



***The Wisconsin Society of Science Teachers was founded in 1958.
Today it is the largest organization in Wisconsin of individuals
interested in the advancement of science education.***

Tony Evers, State Superintendent
Wisconsin Department of Public Instruction
125 South Webster Street
Madison, WI 53703

Dear Dr. Evers,

The Wisconsin Society of Science Teachers (WSST) is a non-profit, membership organization dedicated to the advancement of science education in the State of Wisconsin. A state affiliate of the National Science Teachers Association, WSST's membership is comprised of 750 science educators and as well as many businesses with interests in science education in Wisconsin.

WSST is generally opposed to the proposed changes to PI 34. We would like to point out issues that are of particular concern from the perspective of those who are teaching science in Wisconsin's schools. We are in opposition to PI 34.049 that would consolidate science licenses to one single license. This would allow a teacher with the proposed science license to teach any science subject from grades 4 to 12 with any science major. In Wisconsin, from 1980, to teach discrete courses in grades 10-12, teachers must hold a specialized license such as Biology (1605), Chemistry (1610), Physics (1625) and Earth/Space Science (1635) to teach these courses. As teachers of advanced courses, who have demonstrated subject specific depth of content knowledge through majors or through completion of assessments, retire, they will be replaced by teachers with a more general set of science knowledge.

We agree that increased flexibility for teaching license areas and levels is needed. This is particularly true in rural schools where one or two science teachers teach courses across multiple disciplines and grade levels. However, the need for flexibility must be balanced with ensuring that Wisconsin's students have teachers who have the knowledge to provide rich science learning opportunities at all grade levels. In a 2007 review conducted as part of the National Science Foundation's *Math Science Partnership Knowledge Management and Dissemination project*, researchers at Horizon, Inc.¹ concluded that science teachers with deeper content knowledge were more likely to actively engage students than teachers with weaker content knowledge. In addition, they stated that teachers with deeper content knowledge were better able to identify key concepts within the science curriculum. Research on teacher retention also predicts that reducing teacher knowledge of how to teach specific subjects to specific grade levels will increase teacher turnover.²

Although a single license in science provides increased flexibility for administrators, it also has the potential to erode student learning experiences by allowing teachers without a deep understanding of disciplinary content to teach upper level science courses. We know from decades of research that depth of teacher subject matter knowledge is one predictor of teacher effectiveness.³ A decreased emphasis on teacher content knowledge may have negative consequences for students' future academic success. For example, a 2009 study by Schwartz, Sadler, Sonnert, and Tai found that students who studied key concepts in depth (defined as one month or more) in high school science courses earned higher grades in introductory college science courses when compared to students whose high school experiences focused on breadth of content coverage.⁴

We are also in opposition to PI 34.022 that would remove the specificity that teachers with licenses in early childhood, elementary, middle, and agriculture must receive environmental education preparation as a part

of their teacher preparation program. Early childhood and elementary educators need pre-service preparation to meet the WI Environmental Education standards and to utilize the many outdoor classrooms and school forests in Wisconsin. Wisconsin has a longstanding tradition, since 1935, of integrating environmental education preparedness into teacher training. Please return the specificity to administrative rules that requires environmental education preparation for agriculture, early childhood, elementary, and middle school teachers.

Respectfully,

President, Wisconsin Society of Science Teachers

¹ Heck, D., Smith, S., Taylor, M., & Dyer, E. (2007). Review of empirical research on teachers' mathematics and science content knowledge and its effects on teaching practice and student outcomes. Chapel Hill, NC: Horizon Research, Inc.

²Ingersoll, R., Merrill, L., May, H. (2012). How Preparation Matters. *Educational Leadership*, 69(8), 30-34.

³Darling-Hammond, L., & Youngs, P. (2002). Defining "highly qualified teachers": What does "scientifically-based research" actually tell us?. *Educational researcher*, 31(9), 13-25.

⁴ Schwartz, M.S., Sadler, P.M., Sonnert, G., & Tai, R.H. (2009). Depth versus breadth: How Content Coverage in High School Science Courses Relates to Later Success in College Science Coursework. *Science Education*, 93(5), 798-826