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The Charles A. Dana Center

an organized research unit of
The University of Texas at Austin

Position Statement

Texas students should take four years of science in high school

September 2006

The primary mission of public education should be to enable all students to achieve their life goals and become productive, well-informed members of society. Whether students are entering the world of work right out of high school, or are pursuing a college program, their future success depends on the core skills they develop in their science coursework: problemsolving, communication, and the ability to work as part of a team.

In no other discipline is real-world problemsolving so central as in the sciences. In every science course, the Texas Essential Knowledge and Skills explicitly expect students to plan and implement scientific investigations, gather and analyze data, and communicate results. These expectations are so critical to a student's understanding of science that they appear—in developmentally appropriate language—in the TEKS for every state-approved science course. This repetition is both intentional and necessary to help students move toward greater independence and academic sophistication as they progress through the educational system.

Requiring students to take only three years of science in high school threatens to disrupt this important skill-building process at a time when students should be reaching new heights in their skills and abilities. **Therefore, the Dana Center recommends that every student be required to take four years of science in high school.**

High school students should be introduced to both the biological and the physical sciences so that they have the context to make informed career, consumer, and policy decisions after graduating from high school. The current state guidelines for science courses required in high school—Biology and two of Integrated Physics and Chemistry, Chemistry, Physics, or Principles of Technology—do a good job of providing this diverse background.

We strongly believe that the content of the fourth year of high school science should not be specified. Instead, students should be encouraged to build on their previous

knowledge, explore areas of personal interest, and lay a strong foundation for future careers. Under no circumstances should this fourth course be Integrated Physics and Chemistry, as IPC was intended to be taken earlier, as a foundation for later high school science. The fourth-year science course could be an Advanced Placement course, another TEKS-aligned science course, or any additional courses that could be developed to integrate mathematics and science skills in a rich problemsolving context.

The fourth-year science course should be rigorous. In educational contexts, by *rigorous* we do not necessarily mean just “harder” or “more”—rather, we mean “deeper.” A rigorous program promotes opportunities for students to learn content through a variety of experiences so they gain an in-depth understanding of concepts. When students have been involved in a rigorous program, they can transfer knowledge to novel situations in their present course, future courses, and, more importantly, the real world.

This rigor is already called for in the TEKS, and the fourth year of science should build upon the rigorous experiences *in science* that students have developed throughout their educational careers. In this context, the student experiences called for in the state’s integrated K–8 science standards provide the key foundation of skills and insights in the physical, earth, and life sciences that are needed for high school.

The key to strengthening science education in Texas is not to add more things to learn or to build a rigid sequence of course requirements.

The key is to engage our students in the *process* of science.

Students’ science courses should be among the high points of their academic careers—yet many students dread science and see it as collections of facts without internal connection or larger relevance. This dread is not the fault of students, but of the ways that we, as educators, present science to them. We must use students’ direct experiences with science to build their content knowledge, to differentiate the core understandings of science from the minutiae, and to transform our courses through both rigor and relevance. This change requires meaningful reform—for us to learn how to connect the science we love to the needs, experiences, and futures of the students we serve.