National Council on Teacher Quality

For Immediate Release: Sept. 15, 2010

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THE ALL-PURPOSE SCIENCE TEACHER:
Why Far Too Many States Are Allowing High School Science Teachers To Teach Subjects They May Know Very Little About

A "traffic light" report from the National Council on Teacher Quality exposes loopholes in state regulations that allow science teacher candidates to teach subjects such as chemistry and physics without adequate preparation. While 11 states earn green-light status for avoiding such loopholes, 33 are given red lights for policies that place students at considerable risk.

Washington, DC—Today, the National Council on Teacher Quality (NCTQ) released a report revealing a little-known aspect of "the STEM crisis," usually recognized as a shortage of public-school teachers in the areas of science, technology, engineering and mathematics. While U.S. students do, indeed, suffer because of the science teachers they *don't* have, many states set unacceptably low expectations for the science teachers they *do* have. Among the report's findings:

- By allowing certification in "general science," rather than a specific subject, most states do not guarantee that secondary biology, chemistry and physics teachers have mastered the content they teach. The resulting loose definitions of "science teacher" render everyone in the profession interchangeable.
- Although high-school-level science is quite specialized, all but 11 states allow secondary science teachers to obtain general-science certifications or combination licenses across multiple disciplines. In most cases, these teachers need only pass a general-knowledge science exam that does not ensure subject-specific knowledge.
- While resource-strapped districts—in rural areas, especially—believe they have to be "flexible" in assigning teachers to various subjects, employing technology, distance-learning and alternate routes can help improve science-teacher expertise.

"There is simply no way to be an effective teacher of biology, chemistry or physics if one does not know the subject matter," said Sandi Jacobs, NCTQ's Vice President. "The lax requirements of too many states create loopholes that fail to ensure teachers know the content they will teach. For example, in a shocking number of states, a prospective chemistry teacher need only pass a 120-question general-science test that includes as few as 16 questions on chemistry, meaning the candidate could answer every chemistry question incorrectly and still pass."

As a result of NCTQ's review of the states' science-teacher licensure requirements, the report assesses whether each state ensures subject-specific expertise. Aside from awarding a green, yellow, or red light (see state list, next page), the report outlines each state's strengths and weaknesses. Among the state findings:

- In Nevada, to complete a major in general science, candidates only have to complete one course covering various subjects, including biology, chemistry and physics. They then take a general-science exam, which, because of its breadth, does not demand scoring highly in any one area. So, theoretically, a candidate could take just 3 hours in physics, answer many questions in that section of the test incorrectly and *still* go on to teach high school physics.
- In the same vein, Michigan offers a "group major," also covering a variety of subjects at 36 total credit hours, which amounts to no major, or specialization in any one subject, at all.
- Wisconsin, regardless of offering various science licenses, only requires candidates to pass a general-science exam. So, though a candidate may specialize in one subject, by passing the exam, he or she can go on to teach all science subjects.
- Florida does not offer general-science certification, nor does it allow any combined-subject science certifications. To teach biology, chemistry, Earth-space science or physics, candidates must specialize in those fields and demonstrate subject-matter knowledge in what they teach.

What the lights indicate: **Green** means a state ensures that its teachers possess the content knowledge necessary to teach specific subjects. **Yellow** states do not offer general-science licenses, but allow for combination certifications that fail to ensure sufficient knowledge in all covered areas. **Red** indicates catch-all certification requirements and, in some cases, no demands to demonstrate specific content expertise.

Green
Florida, Indiana, Kansas, Kentucky, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Tennessee, Virginia

Yellow
Arkansas, Georgia, Illinois, Maine, Maryland, Oklahoma, South Dakota

Red
Alabama, Alaska, Arizona, California, Colorado, Connecticut, Delaware, District of Columbia, Hawaii, Idaho, Iowa, Louisiana, Michigan, Mississippi, Missouri, Montana, Nebraska, Nevada, New Mexico, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, Wyoming

To view the full report, including all of the findings and recommendations, please go to www.nctq.org/scienceteacher.

The National Council on Teacher Quality is a non-profit organization comprised of reform-minded Democrats, Republicans and Independents. The organization supports reforms in a broad range of teacher policies and seeks to lend transparency and accountability to the three institutions that have the greatest impact on teacher quality: state governments, colleges of education and teachers unions.