Math Instruction for Committed Youth within Juvenile Correctional Schools

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Abstract

The current paper provides a description of instructional approaches for teaching mathematics to secondary students with learning disabilities (LD) and emotional disturbance (ED) within juvenile correctional schools. Recommendations for math instruction are based on a comprehensive review of the literature and examples are provided from an urban juvenile correctional facility school for committed youth. Six key topics are presented: (a) advance organizers; (b) direct instruction (di); (c) use of technology and real-world problem solving tasks; (d) use of varied student grouping; (e) presenting information in a graduated instructional sequence; and (f) strategy instruction.

The academic needs of youth with emotional disturbance (ED) and learning disabilities (LD) in juvenile corrections are one of the most neglected areas in practice and research (Browne, 2003; Coffey & Gemignani, 1994; Gagnon & Mayer, 2003; Leone, 1994; Rutherford, Quinn, Leone, Garfinkel, & Nelson, 2002). Specifically, many correctional facilities provide unsatisfactory education and special education support; which has resulted in class-action litigation in more than 25 states (Leone & Meisel, 1997; Meisel & Leone, 2004). Of the 108,000 students committed to long-term juvenile correctional facilities (Sickmund, 2004), approximately one-third have identified disabilities (Quinn, Rutherford, & Leone, 2001). However, almost no information exists that addresses instruction in juvenile correctional schools for committed youth. The

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dearth of information regarding special education in juvenile correctional commitment facilities contrasts with recent education and special education reforms. Specifically, the Individuals with Disabilities Education Act (2004) guarantees students with disabilities access to the same rigorous curriculum as their nondisabled peers.

Similarly, the reauthorized Elementary and Secondary Education Act, also known as No Child Left Behind (NCLB) (2001) promotes a high quality education for all students and specifically targets student competence in math and reading. Within this mandate, there is also a clear emphasis on using empirically-validated instructional techniques. The calls for scientifically-based interventions in NCLB are ultimately geared toward improving the performance of all students in schools, including those students within juvenile corrections (Leone & Cutting, 2004).

Competence in mathematics is a critical component for academic success, graduation, and positive post-school outcomes. Secondary school-aged youth with ED and LD need effective and efficient instructional approaches to pass rigorous state assessments and earn high school diplomas. However, only anecdotal information currently exists on teachers' use of validated math instructional approaches within juvenile correctional schools (Gagnon & Mayer, 2004). Coffey and Gemignani (1994) noted that teachers' approach to math within corrections commonly reflects an emphasis on worksheet-based drill and practice of basic math facts. This contrasts with most states' alignment of standards and assessments with the National Council of Teachers of Mathematics (NCTM) Standards for teaching math (Blank & Dalkilic, 1992; NCTM, 2000; Thurlow, 2000). Often, state assessments emphasize higher-level problem solving tasks that focus on conceptual knowledge and real-world application.

In addition to a dearth of research, other complications may exist in the education of youth with special needs in these facilities (Gagnon, in press). Common problems include an emphasis on punishment rather than rehabilitation of juveniles, and competition for limited fiscal resources among education, security, and physical plant maintenance (Leone & Meisel, 1997). Leone and Meisel also noted that correctional education programs may not have the autonomy necessary to ensure student academic needs are met. In addition, security needs may require creativity and adaptation from teachers. For example, the use of math manipulatives would require teachers to organize and count materials at the beginning and end of each class.
Clearly, juvenile correctional facilities have some unique attributes and require teacher flexibility. However, instructional strategies should be based on research, rather than the setting in which these youth attend school (Gagnon, in press). One promising approach is to rely on existing research that focuses on effective instructional strategies for students with ED and LD in other settings, as these youth are overrepresented in juvenile corrections (Foley, 2001; Quinn, Rutherford, Leone, Osher, & Poirier, 2005; U.S. Department of Education, 1999). In a review of math research for secondary students with ED and LD, Maccini and Gagnon (2000) identified six general categories of empirically-validated approaches. These areas can assist teachers in strengthening student basic math skills and proficiency with open-ended problem solving questions. These empirically-validated instructional approaches include: (a) advance organizers; (b) direct instruction (di); (c) use of technology and real-world problem solving tasks; (d) use of varied student grouping; (e) presenting information in a graduated instructional sequence; and (f) strategy instruction. In the sections that follow, we described the six instructional approaches, provide a specific example of each instructional approach within the context of school observations and the literature, and provide instructional implications for teaching math to students with LD and ED committed to juvenile correctional facilities.

