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Thermal comfort of adolescent children – Engaging children for improving reliability of responses

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SUMMARY
When attempting to assess children's thermal comfort, children may interpret the survey instruments differently than adults and especially the researchers. In this work, we briefly summarize our development of a child-centric methodology to engage 8-11-year-old students in a living lab setting. Through interactive videos, pictorial questionnaires, and open discussions, 20 participants explored concepts like thermal comfort, sustainability, and energy efficiency. The engagement strategies ensured high involvement and reliable responses. The study highlights the importance of tailoring research instruments to children's requirements and offers a protocol adaptable for future studies.

KEYWORDS
thermal comfort; engagement; thermal comfort questionnaire; children's thermal comfort; classrooms

1 INTRODUCTION
Thermal comfort in classrooms is critical for students' well-being and learning effectiveness. Adolescent children have distinct thermal comfort needs compared to adults. Existing research often relies on adult-focused instruments and methodology to engage children. But, as has been established, participants may not interpret thermal comfort questionnaire in the manner as researchers intend (Schweiker et al., 2020). This raises questions regarding the reliability of responses. We intended to address this drawback, specifically for children as participants, by developing an engagement methodology for school students in a living lab setting. Our approach is summarized in this work.

2 METHODS
The study involved 20 participants aged 8-11 years in a living lab environment. A multi-faceted engagement plan was created which included:
Introduction Session: Children were briefed on the study's objectives and their role as participants, viz. Assistant Scientists (Figure 1 a).
Instructional Videos: Videos covered topics like thermal comfort, sustainability, and energy efficiency, making concepts relatable.
Pictorial Questionnaires: Traditional scales were replaced with pictorial representations for accessibility (Figure 1 b).
Interactive Discussions: Children were encouraged to share their perception and thoughts around thermal comfort, climate change, and energy-efficient classrooms.
The overall engagement lasted four hours. We developed engagement instruments in both English and Danish. Detailed instruments are available upon request.

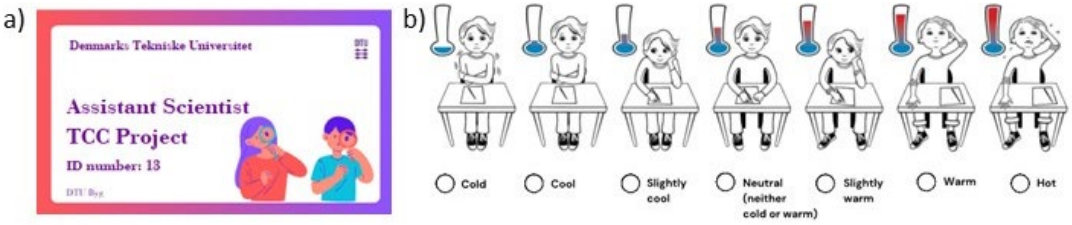


Figure 1. a) The "Assistant Scientist" badge, intended to impress upon children their key role in the study. b) Pictorial, gender neutral, thermal sensation scale.

3 RESULTS

A summary of children's thermal comfort responses have been discussed in a previous work (Caporale et al., 2024). The reliability of the children's responses for thermal comfort-acceptability questions and the wellbeing related questions was assessed using Cronbach's alpha. We found a high internal consistency for both the wellbeing ($\alpha = 0.87$, 95% CI: 0.83-0.91) and thermal comfort-acceptability ($\alpha = 0.89$, 95% CI: 0.86-0.94) clusters in the questionnaire. This suggests that the engagement strategies were effective in eliciting consistent and reliable responses.

4 CONCLUSIONS

This study highlights the importance of participant-centric methodologies in thermal comfort research. One important goal was to ensure that children felt they were an essential part of the study. We did not want to go in as "experts" conducting a study on the children. Rather, we were "scientists", working with the children. Prioritizing children's engagement ensures accurate data, supporting the design of healthier, more comfortable learning environments. The idea also extends to other participants and age-groups. The developed protocol, combining interactive sessions, pictorial questionnaires, and open discussions, cane be tailored for different age groups and cultural contexts. We will be discussing more on these protocols in the workshop entitled "Charting the future of classroom indoor climate research in the Global South – Learnings from community engaged research and design thinking" during the conference.

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