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Lesson study is an approach to professional development that involves several interrelated phases. Groups of teachers collaborate to design a lesson. They then implement it and discuss its effectiveness with an eye toward continuing to polish the lesson in the future. The presenters will describe the dynamics of a lesson study project funded by a mathematics partnership grant from the State of Delaware. The project is unique in that university mathematics faculty, in collaboration with lead teachers at the high school level, were involved in helping frame and address critical issues in designing lessons to be taught to high school students. After the lessons were taught, university mathematics faculty participated in conversations with teachers about what went well in the lessons and what needed improvement. Over the course of the project, lessons were designed that dealt with various topics, including the Pythagorean Theorem, polynomial multiplication, and systems of equations. To demonstrate the effectiveness of the approach, the presentation will describe how the lesson study project allowed university mathematics faculty to help high school teachers refine their approach to teaching polynomial multiplication and factorization using algebra tiles. (Received September 16, 2008)