

Using kinesthetic exercises in teaching

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Introduction

There are many teaching styles for university teaching (Entwistle, 2007, Rienecker et al. 2019). In this report, I will focus on a tool called kinesthetic learning exercises, or just kinesthetic exercises. Kinesthetic exercises play a vital role in teaching by actively engaging students through movement and hands-on activities. While these methods are particularly beneficial for kinesthetic learners—students who absorb information most effectively through physical activity rather than passive listening or reading—they can enhance learning for all students, regardless of their preferred learning style.

Kinesthetic exercises are likely taking advantage of coupling in the mind called embodied cognition (Bruun & Christiansen 2014), where our perception of and understanding of the world are not only formed in our minds but also through our senses and physical interactions with our surroundings. Hence, movement and sensing help us grasp abstract topics and create memories.

Incorporating kinesthetic exercises is not about repairing a problem in teaching, but about refining and enriching the learning experience. Integrating movement-based activities can make a well-structured lecture more dynamic, interactive, and memorable. Through my experience, I have come to appreciate the potential of kinesthetic exercises in improving retention and comprehension of the material.

By incorporating these exercises, I aim to make my teaching more engaging and effective. Activity-based learning fosters more profound connections between theoretical concepts and real-world applications, making lessons more meaningful and interactive.

Additionally, physical engagement can help sustain students' attention, reduce cognitive fatigue, and create a more inclusive learning environment.

As I continue to develop my teaching methods, I seek to explore and implement a variety of kinesthetic exercises to enhance student participation and understanding. This approach will benefit kinesthetic learners and add diversity to instructional strategies, ensuring lessons resonate with a broader range of students. Among the key benefits can be listed:

1. **Enhances Engagement** – Movement-based activities keep students actively involved, reducing boredom and increasing focus.
2. **Improves Retention:** Physical experiences help reinforce memory, making learning more effective. They may also help students remember what they did and what happened in class.
3. **Supports Different Learning Styles** – Kinesthetic exercises complement auditory and visual learning for a well-rounded education. The more channels of communication we engage in, the better the material will get through cognitively.
4. **Encourages Collaboration** – Group activities and hands-on projects build teamwork and communication skills and break down barriers between teachers and students.

Examples of Kinesthetic Exercises:

There are many different examples of kinesthetic exercises, and their type will depend on the field and topic. The student's age or audience, in general, is also essential to determine what kind of exercise will work. Regardless, even a lousy exercise is better than no exercise. Here are some examples from the literature or what I could think of from my past:

- **Role-playing & Dramatization** – Acting out historical events or scientific concepts.
- **Hands-on Experiments** – Science experiments, math manipulatives, or interactive problem-solving. Example: Measuring the angular momentum of rods rolling down an incline (Richards, 2019). The folding of a sheet of paper to illustrate a topological concept, e.g. how

the neural tube is formed out of sheets of tissue during embryo-development.

- **Movement-based Learning** – Using gestures, dance, or physical games to reinforce vocabulary or concepts.
- **Tactile Activities** – Building models, crafting, or using physical objects to explain abstract ideas.
- **Scavenger Hunts & Outdoor Learning** – Incorporating movement into lessons through exploration and real-world application.
- **Learning tables (mostly for kids)**. The class stand up and individuals jump when their number is part of the small table is shouted by the teacher, e.g. jump on 2, 4, 6.. etc.
- **One student gets a whistle**: While working through some electromagnetism mathematics derivations, the student must blow the whistle every time the teacher uses one of Maxwell's equations. This turns dry math into a game, and everyone pays attention. People always love games and fun competitions.

Best Practices:

- Incorporate **structured** movement to keep lessons focused. Practice and try it before. Never improvise.
- Provide **varied** activities to cater to different subjects and learning objectives.
- Utilize **technology**, such as virtual simulations, interactive whiteboards, or student-controlled online tools like *Sendsteps*, *Padlet*, *Mentimeter*, and *Menti*.
- Assess students through **performance-based tasks** instead of traditional tests.