School Description
The school of interest is located within a juvenile commitment facility within a large metropolitan area. The school serves youth 12-18 years of age. At the time of the observations, 80 committed youth were enrolled in the educational program, with 40% (n = 32) of the student population receiving special education services. Additionally, the average length of stay was 6 months, followed by a 6-week transition program. The school provides courses in mathematics (e.g., basic, intermediate, advanced, GED preparation), science, social studies, English/Reading, health, art (e.g., fine arts, graphics), life skills, limited vocational training (e.g., technology) and GED preparation. Students can earn academic credit at the school that is transferrable to public schools. Also, students have the option of working toward a high school diploma or GED (with some restrictions, such as age).

Math classes were divided into six skill levels including (a) level 1 (basic skills, such as place value, fractions, pattern recognition); (b) level 2 (basic skills continued, such as advanced fractions, decimals, percents); (c) level 3 (word problems, ratios, geometry); (d) level 4 (Pre-GED, integers, equations,
inequalities); (e) level 5 (GED, multi-step word problems); and (f) level 6 (pre-college math and SAT preparation, including algebra, trigonometry, calculus). Students are assessed and placed in math classes as a function of their reading level (although not our current focus, this approach is not recommended).

Classroom observations included the lowest level math class, the highest level, and an intermediate level math class. Teacher A taught the lowest level (i.e., basic skills) math class, which included 7 students. The class lesson objective (i.e., greatest common factor) and date were written on the board prior to the start of the lesson. The lesson consisted of whole group instruction and the content of the lesson included: (a) review of factors; (b) introduction of greatest common factor (GCF); (c) guided practice and review of GCF using a class worksheet; and (d) a homework sheet on GCF.

The highest level math class (GED preparation) was taught by Teacher B and included 7 students. The class lesson objective (i.e., volume of a cube, rectangular solid, and cylinder) and date were written on the board at the start of the lesson. During whole group instruction, the teacher collected homework, and then introduced and provided guided practice for finding the volume of a cube, finding the volume of a rectangular solid, and finding the volume of a cylinder. Lastly, students were provided homework sheets.

Teacher C taught the intermediate math class consisting of 9 students. This day’s lesson consisted of a review of patterns (i.e., finding the missing number(s) in a given sequence) and translating words into algebraic expressions. The lesson objectives were verbally stated by the teacher at the beginning of class. The content of the lesson included: (a) review of patterns using the dry erase board to illustrate four problems; (b) introduction to unknown variables and writing algebraic expressions using textbook problems; (c) guided practice and review of writing algebraic expressions; and (d) review of multiples within a class game format.

Instructional Approaches
The sections below describe the six research-based instructional approaches and are illustrated with either teacher observations or the literature. Implications for teaching are also provided.

Advance Organizers
Description. Students with LD and ED encounter a myriad of difficulties that may impact their math performance. For example, students with social and emotional difficulties may experience learned helplessness (e.g., student may
appear disinterested), impulsivity (e.g., learner may omit numbers, make careless computational errors), and distractibility (e.g., learner may not finish a multistep word problem) (Mercer, 1997). Use of advance organizers is effective in helping students identify, organize, understand, and retain information (Lenz, Bulgren, & Hudson, 1990). Specifically, advance organizers help to orient the learner to the lesson, identify lesson objectives, connect current information to a student's prior knowledge, and improve student motivation to learn the topic (Miller, 1996).

**Example.** A teacher was observed incorporating use of an advance organizer into instruction. Specifically, the teacher identified the lesson objective and oriented the learners to the lesson, visually and verbally (i.e., wrote the lesson objective (GCF) on the dry erase board prior to the beginning of the lesson and reviewed the objectives from the previous lesson).

**Discussion.** It is promising the teacher incorporated use of advance organizers into math instruction via two different formats: (a) visual (i.e., written on the board); and (b) verbal (e.g., eliciting student questions/information). Miller, Strawser, and Mercer (1996) noted that use of advance organizers helps to support strategic behavior (i.e., student use of math strategies) and student attention to the lesson. Student attention can also be promoted by incorporating prompts in the advance organizer (e.g., "What is the strategy we learned yesterday for remembering the problem solving sequence?"). Moreover, Allsopp (1999) recommended that math lessons for secondary students include an advance organizer to help orient learners to the current lesson and to build connections between the new information and student's prior knowledge. Teachers can use the mnemonic, LIP, to help them remember to incorporate three critical features of advance organizers into instruction: "(a) Link the lesson to previous learning or lesson; (b) Identify the target skill; and (c) Provide a rationale for learning the skill" (Allsopp, 1999, p. 75). Teacher B could have used the following advance organizer:

> Yesterday we focused on identifying and drawing common geometric solids including prisms, pyramids, and cylinders. (L). Today we are going to learn to calculate the volume of prisms or the cubic units needed to fill the space occupied by a solid (L). Knowing how to calculate volume will help us when we go shopping, such as determining how much ice our cooler can
hold for our lunch tomorrow. Who can tell me other reasons for determining volume? (P) (Glencoe Mathematics, 1999).

