Increasing Retention of Math Skills

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Abstract: More and more people are enrolling in higher education than ever before. As a consequence of higher education, most students will take more math classes, with increasing difficulty. More often than not, students have received appropriate math instructions prior to college, but are not retaining vital information that future math courses add on to. Can classes be taught in a way to help students retain more information? This project first addresses theoretical approaches in the literature before considering a study conducted at Kent State University. In the study, sections of remedial math classes were divided into control and experimental groups taught by the same instructor. The experimental group were required to spend the same amount of time over additional sessions, and did not receive extra instructional time. The study suggests that compulsory review will increase total student mastery.

Constructivism   vs.   Cognitive Load

Constructivism
- Theory strongly influenced by Lev Vygotsky
- Observes students must construct their own knowledge—it is not possible for information to be "deposited" into students

Zone of Proximal Development
- Implies there are prerequisite skills for advancing through topics

Cognitive Load
- Theory pioneered by John Sweller
- Observes that learning a new skill requires a certain amount of thinking on the part of the learner, who has limited short term memory resources
- If you overload someone they will not be able to gain the knowledge
- The most effective teaching strategies are those that reduce cognitive load to manageable levels

Worked Example Effect
- Giving a student a framework for solving a problem will reduce cognitive load and so improve learning

- Online software for learning math skills
- Creates "Knowledge Structures" individually tailored to students
- Gives student example problems to gauge their understanding of topics
- As Students gain mastery Aleks will move on to different topics, using a flow diagram to determine what the student has mastery of and what topic should be selected next
- Similar theoretical basis as ZPD (Zone of Proximal Development)
- Lets students construct their own paths

Methods
- Classes were divided into control and experimental

Rawson And Dunlosky: Study Tips
- Widely cited paper discussing beneficial learning techniques