breath capacity during the second day's 'Counting white bottles' exercise among 5 of the participants. Conversely, the greatest increase in breath capacity for the 'Counting bowls' exercise was observed on the third and fourth days. Consistent improvement was also noted in the 'Counting white bottles' exercise on these days. When associating these results with the exercises performed on those days, it appears that the long-distance walking and throat singing exercises conducted on the second day, specifically with shakhaa khöömii, contributed positively to the increase in respiratory capacity. In contrast, the long-distance walking and mountain climbing exercises on the third and fourth days may have adversely affected respiratory capacity during *kharkhiraa khöömii*. This is supported by the observation that the duration spent on the 'Counting bowls' exercise using kharkhiraa decreased on the second and fifth days compared to the previous day. Notably, on both the third and fourth days, the participants engaged in the more physically demanding exercise of lifting stones while performing throat singing on an incline. This increased physical demand likely contributed positively to respiratory capacity. While we initially anticipated that the respiratory capacity of the majority of participants would improve due to the long-distance walking or prolonged training sessions on the second and fifth days, the comparative results did not demonstrate a clear association. However, the findings suggest that strength-training exercises, such as weight lifting, not only enhance the tonal quality and power of throat singing but also may positively influence respiratory efficiency and regulation.

To further examine the impact of training duration on respiratory capacity, we conducted an assessment of 8 students (6 males and 2 females) who had not participated in the field training. These students performed the 'Counting white bottles' and 'Counting bowls' exercises during five classroom sessions. They spent a minimum of 45 minutes and a maximum of 105 minutes in a single professional class (see Table 5).

TABLE 5 HERE

Participants reported that they spent varying durations on independent training sessions, influenced by environmental conditions, in addition to their classroom instruction. It would be overly simplistic to claim that they did not engage in any preparatory training due to their lack of participation in the field exercises. Therefore, to enhance the accuracy of the information, we inquired about the training activities they undertook during the summer break. Two senior year students (students 2 and 3) indicated that they practiced by performing in a stage environment. The remaining participants were first-year entrants. (see Table 6a, 6b).

TABLE 6 HERE

Observations of the 'Counting white bottles'and 'Counting bowls' exercises indicated that participants who did not engage in field training generally demonstrated lower performance levels than their counterparts who participated. Notably, participants with prior stage performance experience during the summer break exhibited results comparable to those of participants who had undergone field training. This finding suggests that the variations in lung capacity among participants are directly related to extended training duration, irrespective of the training environment. To enhance clarity in comparing the exercises conducted in these two distinct settings, the average duration of the participants' training sessions over five days is presented below (see Figure 2).