**Direct Instruction (di)**

**Description.** Limited research indicates that teacher expectations in juvenile correctional schools are low and include a primary emphasis on drill and practice of basic math facts via a worksheet-driven approach (Coffey & Gemignani, 1994). However, Coffey and Gemignani asserted that there is no justification for math teachers in juvenile corrections to approach math instruction in this way. The need to establish high quality educational math programs within corrections is especially critical in light of difficulties these students commonly have with self-motivation, persistence, and concentration (Bos & Vaughn, 1994). These traits may inhibit student success in an individualized and worksheet-driven approach to instruction. Additionally, students with ED typically obtain a percent correct rate between 20 and 76 on independent seatwork (Guntner & Denny, 1998). Clearly, providing a textbook or worksheet driven math program with little or no instruction provides daily learning situations in which students may experience relatively little success.

One approach to assisting youth with ED and LD in math is to use direct instruction (di) (Meisel, Henderson, Cohen, & Leone, 1998). The di approach consists of five key components: (a) review of previously learned skills; (b) teaching content using teacher modeling, guided, and independent practice; (c) monitoring student performance and providing feedback to students; (d) providing corrective feedback and use of review and reteaching when needed; (e) use of cumulative review (Rosenshine & Stevens, 1986).

**Example.** Teacher A was observed using the first four components of di. For instance, this teacher reviewed the divisibility rules/questions covered in the previous class period. The rules provided a method for students to identify if a given number was divisible by any of the numbers 2 through 10. Teacher A then linked the divisibility rules/questions to the current lesson, which required identifying the greatest common factor of two numbers. The teacher was also observed modeling new concepts and providing students with guided practice. For example, the teacher completed sample problems on the dry erase board and “thought aloud” the processes as each step was demonstrated. Students were then directed to complete problems from the textbook or worksheets, as the teacher provided positive comments to students concerning their behavior,
effort, and for correctly completing math problems. At times, the teacher stopped the guided practice and provided additional explanation of concepts and problems on the dry erase board. At the conclusion of the class, the teacher also provided independent practice via a homework assignment.

**Discussion.** In light of available research supporting the use of di for secondary students with ED and LD in math instruction (Maccini & Gagnon, 2000) teacher use of di components in the current study is encouraging. In addition to the observed components of di, it is also important to provide a cumulative review. Cumulative review extends beyond review of the previous day’s class and supports maintenance of student skills. One common, appropriate approach to cumulative review involves providing students with “warm-up” problems. These problems are completed as students enter the room, providing for a smooth transition between classes and an effective approach to cumulative review of prerequisite skills (Rosenshine & Stevens, 1986).

It is also noteworthy that the teacher allowed time for students to complete guided practice problems in class, monitored student performance, and provided feedback. Adequately monitored practice is necessary to ensure students complete problems correctly. Monitoring student performance and providing assistance are particularly important for youth with ED and LD in corrections, many of whom have a history of academic failure (Greenbaum et al., 1996; Wagner, 1995; Wagner & Blackorby, 1996) may lack motivation, and may become easily frustrated (Bos & Vaughn, 1994). As such, positive and specific comments from the teacher may provide students the encouragement to complete difficult problems. In addition to the actual teacher comments, teacher circulation and use of proximity can decrease inappropriate behavior, reduce student anxiety and frustration, and facilitate student attention to task (Walker & Shea, 1999). The teacher also provided homework or independent practice. The need for repetition of skills is critical for youth with LD and ED who may have difficulties retaining information without sufficient practice (Wilson, Majsterek, & Jones, 2001).

