**Paper Title** Perceived Changes in Teaching Practices and Views, With Insights in the Process of Teacher Learning

**Author(s)** Gizem Solmaz, Florida State University – Tallahassee; Sebnem Atabas, University of Southern California; Robert Schoen, Florida State University; Claire Riddell, Florida State University

**Session Title** Multiple Perspectives and Methods on In-Service Teacher Learning

**Session Type** Roundtable Presentation

**Presentation Date** 4/12/2021

**Presentation Location** Virtual

**Descriptors** Instructional Practices, Professional Development, Teacher Education - In-Service/Professional Development

**Methodology** Qualitative

**Unit** Division K - Teaching and Teacher Education

**DOI** https://doi.org/10.3102/1691887

## Perceived Changes in Teaching Practices and Views, with Insights in the Process of Teacher Learning

### Abstract

This paper documents teachers' perceived changes in their practices and expectations regarding teaching and learning of mathematics as they participated in a teacher professional development program based on Cognitively Guided Instruction (CGI) and corresponding weekly meetings. In of our analysis, we examined reported changes in teachers' instructional practices and expectations related to teaching and learning mathematics. Although teachers overwhelmingly expressed that adapting to the CGI approach took a great deal of time and effort, they also shared their excitement about the new instructional practices they were incorporating as a result of their CGI professional development experiences.

**Keywords:** Cognitively Guided Instruction, instructional practices, teacher change, mathematics education, teacher education

### Introduction

Despite a consensus on the importance of supporting students' engagement in "more rigorous ways of thinking and reasoning and deeper levels of conceptual understanding" in mathematics classrooms (Stein et al., 2017), "the basic nature of teaching—presenting definitions and rules, demonstrating solution procedures on sample problems, and then asking students to practice the procedures on similar problems—has remained remarkably consistent over the years" (p. 45) (Hiebert, 2013). Given the complexity of changes expected in mathematics classrooms—teachers presenting definitions and rules versus teacher facilitating and leveraging students' emerging mathematics ideas and thinking—putting reform recommendations into practice requires time and consistent effort for teacher learning (Franke et al., 2001). In addition to documenting effective professional development programs supporting the expected outcomes in teacher learning (e.g., attending to student ideas during instruction (van Es & Sherin, 2010), it is important to understand what kind of experiences support teachers' transformation of their instructional practices. Walkoe and Luna (2020) highlighted the importance of understanding what happens in professional development programs, especially in creating highly collaborative spaces. One long established professional development (PD) program that supports teacher learning is Cognitively Guided Instruction (CGI) (Carpenter et al., 1989, 1996; Jacobs et al., 2007).

CGI is a research-based professional development program for elementary school mathematics that offers a theoretical framework building on children's mathematical thinking (Fennema et al., 1993, 1996). While CGI PD has taken on various forms over the last 30 years, at its core remains the goal of increasing teachers' knowledge of their own children's thinking and encourage teachers to plan their instruction informed by their children's thinking and emerging ideas (Carpenter et al., 1992; Fennema et al., 1993, 1996). Some forms of CGI PD programs have incorporated weekly or monthly meetings with the participating teachers, CGI mentor teachers, and research staff (Bauduin et al., 2016; Jacobs, 2007; Kazemi & Franke, 2004) to workshops incorporated with routine meetings (Franke et al., 1998).

We aim to understand what one CGI PD experience looks like from teachers' perspective, what changed regarding their instruction and views, thus shed some light on teacher learning as teachers participated in a CGI PD for one year. Our exploration process is comprised of two levels. In our analysis, we explored what changes in instructional practices and views teachers documented as they reflected on their CGI experiences during the focus group interview. Thus, our research questions were as follows: (1) What are some changes in teachers' instructional practices based on what teachers reported as a result of their participation in CGI

PD and corresponding weekly meetings for a year? (2) What views and expectations related to teaching and learning of mathematics shifted as teachers participated in CGI PD and corresponding weekly meetings for a year?

## Methodology

### Settings and Participants

The data in this study are coming from a large project named *FCR-STEM Learn: Foundations for Success in STEM*. Our sample is comprised of 66 teachers in K–2 grade levels who participated in CGI PD and corresponding weekly meetings for one school year. Participating teachers had completed the first year of a three-year CGI PD program. The program involved nine days of PD (a five-day session in the summer, a two-day follow-up session in the fall, a two-day follow-up session in the winter), and weekly meetings of their grade-level team. The three-year program was designed and delivered by Teachers Development Group. University mathematics professors taught approximately one day of the five-day summer workshops. Research faculty from Florida State University designed and facilitated weekly meetings of grade-level teams of teachers who were participating in the program (Bauduin et al., 2016). During these meetings, teachers engaged in various activities, including identifying problems to pose in their classrooms, examining student work after their implementation of these problems, identifying goals based on student work, etc. Facilitators in these weekly meetings followed the same protocol in each group.

