

Mathematics interventions with low achieving students

Fleischer and Manheimer (1997) allege that 6% of students are affected with math learning disabilities. The learning disabilities are in primary math disabilities also known as dyscalculia. Other problems such as non-verbal communication, and reading disorders, also contribute low achievement in math. Low achievement is more complex with students with dyscalculia because they have difficulty in essential mathematics computations and problem solving. They fail convert linguistic and numerical information into mathematical equations and algorithms (Miller & Mercer, 1997).

Students with learning disabilities and other at-risk-students need varied instructional strategies such as manipulatives, pictorial representation, symbolic operations, problem solving, and cooperative learning. The problem of poor mathematics performance is found to be more prevalent among poor, minority, inner-city students, and with boys retained before the ninth grade, Johnson (2001).

Calhoun and Fuchs (2003) revealed that Peer Assisted Teaching Strategies (PALS) increased mathematical skills among secondary students with disabilities, while Curriculum Based Measurement (CBM) graphs increased motivation in mathematics. With elementary students, Kroesbergen and Van Luit (2003) found instruction and self-instruction to be more effective than the use of computer assisted instruction and peer tutoring.

Gutierrez (2002) is of the view that strategies used by elementary and middle school teachers instructing English learners are also applicable in teaching high school Latinos. These methods include:

- working in small groups,
- allowing students to work in their first or primary language,

- supplementing reading material, and building on students' previous knowledge.

However understanding of students' linguistic backgrounds and mathematical needs proved crucial in effective mathematics teaching. Creating informal conducive environments was also noted as having a contributive factor in teaching minority students. Collaborative approaches to teaching were emphasized by Gutierrez (2002) where students interacted more with each other and shared information and skills.

Teaching successfully to migrant students, involves giving culturally relevant mathematics instruction. Reyes and Fletcher (2003) suggested using an approach based on a culture's contribution to mathematics allows students to develop a sense of pride in their heritage, for example, the Mayan contribution to mathematics and astronomy. Mathematic culturally relevant pedagogy is referred to as ethnomathematics by Reyes and Fletcher (2003).

In schools, with migrant students, an organizational culture focused on instructional improvement, respect for students, student centered instruction, and a spiraling curriculum is significant in improving academic results across all subject areas. Cooperative learning and collaborative methods also assist in such schools in improving mathematics scores.

Johnson (2001) suggested five common sense strategies which claim to help improve performance among poor performing students. These are:

- a) intensifying learning through giving, tough, challenging and intellectually stimulating activities,
- b) providing professional development to ensure skilled teachers,
- c) expanding learning options by creating systems that reflect and celebrate diversity, e.g. flexible scheduling and having small classes,

- d) regular assessment that should help inform teaching, and
- e) intervening early by giving on going and diagnostic assessment and extra learning time.

Miller and Mercer (1997) from their study suggest the following recommendations of best teaching practices in mathematics.

1. Developing a refining rather than reforming posture. This involves:

- a) the use of validated approaches that create success among students,
- b) teacher –learner verification strategy, and
- c) consideration of diversity of learners.

2. Accommodating learner characteristics and needs. Use formal/informal assessments to diagnose students' characteristics and needs. The emphasis with student with disabilities should be to prepare students to function independently in the life after school. Individual attention is critical because students do not learn the same mathematics within the same time span due to different intellectual and cognitive abilities.

3. Use instructional practices with research support. Some of the techniques are:

- a) Demonstration, modeling and feedback,
- b) providing reinforcement,
- c) using concrete to abstract teaching sequence,
- d) setting goals,
- e) combining demonstration with permanent model,
- f) using verbalization in problem solving,
- g) teaching strategies for problem solving, and
- h) using peers, computers and videodiscs.

In summary, all the studies in this paper seem to emphasize the importance of a cultural relevant pedagogy necessitated by the diverse classrooms teachers now face. Linguistic backgrounds of learners tend to affect the students ability to compute and to problem solve in mathematics. Effective instructional practices that are supported by research, and that ensure students' success

should be used to improve the performance of low performing students.

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