Course ID.

Class Name

Cognitively Guided Instruction Year 3 School Year Implementation

Description

Cognitively Guided Instruction (CGI) is a professional development program based on an integrated program of research focused on the development of students' mathematical thinking, instruction that influences that development, teachers' knowledge and beliefs that influence their instructional practices, and the way that teachers' knowledge, beliefs, and practices are influenced by their understanding of students' mathematical thinking. This course is the final installment of formal CGI training.

The pedagogy of mathematics instruction will substantially reflect CGI underpinnings and a significant degree of impact in classroom teaching and learning as defined by these outcomes.

Outcomes

Participants will --

Know:

- Children's solution strategies for problem solving
- Cognitively Guided Instruction framework
- How to classify word problems according to their level of cognitive complexity

Participants will Understand that:

- Strengthening children's ability to reason about arithmetic, and building their capacity for algebraic reasoning are vital to the process of applying understanding to problem solving.
- Facilitating discussions can provide a window into children's thinking which allows the teacher to design support for each student as their mathematical strategies evolve over time.
- Using open and true/false number sentences to develop students' understanding of equality reveals deep understanding as well as naive or inaccurate thinking.

Participants will be able to do:

- Analyze story problems and number sentences to determine their mathematical demands to make sure we are supporting the students in their present stage of cognitive development which readies them for the next stage.
- Recognize student responses in terms of cognitive development to understand where they are in the framework and scaffold their progress to the next level.
- Design problems that will develop students' understanding of concepts and skills, giving them the ability to transfer and apply skills to new or similar contexts.

Competencies

Target Audience

Special Education Teacher

	Drake University Graduate Credit (ii)	2.0	$0.00
Credits		2.0	$0.00
	Licensure Renewal (ii)	2.0	$0.00

Course Type: Instructor-led

Prerequisite Notes:

In District?: Yes - Available only to district staff

Location:

Meeting Dates:

11/24	8–3pm
12/19	3–5pm
1/9	3–5pm
1/23	3–5pm
3/6	3–5pm
3/24	3 8–3pm
3/27	3 3–5pm
4/17	3–5pm
5/6	3–5pm

Facilitator/Presenter:

Contact:

Contact e-Mail:

Contact Phone:

Approver:

Research:

Carpenter, T.P. Fennema, E., Loef Franke, M. , Levi, L., Empson, S. (September, 2000). Cognitively Guided Instruction: A research-based teacher professional development Program for elementary school mathematics. Research Report: National Center for Improving Student Learning and Achievement in Mathematics and Science.

Cognitively Guided Instruction is listed as a promising practice on the Promising Practices Network.
http://www.promisingpractices.net/program.asp?programid=114

These additional articles will be used during trainings to support the participants' understanding of the foundational concepts of CGI:

Equal Sharing and the Roots of Fraction Equivalence by Susan B. Empson March, 2001
This article presents examples of children’s invented equal-sharing strategies that lay a foundation for reasoning about equivalence by connecting ideas of multiplication, division, and fractions.

Children’s Understanding of Equality: A Foundation for Algebra by Karen Falkner, Linda Levi, and Thomas Carpenter Teaching Children Mathematics, December 1999
Although teachers frequently use the equals sign with their students, it is interesting to explore what children understand about equality and the equals sign. Children must understand that equality is a relationship that expresses the idea that two mathematical expressions hold the same value.

Fostering Relational Thinking while Negotiating the Meaning of the Equals Sign by Marta Molina and Rebecca C. Ambrose September, 2006

	Integral to children’s work in algebra is an understanding of the equals sign. But, children tend to perceive the equals sign as a stimulus for an answer and react negatively to number sentences that challenge their conceptions of the equals sign. Learning-Disabled Students Make Sense of Mathematics by Jean L. Behrend This article summarizes a study in which Learning Disabled students were assessed and encouraged in their natural problem-solving strategies. Counting Collections by Julie Kern Schwerdtfieger and Angela Chan Counting collections provides children with rich opportunities to practice oral counting, develop efficient counting strategies, group objects in strategic ways, record numbers, and represent their thinking. Multicultural Mathematics and Alternative Algorithms by Randolph Philipp This article summarizes the variety of algorithms different cultures use and the use of student invented algorithms. Alternative Algorithms: Increasing Options, Reducing Errors by Tamela Randolph, 2001 School based mathematics focuses on computation and estimation, the tasks of developing number sense, place value understanding, and strategies for computing with algorithms remains important to teachers. Alternative algorithms present opportunities for critical thinking and for increased communication and an atmosphere of high expectations. Making the Most of Story Problems by Victoria R. Jacobs and Rebecca C. Ambrose Dec. 2008/Jan. 2009 Story problems can be powerful tools for engaging young children in mathematics and many students enjoy making sense of these situations. It is critical to honor children's approach to story problems so they construct strategies that make sense to them.
School Improvement Rationale	This professional development is in response to district needs to improve student achievement in mathematical problem solving. All district have a goal to improve achievement in mathematics and through this professional development, teachers will practice using evidence of students' thinking to plan upcoming instruction targeted at advancing students' understanding of key mathematical concepts. Through implementation of CGI, teacher teams will be expected to collaborate around student response to instruction.
Grade Range	Elementary
Impact on Teaching and Learning	Theory will be provided by the instructor during the large group meetings, and by readings from the texts Childrens' Mathematics: Cognitively Guided Instruction and Thinking Mathematically: Integrating Arithmetic and Algebra in Elementary School, and the supporting articles listed in the research category.
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Demonstrations	Videos and instructor modeling of questioning and responding to students' levels of mathematical thinking will be used during large group meetings. During smaller team meetings, participants will model for one another their thinking about students' solution strategies, and the problems and number choices that would help students to advance their understandings. Demonstrations may be done live or through technology.
Opportunities for Practice and Feedback Options	Role playing classroom scenarios with instructor feedback and discussion will be conducted during large group trainings. Throughout the school year participants will practice in their classrooms with feedback from peers at monthly team meetings and at the two large group follow up trainings with the instructors.
Collaboration	Teams will meet regularly to discuss the progress they are making with understanding and implementation of CGI. Activities and reflections will be recorded on monthly team logs.
Plan for Implementation	Each teacher will complete a CGI implementation 3-5 times a week. During scheduled monthly meetings, teams will address and share their implementation, particularly any barriers to implementation and reflecting upon successes.

