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Spielhagen, Frances. (2011). *The Algebra Solution to Mathematics Reform (Completing the Equation)*. NY: Teachers College Press.

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Reviewed by Jennifer Ruef
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Frances Spielhagen has us at “solution.” It’s what we all want, intuitively, inherently, and passionately: true equity in mathematics education, and a real promise of closing the achievement gap. She tells the story of a large Virginia school district that employed research to inform policy, and policy to prompt changes in curriculum and instruction. It is so neatly tied together with both quantitative and qualitative analysis that the reader is drawn to this report as to a gripping novel—one wants to know how it all plays out. Do the good guys win?

Spielhagen writes from the perspectives of researcher, policy analyst, and consultant to the Chesterfield, Virginia school district. She builds a compelling case, both for her

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reader and district officials, that the status quo is inherently inequitable. As the story began, Chesterfield employed a somewhat subjective system to create mathematical castes of students in their seventh grade year. This decision holds significant equity implications: “at issue in the tracking debate is the type of instruction students receive in different tracks” (p. 28). Tracking affected the amount of mathematics students studied, and the quality of that instruction. Students selected for the lower track “felt they had been judged on their immaturity rather than their ability” (p. 46). The fact that students of color and low socio-economic status were underrepresented in the advanced eighth grade algebra track was another indictment; one should not, in an equitable system, be able to determine the level of a math class by noting the color of its participants.

The challenge was clear, but how would the Chesterfield district rewrite its story? “Change, they decided, would come for their students, once they faced up to exactly what was going on in the district” (p. 31). The district took the data as a mandate for change, and embarked on a brave, and potentially perilous, journey. Having mined test and achievement data, Spielhagen and her colleagues set out to shift policy and practice—no small feat in any school system. The first change was a trial period that piloted tossing out the selection criteria and opening enrollment in eighth grade algebra to all. When data showed no negative affects on student outcomes, district policy changed to embody an expectation that all Chesterfield students would study algebra in the eighth grade. It is worth noting, as a refreshing change, the role that standardized test data played in *de*-tracking.

But now the plot thickens: teachers who once held significant cultural capital as the teachers of the elite faced a *de facto* loss of that status. And teachers who had not taught that level of mathematics had a new need for pedagogical content and curricular knowledge. This is exactly where we expect the major plot crisis: good guys vs. bad. Instead, we are treated to a remarkable confluence of will and collegial cooperation. Chesterfield teachers became a Community of Practice (Wenger, 1998) centered around retooling themselves to teach eighth grade algebra to all.

The teachers met regularly in professional development groups led by experienced teachers, who shared curriculum and pedagogical content knowledge. Over time, the meetings evolved to a sharing of best practices and lesson plan study to improve curriculum and instruction. There was a shift in leadership—newcomers to teaching this level began leading professional development sessions. That a group of teachers saw the value to their students as far outweighing their own doubts and concerns, and that they banded together around practice and profession is amazing, examined on its own. But beyond that, it injects a sense of hope and faith that policy and practice reform can really make a difference.

And what of those students, the center of the analysis and the reason for such significant change? They are at the heart of Spielhagen's text. She gives voice to those who are so often left silent in research, and that gives her argument significant heft. Of course we care about research and analysis, policy and practice shifts. But in the end what we really want to know is whether Angela was the first person from her family to attend college. We want to know if Jason was given the chance to excel in mathematics after he hit his developmental stride somewhere in the middle of eighth grade. Spielhagen rewards us with a look into how policy and practice can change lives, as presented by the students themselves.

The text is not without problems. The reader is left to interpret ambiguous terms such as *eighth grade algebra* and *rigor*: what do they really mean, and by what standard are they measured? There is also a bit of hand waving regarding the numbers of students who take two years to complete algebra. This is considered a viable option, as is studying algebra in the seventh grade for students designated as gifted. But the lack of numbers muddies the picture of just who studies algebra solely in the eighth grade, and how students are selected for those tracks. The most problematic, and overarching, issue is simply this: are all students truly developmentally ready to study algebra in their eighth grade year? Spielhagen could have begun to answer that question with a discussion of what constitutes rigorous eighth grade algebra, and by pointing us to research of the question. Instead she leaves us with a bit of a cliffhanger.

Criticisms aside, Frances Spielhagen offers a significant contribution in her study of a school district that dove down the rabbit hole of self-examination, and came out a better version of itself. In the final analysis, everyone got to be a good guy. Further, she offers a primer on how to shift policy and practice: research, analyze, shift policy to change the rules, foster ownership among stakeholders, and offer support and trust to teachers to do the real and challenging work of changing curriculum and practice. She leaves us believing social justice and equity are not only worth fighting for, but utterly achievable. And that makes for a truly inspiring read.

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About the Reviewer

Jennifer Ruef is a doctoral student of the Graduate School of Education at Stanford University. She is a former secondary mathematics instructor who studies curriculum and teacher education, with a particular focus on issues of social justice and equity.

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