Plan for kinesthetic exercise in my teaching

The settings and context of the project are that I am teaching medical students in the 3rd semester. The topic and course module are the Central Nervous System. The two lectures I will give are on the inner ear. The number of students in the course/module: 300-400, hence it is a large lecture format, which can be a challenge (Geske, 1992, Nyagope 2023).

I will use sound coming from me to the students to illustrate certain aspects of hearing.

Besides the listed advantages of kinesthetic exercises in general, they serve a particular purpose in this course. I teach “the inner” and the auditory system. Part of the curriculum is understanding how our hearing allows us to localize sources in the horizontal plane for low but now high sound frequencies.

Point-by-point plan:

1. Briefly explain the exercise to the students: You have to close your eyes and point towards the perceived location of the sound
2. Students close their eyes
3. Teacher sneak to a different (unknown) location
4. Teacher starts the sound from this new unknown location
5. Students are asked to point to the perceived location, while keeping their eyes closed.
6. Now the students are asked to open their eyes to see the real location, and how they performed.

This is performed for low frequency first. Then repeated for high frequency for comparison.

Hence, we can directly test the student's ability to localize sounds using a sound source, my mobile phone, with a sound-generating app (tone generator). This is very instructive for the students. Having their eye closed and not knowing where I am, then having to point their fingers toward the sound source i.e. where I am standing in the room, as they listen to two different frequencies (400 Hz and 10 KHz), it will become apparent that most of the students are not able to do it for high frequencies.

Of course, I could have just told them this, but they would not have internalized and remembered it. Surprisingly, many people are not aware of this difference between high and low frequencies of sound. I expect most students to remember this aspect after attending the lectures.

Outcome and Feedback

During the lecture, I performed a kinesthetic exercise. I inspected their ability to localize sounds by observing how many people pointed towards me. I asked people to open their eyes and see how many (few) could localize the sound in space.

This should clearly illustrate the point I am making, which is that localizing sound in space depends on the frequency. With the integration of student-controlled online tools like sendsteps.com (or Mentimeter and Kahoot), I can probe the effectiveness of the exercise, which will also be a central element of the evaluation. Probing question was the following:

Table 1. Probing question and results. 64.5% can easily locate sounds in high frequency. 25.8% sounds in low frequency and for 9.7% the frequency did not have an effect. Based on in total 31 votes.

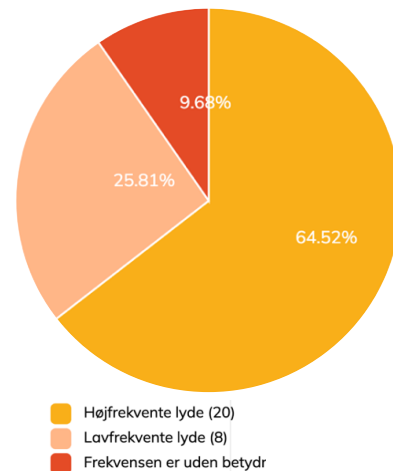
Hvilken lydkilde er nemmest at lokalisere for hørelsen?

A. Højfrekvente lyde 64.5% (20 votes)

B. Lavfrekvente lyde 25.8% (8 votes)

C. Frekvensen er uden
betydning 9.7% (3 votes)

Total 100.0% (31 votes)



Student evaluation of the kinesthetic exercise

To test the effectiveness of the exercise, I asked the students to fill out a questionnaire on the online screen application (menti.com, or padlet). Questions for students: 7) Evaluering af kinæstetisk øvelse: Synspunkter?

Which translates to English as “Evaluation of the kinesthetic exercise: Comments”. The results from the questionnaire are the following:

”Det var godt med noget involvering af os med øvelser. Det gør at man husker det bedre”

”Godt afbræk og sjovt nok”

”Det fungerede fint :-)”

”Meget sjovt”

”Stor fan”

”Det fungerede godt.”