### Data Collection

Upon completing their first year in the program, collaborating teachers in weekly meetings were asked to join the focus-group interview. Data were collected through 22 semi-structured, face-to-face, focus-group interviews (Marshall & Rossman, 2011) lasting from 15 to 27 minutes each. Each weekly meeting group consisted of 2–5 teachers in the same grade level or mixed K–2 grade levels and these meetings took place in the 2015–2016 school year with total 66 teachers. Upon the completion of the weekly meetings, all the teachers were asked to join the Exit Interview. The purpose of the interview was to improve the weekly meetings for the following year and to determine the effective aspects of the weekly meetings. During the focus group interview, teachers were asked to reflect on their one-year experience as a group (see Figure 1 for interview questions). These interviews were audio recorded.

### Data Analysis

In this study, we used methods of case study and grounded theory (Yin, 2002). First, we transcribed the audio-recordings of focus-group interviews. For the analysis of the transcripts, we used NVivo 12. After reviewing the transcripts, we started making notes about emerging codes, identified codes, and developed the coding manual. Themes emerged on changes in instructional practices, expectations, and views related to teaching and learning mathematics. Although our coding manual is informed by the work of Carpenter and colleagues (2015), and Jacobs and Empson (2016), we chose to use the language teachers used during the interviews in creating our codes. Some experiences that teachers in each group identified to be important in the process of learning about CGI. We divided transcripts into idea units (Tekkumru-Kisa & Stein, 2015), which are conceptualized as “a distinct shift in focus or change in the topic” (Jacobs et al., 1997, p. 13). In this paper, we are presenting our analyses of 22 interviews. It is important to note that in this analysis, we focused on teachers’ collective conversations Thus, our analysis shows evidence of changes in teachers’ instructional practices, views, and expectations in group level rather than individual level.

# Results

## Research Question 1: Changes in Instructional Practices

Our analysis showed that after teachers' involvement in the CGI PD and corresponding weekly meetings, teachers started identifying new instructional practices to increase attention to children's thinking. As presented in Table 1 and Table 2, teachers reported that their engagement in CGI PD and weekly meetings contributed to the implementation of new instructional practices. In almost all the focus groups, teachers reported implementing a new instructional practice of letting students solve problems in their own ways. For example, one of the teachers stated: "…I think I've learned how to teach my kids to solve in their own ways as opposed to me telling them how to solve it" (Focus Group 2). Many teachers highlighted how they started stepping back and letting children solve problems in ways that made sense to them.

In half of the focus group interviews, teachers discussed that they were able to understand children' thinking. They expressed that they were able to identify where children were in their understanding of concepts and ideas, understand why children were struggling, and what children were doing as they were solving problems. One teacher in Focus Group 1 reflected on her previous instructional practices limiting her capabilities to keep track of children's growth as follows: "I think we missed the fine details or the improvements that the children made because we were so busy on doing our agenda, making sure that they drill and practice and we missed the little tiny growths that they had." (Focus Group 1).

Two other instructional practices that teachers discussed during their focus group interviews were attending students' thinking. As an example, in Focus Group 2, a teacher reported that "This year I am able to see right where my students are." In this reflection, we see evidence of teachers' increasing attention to children's thinking and how they were getting more confident in seeing where children were in terms of their understanding of the material. Other instructional practices that teachers discussed were interacting with children about their ideas without the teacher imposing her ideas, monitoring student thinking, and asking questions to uncover student thinking. These instructional practices that teachers reported to start using after they participated in the program highlighted teachers' efforts to understand children's thinking and build their instruction on them.

Although not explicitly asked in the interview, some teachers expressed having difficulty in integrating the CGI into their instruction. Some of these difficulties involved setting goals for children based on their existing thinking and understanding of the mathematical ideas (e.g., regrouping idea, counting by ones, counting by tens), seeing how standards were connected, and recognizing the mathematics that children use in connection to standards (see Table 1 and Table 2).These difficulties imply teachers were increasing their attention on student thinking and how student thinking can become the center of their instruction. For example, teachers reported the standards had driven their instruction but with CGI they were trying to start with children's thinking and moved towards to standards.