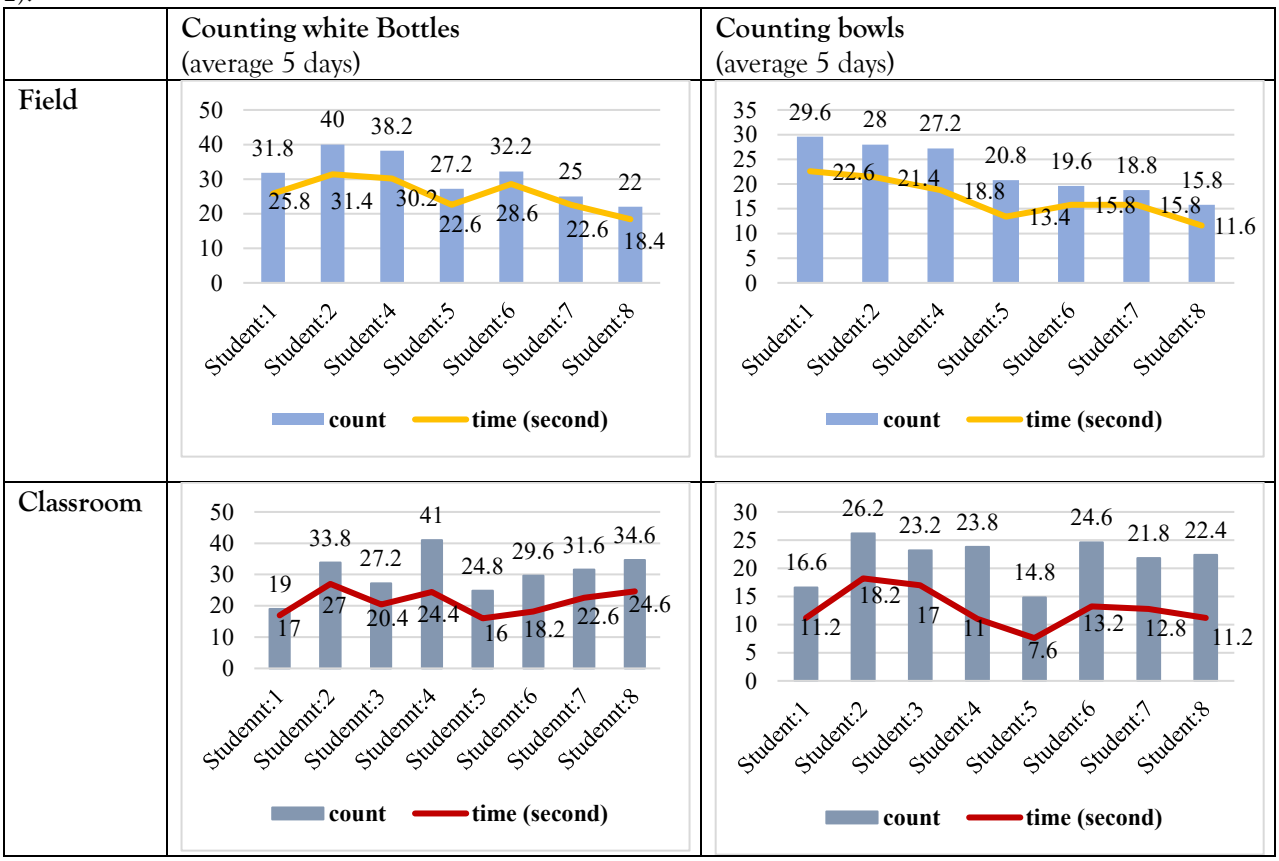

Figure 2. *Average performance metrics of the two exercises conducted in field and classroom environments over a period of five days.*

If the participants engaged in field practice had been observed again during the classroom sessions, it would have been possible to compare the improvement of each participant. However, to explore the impact of field practice on performance, the focus was more on the pulmonary capacity measurements of participants who did not participate in the field training. This is because it was hypothesized that students who did not participate in field training would have relatively lower lung capacity.The observational results indicate that the 5 days average performance duration for the 'Counting White Bottles' (*shakhaa khöömii*) exercise among participants who underwent field practice was maximum duration 31.4 seconds, minimum duration 18.4 seconds, whereas the maximum duration recorded for participants in the classroom setting was 30.4 seconds, minimum of 16.4 seconds. For the 'Counting bowls' (*kharkhiraa khöömii*) exercise, the average duration for field participants was maximum duration 22.6 seconds, minimum duration 11.6 while classroom participants recorded a maximum of 18.2 seconds, and minimum of 8.6 seconds.

If we analyze the average time allocated per student for the "Counting white bottles" and "Counting bowls" exercises over five days, notable differences emerge between students who participated in field practice and those who completed the exercises in a classroom setting. For the "Counting white bottles" exercise, the average time recorded by students engaged in field practice was 25.6 seconds, compared to 21.9 seconds for students who did not participate in field practice. Similarly, for the "Counting bowls" exercise, the average time for

students in field practice was 17.1 seconds, while those who remained in the classroom averaged 13.2 seconds (see Table 7). Although these differences may appear minor, they are significant when considering that the breathing exercises involved in the art of *khöömii* are measured in seconds, highlighting the impact of field practice on performance.
TABLE 7 HERE

CONCLUSION

It was initially assumed that the time required to complete the "Counting white bottles" and "Counting bowls" exercises would differ significantly between students who participated in field practice and those who did not. However, the measured differences were minimal. Nevertheless, it is important to emphasize that this was exploratory study, conducted to gather preliminary data and establish baseline measurements, which would inform focus areas for continued, future research.
The study did reveal, however, that there was a significant improvement in breath strength, as evidenced by the following observations, which were made by all three Instructors: that engaging in various exercises outdoors- such as throat singing while walking long distances, throat singing against the wind, climbing and descending mountains, throat singing barefoot on river gravel, listening to the sound of flowing water while singing, and lifting stones - noticeably enhanced students' breath control, vocal strength, and timbre. These preliminary findings indicate the need to look further into the field exercise component of instruction, for improving the training of *khöömii* singers in university degree programs.

Notes

1. In addition to these exercises, the "Cloud Chasing *khöömiilökh*" exercise may also be conducted during the field training (B. Odsuren, personal communication, 2024). This exercise, also known as "cloud splitting" or "cloud chasing," involves lying face up on the riverbank, listening to the soothing sound of running water, and focusing on a thin cloud floating in the sky. The goal is to measure the cloud with the breath and blow it in one breath until the cloud disintegrates. During this exercise, the legs should be in a comfortable position, with the hands placed on the abdomen to feel the breathing. (Örnö 2013). However, there was no opportunity to perform this exercise during the observation period in this study.
2. Breath control: Focuses on enhancing lung capacity and breath sustainability, essential for *khöömii* techniques. (Table 2)
3. Tongue & Lip Regulation: Exercises that target fine motor control of the vocal tract, including articulatory strength and precision (Table 2)
4. Tone & Strength Development: Aims to improve vocal resonance, power, and tonal clarity specific to *khöömii* performance. (Table 2)
5. "*Tsagaan lonkh toolokh*" and "*Khul toolokh*" are traditional breath control exercises rooted in Mongolian oral play and used as proxies for respiratory capacity in this study. (Table 2)
6. Total Time over 5 Days: Total cumulative breath-holding duration of one student across five days. (Table 7)
7. Average per Student: Mean value of all students' daily averages over five days. (Table 8)

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