**Technology and Real-World Problem Solving Tasks**

**Description.** Technology-based instructional approaches can significantly impact student learning and motivation to learn higher-level math concepts; particularly when embedded within real-world problem solving tasks (Maccini & Gagnon, 2005). This approach relies on the use of a computer, calculator, or other specialized systems as the mode of instruction (Vergason & Anderegg, 2005).
Technology-based instruction can assist teachers in moving away from a focus on memorization and routine manipulation of numbers in formulas and toward instruction and activities embedded in real-world problems (Bottge & Hasselbring, 1993) that promote active student learning (Kelly, Gersten, & Carnine, 1990). Additionally, calculator use provides students access to math concepts beyond their computational skills level (NCTM, 2000).

**Example.** During the observations, Teacher B incorporated technology and linked instruction to real-world activities. Specifically, the teacher allowed students to use calculators for basic computational tasks as they calculated volume. Also, prior to introducing the formula for volume of a cube, the teacher asked the students, “Why do we need to know the formula?” and provided a personal example of shopping and comparing prices by volume.

**Discussion.** Calculator use has minimal validation as an effective tool when working with students labeled ED and LD (see Advani, 1972). However, calculator use is widely accepted by researchers (Jarrett, 1998; Maccini & Gagnon, 2005; Milou, 1999) and the NCTM (2000). Calculators may be used for computation, error correction, problem solving, concept development, pattern recognition, data analysis, and graphing (Jarrett, 1998; Maccini & Gagnon, 2002). For calculators to be effective during class activities and math assessments, teachers should provide instruction to students on how to use them. Instruction in calculator use should include all components of dí (Maccini & Gagnon, 2002). Additionally, Salend and Hoffstetter (1996) recommend use of an overhead projector to model and teach calculator use and to provide specific instruction to students concerning the function of each key.

The use of real-world math activities, or embedding instruction within a context relevant to students can have a major impact on student interest, participation, and generalization (Polloway & Patton, 1997). Additionally, by embedding problem solving information within a real-world context, students may activate their conceptual knowledge when presented with a problem solving situation outside the classroom (Gagne, Yekovich, & Yekovich, 1993). NCTM (2000) and researchers (Maccini & Gagnon, 2005) advocate use of real-world activities to the greatest extent possible.

Both technology and real-world activities can be effectively combined to teach math to adolescents with ED and LD. This combination has been validated in other school settings including alternative schools where youth typically have experienced a great deal of school failure (Bottge, 1999; Bottge &
Hasselbring, 1993; Bottge, Heinrichs, Chan, & Serlin, 2001; Bottge, Heinrichs, Mehta, & Hung, 2002). Therefore, it is logical to assume that such strategies would be similarly effective within a correctional classroom with appropriate accommodations for student safety. Other critical features integral to technology use include incorporating components of effective instruction with extensive teacher involvement as facilitator and discussion leader (Maccini & Gagnon, 2005). For example, researchers (Kelly, Carnine, Gersten, & Crossen, 1986; Kelly et al., 1990) noted the importance of computer software that provides a wide range of examples and nonexamples, as well as pictorial representations that enhance concept development (see Maccini & Gagnon, 2005 for examples of effective instructional design features that should be included in software programs).

**Student Grouping**

**Description.** Youth in juvenile correctional math classes commonly work on individual math assignments and there is little interaction among students (Coffey & Gemignani, 1994). However, variations in grouping could include whole group instruction, small group instruction, one-on-one support, cooperative group activities, individualized instruction, and peer tutoring. Small group instruction is particularly important in classes within juvenile correctional schools due to the wide range of student abilities. Also, researchers (Meisel et al., 1998) support the use of peer mediated instruction in juvenile correctional schools. For example, classwide peer tutoring is an effective approach to grouping that can strengthen student math skills (Allsopp, 1997) and may also reduce occurrences of behavioral problems (Penno, Frank, & Wacker, 2000). According to Allsopp, the approach is a, “systematic instructional strategy that uses students within the same classroom to tutor one another” (p. 368).

Common components of classwide peer tutoring (CWPT) sessions includes teacher-lead instruction of the new material, pairs working together during scheduled tutoring sessions, reciprocal tutor and tutee roles, structured tutoring formats for students to follow with correction procedures, teacher monitoring of the tutoring sessions, and team competition (Olson & Platt, 2000).

**Example.** In each of the three classrooms observed, teachers combined whole-group instruction with opportunities for students to work individually on a textbook or worksheet assignment. At times, spontaneous student collaboration existed. However, this took the form of a single student asking another student...
how to complete a specific problem. The teachers did not reprimand students for helping each other, nor promote a formal process for student collaboration.