Formative Assessment of Adult Learners	Formative assessment will occur through observation by the quality of participants' class preparations, as well as implementation refection.
Schedule of Implementation Checkpoint	Weekly
System Support (In District Only)	
Class Materials	Two texts will be provided for required reading for participants: Children's Mathematics: Cognitively Guided Instruction and Thinking Mathematically: Integrating Arithmetic and Algebra in Elementary School. Instructional guides called Learning Mathematics in Primary Grades (K-2) or Learning Mathematics in the Intermediate Grades (3-5) will be provided also. Other articles will also be provided as needed by instructors (see the research category for a listing of these articles).
Evaluation of Learning	See rubric for details
Evaluation of Learning (Refer to Rubric)	Yes
Class Requirements	Participants will: 1) Complete and submit a reflection journal 2) Use problem solving to build fact fluency 3) Analyze student solution strategies 4) Complete reading assignments 5) Attend Follow-up days of training (2 days for 6.5 hours each) 6) Teachers will meet for two hours from December through May and collaborate on student work 7)Teachers will implement a CGI problem three times a week from December through May.
Assignments	CGI Year 3 Hours CGI Year 3 2 full days of inservice (follow up days) at 6.5 hours each for 13 hours Collaboration meetings starting in December through May at 2 hours each for 14 hours Implementation starting in November for 3 times a week for 28 weeks1.5 hours to implement at plan for 84 hours. Total number of hours is 111.
Iowa Teaching Standards	ITS 1 - Academic Performance ITS 2 - Content Knowledge ITS 3 - Content Planning Instruction ITS 4 - Delivery of Instruction ITS 5 - Monitor/Assess Learning ITS 6 - Classroom Management
Iowa Leadership Standards	

Evaluation Rubric for: Cognitively Guided Instruction (Year 3, School Year Learning Team) (Learning Team) Criteria	**4 – Proficient** Demonstrates good understanding and skill	**3 – Adequate** Demonstrates satisfactory understanding and skill	**2 – Limited** Demonstrates some understanding and skill	**1 – Poor** Demonstrates little or no understanding or skill	**0 - Not completed or not able to be scored**
Criterion 1: Implement and log the use of CGI problems in classrooms	Implement and log the use of CGI problems in at least 60% of the scheduled math class periods (approximately 100 problems annually)	Implement and log the use of CGI problems in at least 50% of the scheduled math class periods (approximately 85 problems annually)	Implement and log the use of CGI problems in at least 40% of the scheduled math class periods (approximately 70 problems annually)	Implement and log the use of CGI problems in at least 30% of the scheduled math class periods (approximately 55 problems annually)	Does not implement or log CGI problems in scheduled math classes
Criterion 2: Attend local CGI team meetings in building	Attends at least 14 hours of team meetings: 2 hrs/ month	Attends 12 hours of team meetings	Attends 10 hours of team meetings	Attends 7 hours of team meetings (1 hour per month)	Attends less than 7 hours of team meetings
Criterion 3: Self-Reflection	Scores self on Individual Reflection Rubric.	**----------This criterion is either met or not met. ----------**			Does not participate in self-reflection or peer observation
Criterion 4: Attend follow-up sessions	Attends 2 follow-up session during the year	**----------This criterion is either met or not met. ----------**			Does not attend 2 follow-up sessions during the year
Criterion 5: Recording and analyzing of student video	Records the work of and analyzes growth of three students across the year	**----------This criterion is either met or not met. ----------**			Does not record the work of and analyze the growth of three students across the year
Criterion 6: Attendance/Participation (This criterion is not included in the scoring but must be completed to receive credit.)	Reflects 30 hours collaborative hours completed for 2 credits.	**----------This criterion is either met or not met. ----------**			Does not reflect 30 collaborative hours completed for 2 credits.

A - total of 20 points earned
B - total of 16-19 points earned
C- total of 12-15 points earned
D-total of 8-11 points earned
F - total of <8 points earned