”Det var godt med noget aktivt for deltagerne, og syntes det illustrerede en god pointe, selvom det måske ikke præcist virkede”

”Jeg synes, at det fungerede rigtig fint, og at det var fedt at blive aktiveret”

”God ide at give tid til at tænke over svar, samt at vente med at 'afsløre svaret' for at fastholde koncentrationen/interessen. Genialt at have resumé undervejs.”

”Mega fed forelæsning - dejligt med resumeer undervejs, så man ved, hvad der er vigtigt og godt at blive aktiveret undervejs”

”Det hele fungerede super godt!”

”Virkelig godt med interaktive øvelser! Man vågner lige op og forstår og husker teorien meget bedre! Og god energi :)”

”Ved den højfrekvente tone, nåede mange at se, hvilken retning du bevægede dig i. Forklarer måske, hvorfor de fleste kunne lokalisere lyden :) “

Colleague's evaluation of the Kinesthetic exercise

Here will be put a couple of sentences and evaluations from Ole Kjærulff and Lars Klingenberg from the double lecture that they attended on 6 May, 2025:

[Lars Klingenberg, pædagogisk konsulent (from notes)]

”Overordnet: Som forelæsning, er de to forelæsninger, du gav, noget af det bedste jeg har set. 1) De afgrænsede sektioner med resume fungerer rigtig godt. Det gør det nemt og hurtigt at fordøje og underbygger din narrativ. 2) Der er mange gode figurer som fungerer pædagogisk godt: Man zoomer ind fra det ydre øre ind i det indre. Farvekoder i kurver underbygger også forklaringerne, med minimalt overflødig indhold (med få undtagelser). 3) Du er god til at bruge analogier feks. trommesæt, som virker virkelig stærkt. Du begik kun få talefejl, som du dog hurtigt fik rettet. Overordnet virkelig gode forelæsninger, som fungerer godt. Vedrørende den kinæstetiske øvelse: Du kan sagtens inkludere flere øvelser, og forbedre dem du har. Feks. stiller du mange retoriske spørgsmål, (feks. ”hvad er lyd”), som du selv svarer på. Der kan du bede folk om at diskutere det 2 og 2, inden du giver svaret. Jeg foreslår også at du kan bede folk om at række hånden i vejret når de først kan høre de lave frekvenser i audiogrammet. Senere kan du spørge folk om hvorfor vi har 2 ører. Arbejd med folks tal-forståelse. Faktor 50 versus en faktor 1 million. Kæmpestor forskel. Jeg foreslår også at du gentager øvelsen med lyden 2-3 gange for at folk er helt med på hvad det går ud på og dermed får mere ud af den. Du kan sagtens have flere kinæstetiske øvelser med.”

[Ole Kjærulff, lektor og erfaren kollega (from notes)]

”Overordnet: God forelæsning. Jeg er glad for den begejstring du udtrykker for klassisk neurofysiologi. Dine resumeer virker godt og jeg overvejer selv at bruge dem. Også fint at du skriver hvad der er uden for pensum direkte på dine power point slides. Med hensyn til fagtermer, så er det vigtigt ikke at bruge Engelske ord.

Studerterne skal allerede lære både Danske og Latinske ord i neuroanatomi, og det er unødvendigt også at bruge Engelske ord.”

Discussion: pros and cons of kinesthetic exercises

The pros of using kinesthetic exercises are listed above in the introductions. The cons are primarily that it slows down the teaching and it can be difficult to go through the entire material in the given time. But overall, I consider the benefits of kinesthetic exercises to outweigh the shortcomings. The exercise I planned and executed worked amazingly well. I will certainly use it in the same lectures in the future. I will also use kinesthetic exercises more in my other teaching, and potentially in my scientific presentations as well, if possible.

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