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**Mirrors & windows into student noticing.**

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Summary: In many classrooms, students solve problems posed by others – teachers, textbooks, and test materials. These problems typically describe a contrived situation followed by a question about an unknown that students are expected to resolve. Unsurprisingly, many students avoid reading these problems for meaning and instead engage in a suspension of sense making characterized by rule-following behavior and keyword searches. Problems in everyday situations, however, do not come preformulated. Instead, these problems and the reasoning that they instantiate develop simultaneously as problem solvers informally question the situation and begin to formulate conjectures and possible pathways for solving these problems. Word problem difficulties have been investigated primarily by looking at what students do or do not do, including looking at student errors or students' failure to use linguistic knowledge. These explanations suggest that students, not the problems need to change. In this article, the author suggests using a windows-and-mirrors framework for encouraging students to be problem posers. Like a window, a problem should be an opportunity for students and teachers to look out for what makes sense to solve the problem. Simultaneously, like a mirror, a problem should be an opportunity for students and teachers to look into what students notice as relevant for solving a problem. Readjusting the window and/or the mirror – as it is recognized in word problems – signifies reformulating a problem. Reformulating problems is important because asking students to solve preformulated problems has shown that students do not make sensible connections of mathematics to situations. When such experiences repeat every day, students develop self-perceptions that they are not good at math. The aim of this article is to explain how to help culturally diverse and socioeconomically disempowered students use problem posing to reflect their knowledge and gain insight into new knowledge. This article discusses four research-based strategies that can support all students in problem posing: (1) Let students specify some quantities; (2) Let students frame problem questions; (3) Promote problem posing at various points; and (4) Invite students to interpret representations. The author also provides questions that can elicit student noticing by restoring experiential mirrors and opening mathematical windows. (ERIC)

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[http://www.nctm.org/Publications/Teaching-Children-Mathematics/2016/Vol22/Issue6/Mirrors-\\_-Windows-Into-Student-Noticing/](http://www.nctm.org/Publications/Teaching-Children-Mathematics/2016/Vol22/Issue6/Mirrors-_-Windows-Into-Student-Noticing/)