Discussion. The whole group approach employed by each teacher is one appropriate method of math instruction at the secondary level. Large group presentations can be effective due to time efficiency and student preparation for postsecondary setting demands. However, in addition to whole group instruction, teachers should consider use of peer tutoring. This approach may be particularly effective for independent practice of math skills (Allsopp, 1997). If properly structured and monitored, peer tutoring can increase student learning and provide needed socialization (Franca, Kerr, Reitz, & Lambert, 1990). However, use of peer tutoring should include student training in a specified set of steps or procedures. Such structure is important for youth in corrections, many of whom may have limited socialization and self-regulation skills.

Allsopp (1997) noted the positive effects of a classwide peer tutoring (CWPT) approach. In CWPT, the entire class participates in a 30-minute program that can be implemented 2 – 5 days per week. Within a given session, each student acts as a tutor for 10 minutes and tutee for 10 minutes. Students take the last five minutes of each session to record their individual points. Each student may earn points for correct responses, error correction, and following the tutoring procedures. To increase self-management and positive student interactions, the tutor may record points for correct tutee responses and correcting errors. The teacher is free to award points to students for adhering to the CWPT procedures. At the end of each week, teams that meet a specified criteria level may earn a special reinforcing activity. To implement CWPT, it is important for the teacher to identify specific procedural steps and expectations for students to follow (see Allsopp, 1997). Students should then be taught the procedures through a process based on the previously noted components of di.

Strategy Instruction
Description. Teaching learning strategies helps learners to: (a) comprehend, organize, and remember vast amounts of content knowledge required in most secondary classrooms; and (b) become more active and self-regulated learners (Ellis & Lenz, 1996). Strategic instruction involves, "guidelines for how to think and act when planning, executing, and evaluating performance on a task and its outcomes" (Ellis & Lenz, p. 30). Research (Huntington, 1994; Hutchinson, 1993; Montague, 1992; Maccini & Hughes, 2000; Maccini & Ruhl, 2000)
supports the use of learning strategies by secondary students with math difficulties. Math strategies for students with LD include explicit teacher modeling in cognitive (i.e., the steps necessary for solving a problem) and/or metacognitive steps (i.e., helping students instruct, monitor, and assess, their problem solving performance via self-questions) (Montague, 1997).

Example. In the second level or intermediate math class, Teacher C reviewed a previously introduced strategy to help students remember division: divisor → down → door. For modeling how to translate “half of a number” into a math expression, the teacher wrote $1/2 \times 10 = 10/2$ on the board and stated, “leave the ‘2’ at the ‘door’ and the ‘10’ inside the ‘house’ while writing the following:

\[
\begin{array}{cc}
2 & 10 \\
\end{array}
\]

2 at door; 10 inside the house

**Discussion.** The teacher incorporated strategy instruction that focused on a method for solving a particular problem. It is also recommended that instructors teach a few rules (e.g., multiplication rule, divisibility rule) that are applicable to many problem types. Ellis and Lenz (1996) also recommend more generalizable strategies that are applicable within and/or across content areas. The researchers asserted that three features are necessary within strategy instruction to help facilitate independent learning. The first feature involves the *content* of the strategy and refers to the specific steps needed to cue the learner to use cognitive and metacognitive strategies, rules/or actions. Metacognitive strategies are necessary to help students monitor and regulate their processes while performing a task. Students can ask themselves questions while problem solving (e.g., “Did I follow the correct procedures?”; “Did I check the reasonableness of my answer?”).

The second feature, *design*, addresses the packaging of a strategy that facilitates learning and ease of use. Such design features include the use of a memory device, such as the first letter mnemonic strategy. Strategies should consist of seven or fewer steps and have simple wording for ease of recall. For example, one empirically validated memory device is the first-letter mnemonic, SOLVE (Miller, 1996, p. 353) in which each letter represents a specific step necessary for successfully solving basic math facts: (a) See the sign; (b) Observe and answer; (c) Look and draw; (d) Verify your answer; and (e) Enter your answer.

The third feature, *usefulness*, refers to the transferability of the strategy across time, settings, and contexts. For example, the STAR strategy, is a first-
letter mnemonic that cues students with disabilities to memorize and recall effective problem solving skills. The strategy has been shown to help secondary students across contexts (e.g., with integer numbers and problem solving) and results have been maintained over time (Maccini & Hughes, 2000; Maccini & Ruhl, 2000). Specifically, the STAR steps prompt students to: (a) Search the word problem (e.g., read the problem carefully); (b) Translate the problem into a picture form (e.g., represent the problems via use of manipulatives or pictorial display); (c) Answer the problem (e.g., solve for the solution); and (d) Review the solution (e.g., check the reasonableness of their answer). The strategy steps and substeps are also listed on a structured worksheet to help facilitate both problem representation (i.e., the first two steps of STAR) and problem solution (i.e., the last two steps of STAR).