## Research Question 2: Shifts in Teachers' Views and Expectations Regarding Teaching and Learning of Mathematics

Teachers reported notable changes related to their expectations of students and their understanding of their own role in the teaching and learning of mathematics. Teachers discussed how students were capable of solving problems without teachers telling them what to do, bringing sophisticated ideas aligned with standards, solving problem teacher didn't expect them to be able to solve, and coming up with a wide variety of strategies—even the ones that teachers were not anticipating (Table 3 and Table 4). During the focus group interviews, many teachers showed evidence of a shift in their expectations, seeing their children more capable of solving problems. For example, in Focus Group 21, teachers shared how they were hesitant about letting students solve problems on their own ways and children's capabilities to solve problems without teachers' involvement as follows:

> **T21A:** Well, I was scared to do that [letting students solve problems without telling them what to do] before. I thought I had to give them some kind of scaffolding or something in advance.
>
> **T21B**:…That's pretty much the mindset of most of the teachers who are not doing CGI and that and that's kind of part of what It's hard if you haven't experienced this [CGI experience]and read this [*Children's Mathematics Cognitively Guided Instruction* book].
>
> [Additional conversation.]
>
> **T21C: …**The one that's sticking in my mind is the multiplication. "Oh, they cannot!" and "You [weekly meeting facilitator] are like, 'Let's try.' Oh my God! they're doing that! You know, Yeah, I mean, it's like, I don't know how to say it, but it's like you don't trust what they know, release it. Yeah, just let it go. It is awesome! (Focus Group 21)

In this conversation, we see teachers building on one another's idea on how they were not initially convinced students could solve problems without teachers telling them what to do. However, teachers' classroom experiences and experimentation with involving their students in problem solving prompted them to question their beliefs about whether children can solve difficult problems without a teacher showing them the solution or the directions. Another code that went hand in hand with seeing students capable of solving problems without telling them what to do was seeing that students could solve "*any* word problem" (Focus Group 1). In Focus Group 12, teachers discussed how they did not have any limits on the story problems that they would use even in kindergarten classrooms:

> **T12A:** I have learned that umm the children do not have to master, the, for instance in number identification or the writing, the numbers, in order to solve the problem. For instance, they can master number 1–3 or 1–4 and you can begin introducing word problems... I have also learned that we can do multiplication and division. These things that I have not done, never ever thought kindergarten could solve that. But they are able, you know? (Focus Group 12).

In this quote, we see how teachers' previous ideas about mastering skills before letting students to work on story problems have been challenged. After children learned about number identification and writing in kindergarten, they were ready to work on story problems, even problems that required them to use ideas related to multiplication and division.

Another important theme that emerged was around teachers' abilities to better understand what they were doing in class (e.g., their decisions during instruction) and their feelings of confidence about their teaching (e.g., why they are doing what they are doing). In many focus groups, teachers discussed how they were getting more confident in their mathematics teaching, especially their instructional decisions. As an example, a teacher in Focus Group 6, shared how she was getting better in questioning as follows:

> **T6A:** It's been fun to see how the questions are... remember in the beginning- I know I was always- what questions do you ask and I don't know what to ask. And you see how it progresses, you learn more. I think I still have a long way to go, but I feel like I have a better grasp on questioning. I mean when you watch Alice [PD

> facilitator] do it, it's so the way she questions and the question she asked her just right. Just what to ask for every little thing they [students] do. I would like to be able to do that, we are just practicing (Focus Group 6).

Similar to other instances, in the quote, the teacher highlighted how she was getting more confident in her teaching, especially her questioning. Given the importance of questioning while interacting with children and uncovering children's thinking, the teacher showed evidence of her improving confidence in her instructional decisions. Another teacher in Focus Group 5 addressed her improvement in understanding what her children were doing as follows: "think I'm more mindful of my students, and what they're actually doing, and how they're thinking, as opposed to previous years." In addition to teachers' improving confidence in their teaching and their growth as a teacher, it is worthwhile to point that in these examples, teachers also framed their learning as a long-term process, and they are only just beginning this process.

Many teachers described this process as a shift in mindset. Teachers identified CGI as an approach that transformed their views on how teaching and learning happen (see Table 5 and Table 6). Teachers expressed that CGI program changed their approach to teaching and learning mathematics in fundamental ways. As an example, a teacher in Focus Group 1 stated:

> **T1A:** Umm, I think, one thing that I would totally stress is that it is the mindset. It is you not being afraid not to be in control of the classroom and that you umm you are giving your students the opportunity to find out what works for them, umm and that, you get to share. It is more so your teachers, just kind of standing back and letting the kids do the work, don't give them everything (Focus Group 1).

