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**Joint Standing Committee on Education and Cultural Affairs on
LD 11, An Act Regarding Temperature Standards for School Buildings
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Senator Rafferty, Representative Murphy and members of the Joint Standing Committee on Education and Cultural Affairs: I am Senator Rick Bennett of Oxford; and I have the honor of serving 14 communities in Western Maine in the State Senate. It is my pleasure to present LD 11, "An Act Regarding Temperature Standards for School Buildings."

Imagine trying to focus and complete a test when you're sweating in a boiling classroom or shivering in a frigid one. Both high and low temperatures can interfere with a child's learning.

I submitted this bill on behalf of one of my neighbors who reached out to me in September of 2023 because the temperature in her children's school was unbearably hot. I want to thank my neighbor, who will be speaking after me today, for bringing this important issue to my attention. She is a teacher and has served on the school board so has seen the effect of extreme temperatures on children and the tough position school boards are in without guidance.

She told me that for three days during the beginning of the school year, schoolchildren were subjected to temperatures above 90 degrees for hours while in school. After the third day in a row of excessive temperatures, the district made the hard decision to have the children dismissed.

As you all know, Maine has a cold climate. However, in recent years, due to climate change, the state has experienced more and more days of extreme heat. Few, if any, schools in Maine have air conditioning to help students deal with the intense heat.

High temperatures are not conducive to student learning. Studies have shown that students who learn in hot classrooms are more likely to experience fatigue, headaches, and difficulty concentrating. They are also more likely to miss school and perform poorly on tests. This should be intuitive. Personally, I struggle to think clearly when I am uncomfortably warm.

Studies have shown that temperature makes big difference in a child's education. For example, a study by the National Bureau of Economic Research found that a 1-degree Fahrenheit increase in classroom temperature can lead to a 1% decrease in student learning. Another study by the American Economic Journal found that students who attend schools without air conditioning are more likely to drop out of school.

Several sources state that the ideal temperature for learning is between 68° and 73°

Fahrenheit. This is similar to the US Department of Labor recommendations for workplace temperatures, which range between 68-76°F.

I have linked to a number scholarly journals that explain how temperature affects students' learning in classrooms:

- "Effects of Classroom Ventilation Rate and Temperature on Students' Test Scores" by Ulla Haverinen-Shaughnessy and Richard J. Shaughnessy (2015)¹. This study found that students' test scores in mathematics, reading, and science were significantly higher in classrooms with adequate ventilation and a comfortable temperature.
- "The Effect of Classroom Learning Environment on Students' Academic Achievement in Mathematics at Secondary Level" by Riaz Hussain Malik and Asad Abbas Rizvi (2018)². This study found that students' academic achievement in mathematics was positively influenced by a classroom learning environment that was perceived as being comfortable and conducive to learning.
- "Heat and Learning" by Joshua Goodman, Michael Hurwitz, Jising Park and Jonathan Smith (2018)³. This study by conducted by the Harvard Kennedy School studied 10 million PSAT-takers and found that students' learning is significantly impaired by heat, with a 1°F hotter school year reducing that year's learning by 1 percent.
- "Too hot or too cold to study? The effect of temperature on student time allocation" by Ivan Carlo Alberto, Yang Jiao and Xiaohan Zhang (2021)⁴. This study found that students are less likely to attend class and study on days when the temperature is too hot or too cold.
- "Classrooms' indoor environmental conditions affecting the academic achievement of students and teachers in higher education: A systematic literature review" by Henk W. Brink, et al. (2021)⁵. This systematic review found that there is strong evidence that classroom environmental conditions, such as temperature, ventilation, and lighting, can have a significant impact on students' academic achievement.

These are just a few of the many scholarly journals that have been published on the topic of

¹ Haverinen-Shaughnessy U, Shaughnessy RJ. Effects of Classroom Ventilation Rate and Temperature on Students' Test Scores. PLoS One. 2015 Aug 28;10(8):e0136165. doi: 10.1371/journal.pone.0136165. PMID: 26317643; PMCID: PMC4552953.

² Hussain, R., & Rizvi, A. (2018). Effect of Classroom Learning Environment on Students' Academic Achievement in Mathematics at Secondary Level. *Bulletin of Education and Research*, 40(2), 207–218. <https://files.eric.ed.gov/fulltext/EJ1209817.pdf>

³ Goodman, Joshua, Michael Hurwitz, Jisung Park, and Jonathan Smith. "Heat and Learning." HKS Faculty Research Working Paper Series RWP18-014, May 2018.

⁴ Ivan Carlo Alberto a, et al. "Too Hot or Too Cold to Study? The Effect of Temperature on Student Time Allocation." *Economics of Education Review*, Pergamon, 5 Aug. 2021, www.sciencedirect.com/science/article/pii/S0272775721000716.

⁵ Brink HW, Loomans MGLC, Mobach MP, Kort HSM. Classrooms' indoor environmental conditions affecting the academic achievement of students and teachers in higher education: A systematic literature review. *Indoor Air*. 2021 Mar;31(2):405-425. doi: 10.1111/ina.12745. Epub 2020 Oct 21. PMID: 32969550; PMCID: PMC7983931.

temperature and students' learning. The research is clear that temperature can have a significant impact on students' ability to learn. Schools should take steps to ensure that classrooms are comfortable and well-ventilated.

Of course, I understand that setting a range of 68° and 73°F may not be possible in all schools without significant and expensive infrastructure upgrades. But while we may not be able to provide a pristine learning environment, there should be basic standards we aim to meet. Our students would be better served if they didn't have to try and learn under difficult circumstances.

For our children's future, and the future of our state, having a temperature range for learning will help ensure that our students are able to learn in a comfortable and safe environment. Thank you for your time today. I encourage you to support LD 11 and I would be happy to answer questions.