Study says more math homework doesn't equal increased student achievement

Building sense of self-efficacy more important How much homework should teachers give students?

This is a tough question for many teachers because they have to be realistic about the time their students are willing to spend on homework but they can't help thinking that more homework means high achievement. Many teachers are also troubled by differneces in students' home and life circumstances, some of which lend themselves to supporting homework more than others.

A recent study on math homework in the *Journal of Advanced Academics* provides some new guidance for math teachers: It's not the amount of time students spend on homework that is important in raising achievement, but the sense of self-efficacy they develop while carrying out assignments. It's also important that students have the resources they need to complete their homework, such as a quiet place to work, a computer, calculator, etc.

To develop students' sense of mastery and self-efficacy, teachers should assign homework on material that has been adequately covered in class and should differentiate homework based on students' ability levels. Teachers should be careful to progress at a reasonable pace from easier to more difficult tasks, verifying that students can solve problems before giving them assignments. Parents and teachers should be careful about the messages they are sending to students about their abilities in math (e.g. different attitudes towards girls and boys).

While educators have little influence on the homework support resources students receive at home, they can provide those resources at school, such as making available a quiet area where students can work on homework at school and making available needed supplies such as dictionary, computer, etc. Educators also can inform parents and tutors about how important it is to provide

students with needed resources when they are doing homework.

“Given that these resources constitute a form of social capital, they also have the potential to enhance an individual's self-efficacy beliefs. Although some of these resources seem to be characteristic only of a home site, increasing the number of these available at any site where homework support is provided should be viewed as important,” the researchers write.

Association with poorer achievement

Not only did time spent on homework have little beneficial impact on achievement in this study, it actually was associated with poorer achievement.

“Although this was a surprising finding, a lack of understanding of a subject can lead to inefficient and disproportionate effort as well as diminished motivation.

“…This observation fits the notion that students who have low mathematics scores and spend more time on mathematics homework do it precisely because of low self-efficacy and fewer support resources,” the authors write.

Girls spent approximately 5% more time on math homework compared with boys. Black students spent an average of 21% more time on math homework than their white counterparts and Hispanic students average approximately 16% more time on math homework.

The study analyzed data on 5,200 students (2,603 boys and 2,597 girls) from the 2003 Program for International for International Student Assessment (PISA) student and school questionnaires (National Center for Educational Statistics, 2003). The PISA assesses reading literacy, mathematics literacy, and science literacy skills of 15-year-olds in the U.S. Only one subject is surveyed in depth on a rotational basis each year while the other 2 are given relatively less attention. In 2003 the primary subject was math.

Students ranged in age from 15.25 to 16.33 years. Most math students were in grade 10 (3,249), but many were in grade 9 (1,618) and a few were in grade 11 (333). The ethnic breakdown was as

follows: 3,097 Caucasian, 799 African American, 883 Hispanic, 169 Asian and 252 of mixed or other ethnicity.

Efficacy, amount of time, support The study focused on the impact of 3 variables: Time spent on homework, homework support resources and self-efficacy. Among the questionnaire items used for the study analysis were:

- 8 questions related to self-efficacy. The questions assessed a student's confidence in performing various math operations (e.g. “How confident do you feel about having to do the following calculation? Solving an equation like 3x + 5=17.” The students responded on a scale from 1-4 with 1 signifying very confident to 4 not at all confident.)
- 8 questions on socioeconomic status that related to homework support resources. Students were asked if they had a desk where they could study, a room of their own, a quiet place to study, a computer for use with school work, a link to the Internet, their own calculator, books to help with their homework and dictionaries. A student who answered yes to all 8 questions had a value of 1 and a student who answered no to all questions had a value of 0.
- Ratio of actual number of self-reported hours the student spent on math homework to actual hours the student spent on all homework.

In the questionnaires, only 0.7% of students reported having no access to the 8 homework support items. Most students reported having access to most of the items:

- 69.5% reported access to 7 or 8 of the resources
- 22.1% reported access to 5 or 6 of the resources
- 5.8% reported having access to 3 or 4 of the resources
- 1.9% reported having access to 1 or 2 of the items

Girls reported having 2.4% more homework support than boys. White students had 10% more homework support resources available to them than Black students and 13% more than Hispanic students. On average, Asian students had about 11% more homework support than Black students and 14% more homework support than Hispanic students.

Other previous research has found that the most potent factor

affecting achievement was the amount of homework the student actually completed as opposed to the amount of homework that was assigned, the researchers report.

Based on this study, researchers say there's evidence that developing students' self-efficacy when doing math homework can help shrink the achievement gap between white students and black and Hispanic students.

“Mathematics Achievement: The Role of Homework and Self-Efficacy Beliefs,” by Anastasia Kitsantas, Journal of Advanced Academics, Volume 22, Number 2, Winter 2011, pp. 310-339.