**Graduated Instructional Sequence**
Secondary students with learning problems commonly experience difficulty with problem solving tasks and perform at about the fifth grade level (Cawley & Miller, 1989). Youth with LD and ED encounter difficulty with problem solving, such as: (a) selecting which operations to use when solving for the solution; (b) deciphering important from erroneous information embedded in word problems; and (c) and actively participating in problem solving tasks (Miller, 1996). The graduated instructional sequence is a systematic approach to teaching concepts and skills to ensure student understanding (Mercer, 1997). The sequence includes three phases for assisting students as they move from concept development to skill acquisition: (a) concrete (e.g., representing the concept via objects); (b) semiconcrete (e.g., drawing pictures of the objects); and (c) abstract (e.g., using numerical representations).

**Example.** The graduated instructional sequence was not observed in the school observation. However, one example of how the concrete-abstract-abstract (CSA) could have been applied is if teacher C had used the sequence with the lesson objective on translating verbal phrases into math expressions in the intermediate math class. For example, suppose the students were asked to translate the following sentence:

Candy is saving money for an MP3 player. She has $24 in her savings account on January 14 and deposits $3 per week. Write an expression that gives the amount of money that Candy has after N weeks. How much money will she have after saving for 6 weeks?
At the concrete level, students can use the algebra tiles to help them to represent the problems in pictorial or 3-dimensional form by representing the number or constant and variable amounts:

ALGEBRA TILES:

\[ n = 1 \text{ unit} \quad 5 \text{ units} = 25 \text{ units} \quad N = \text{ (# of weeks)} \]

\[
\begin{array}{c}
\boxed{5} \quad \boxed{25} \\
\end{array}
\]

Write the expression \((24 + 3N)\)

After 6 weeks of saving money: \(N\) or 

\[
\begin{array}{c}
\boxed{24} \quad \boxed{18} \\
\end{array}
\]

then:

\[
\begin{array}{c}
\boxed{24} \quad \boxed{54} \\
\end{array}
\]

\[24 + 3N = 24 + 3(6) = $42 \text{ saved after 3 weeks}\]

At the semiconcrete level, students draw pictures of the representations. Finally, at the abstract level, students write numerical representation: \(24 + 7(3)\) and then solve the problem. Students practice a variety of problems per phase until they reach mastery (80% or greater) prior to advancing within the instructional sequence.

**Discussion.** To help students understand underlying concepts and become active participants in their learning process, instruction should include a graduated sequence. Incorporating CSA into math instruction is effective in helping secondary students with LD and ED solve algebraic word problems involving integer word problems, relational word problems, and complex equations (Huntington, 1994; Maccini & Hughes, 2000; Maccini & Ruhl, 2000; Witzel, Mercer, & Miller, 2003). The process helps learners understand the fundamental math concepts prior to advancing to generalizations of rules, facts, or algorithms.
Implications for Practice
Based on classroom observations and a review of validated teaching practices, the following math instructional approaches are recommended to help meet the unique needs of youth with LD and ED committed to juvenile corrections:

1. Include the use of advance organizers to help orient learners to the lesson and to link the lesson to student interest and prior knowledge;
2. Incorporate principles of direct instruction (di) when designing and implementing lessons;
3. Provide lessons and activities that use technology and embed mathematics in real-world situations to foster student understanding of mathematics and promote generalization beyond the classroom;
4. Integrate calculators within instruction and include training for using calculators effectively;
5. Provide a variety of instructional groupings including whole group instruction, small group instruction, collaborative and structured peer activities, and individual work;
6. Incorporate use of a graduated instructional sequence that progresses from use of concrete objects, to semiconcrete, to abstract representations to promote student generalization;
7. Incorporate strategy instruction in mathematics to facilitate independent student learning during mathematics representation and problem solution.

Summary
The instructional approaches described are effective ways for educators in correctional settings to assist learners in mathematics. This is essential in light of legislation advocating empirically-validated instructional practices for all students (NCLB, 2001). Additionally, due to the high percentage of students that are classified as ED and LD within juvenile correctional schools, it is imperative that teachers rely on empirically-validated instructional math practices to ensure students gain access to the general education curriculum and the full range of educational opportunities available to students in public schools (Gagnon & Mayer, 2003).

References


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