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By

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מאת

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עיצוב סיטואציות הוראה למטרת טיפוח גמישות מתמטית במסגרת שיתוף פעולה של חוקרים ומורים

Designing teaching situations aimed at fostering mathematical flexibility within the collaboration of researchers and teachers

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Abstract

Mathematical flexibility is the ability to switch between problem-solving strategies and between multiple representations. It is broadly agreed that fostering mathematical flexibility is important for both problem solving and the construction of new mathematical knowledge. Although teachers recognize the importance of nurturing flexibility, and research literature suggests how to do so, math lessons, as a rule, involve little opportunities for the students to develop their mathematical flexibility. The goal of the current study is to identify and characterize ways of fostering flexibility, which would be perceived by the teachers as appropriate for use in their daily practice.

This study was carried out as part of the TRAIL (Teacher-Researcher Alliance for Investigating Learning) project, in a TRAIL community that chose to study ways to nurture students' mathematical flexibility.

The study focuses on characterizing teaching situations for fostering mathematical flexibility that the teachers designed when taking part in the community activity. Each teaching situation was analyzed in terms of its components (a mathematical problem and a pedagogical context), as well as in terms of the design processes.

Seven experienced teachers took part in the research. The teachers designed the situations, tried them in their classes and analyzed the student outcomes. Teachers' reports on these practices and videotaped episodes of the community meetings were analyzed to characterize the situations and the design processes.

Nine teaching situations designed by teachers dealt with a variety of mathematical topics. Three types of situations have been characterized depending on how they may encourage flexibility: multiple solution situations, situations that encourage search for a better strategy, and dead-end situations. In addition, a number of pedagogical contexts were identified, such as: leading the students towards one strategy by means of engaging them in a series of preliminary problems and encouraging an alternative strategy search by offering subtle hints. The design processes included selecting or adapting existing problems and formulating new ones. In the process of designing the pedagogical contexts, the contribution of the community was evident, as the contexts were designed and refined by combining inputs from teacher-participants and researcher-participants.

The study's main contribution is putting forward the teacher perspective on what they can actually do in their classes in order to support and foster mathematical flexibility in their students.