In this quote, the teacher reports that the CGI program was changing their views about mathematics teaching and learning. Specifically, the teacher was learning to trust that children are able to learn through problem solving and that there is value in having the student work hard to make sense of problems and ways to solve them in their own way. Instead of teachers providing everything children may need to solve problems, they were supposed to stand back and let children solve problems in ways that worked for them. Some teachers expanded CGI from teaching mathematics to a broader view of how teaching and learning happens. As an example, one teacher in Focus Group 1 stated, "It [CGI] wasn't just in math I did it, I did it in reading, I did it in science, so whenever I present it, I present it as CGI type item... it is you changing your mindset, not being afraid to let go, and let your children direct your teaching" (Focus Group 1). Thus, for some teachers, the impact of CGI program expanded their mathematics classrooms. For these teachers, CGI program was about encouraging children to work on tasks without being told what to do in any content area. This led us to examine teachers' descriptions of their learning and explore what experiences in the context of CGI PD and weekly meetings supported teachers to keep that challenging but also a meaningful learning process.

We identified that some teachers even expressed that they felt less frustrated when students made a mistake. Although we cannot make any arguments the mechanism behind these connections, it is highly possible that teachers positioning themselves to explore and understand the child's solution and thinking, rather than evaluating if the child was using a previously demonstrated procedure might play a role in this shift. For example, a teacher in Focus Group 1, stated that "And, it is funny because when she [another teacher] just said that I thought, you know, I realized, when kids couldn't get it, I didn't get mad this year." As teachers started seeing children as capable of engaging in problem-solving and being confident in their capabilities, their attention shifted to understanding children's thinking as opposed to making sure that children were using the procedures as demonstrated.

## Discussion

In this study, we found that teachers identified new instructional practices showing their increasing attention to children's thinking (e.g., asking questions to uncover student thinking, monitoring student thinking, understanding students' thinking, and tracking growth in children) and shifting their view of children as capable of solving problems without being told what to do. These are worthwhile changes in the way teachers see and practice teaching mathematics since these are evidence of teachers challenging "the basic nature of teaching" (Hiebert, 2013) and supporting students' engagement in higher levels of intellectual work and deeper levels of conceptual understanding (Stein et al., 2017). However, there is a payoff for this transformation; in this process, both students and the teachers had to deal with new expectations and roles with some level of uncertainty. On the other hand, this uncertainty supported both teachers and students to develop ownership for their learning and what they do in the classroom. As highlighted before, researchers have largely focused on teacher learning as an outcome rather than understanding what key experiences and processes lead to teacher learning (Walkoe & Luna, 2020). It provides a window to understand what teachers experienced in this learning process with a focus on their perspective.

We acknowledge that having access to teachers' classroom instruction and weekly meetings could enrich our insights about what teachers experienced as they participated in CGI PD and weekly meetings and the changes in their instructional practices and views, in addition to what teachers reported.

## Acknowledgments

The research and development reported here were supported by grants to Florida State University from the Institute of Education Sciences, U.S. Department of Education (grant award number R305A180429) and from the Florida Department of Education (grant award number 371-2355B-5C001). The opinions expressed are those of the authors and do not represent views of the institute, the U.S. Department of Education, or the Florida Department of Education.

## References

Bauduin, C., Schoen, R. C., Bray, W., Champagne, Z. M., Iuhasz-Velez, N., & Tazaz, A. M. (2016). *Weekly Formative Assessment Collaborative Team (FACT) Meetings: Implementation Guide* (Report No. 2016-05). Learning Systems Institute, Florida State University. doi: 10.17125/fsu.1493410046

Carpenter, T. P., Fennema, E., Peterson, P. L., Chiang, C.-P., & Loef, M. (1989). Using Knowledge of Children's Mathematics Thinking in Classroom Teaching: An Experimental Study. *American Educational Research Journal*, *26*(4), 499–531. https://doi.org/10.3102/00028312026004499

Carpenter, T. P., & Fennema, E. (1992). Cognitively guided instruction: Building on the knowledge of students and teachers. *International Journal of Educational Research*, *17*(5), 457–470.

Carpenter, T. P., Fennema, E., Franke, M. L., Levi, L., & Empson, S. B. (2015). *Children's mathematics: Cognitively Guided Instruction*. (2nd ed.). Heinemann.

Fennema, E., Franke, M. L., Carpenter, T. P., & Carey, D. A. (1993). Using Children's Mathematical Knowledge in Instruction. *American Educational Research Journal*, *30*(3), 555–583. https://doi.org/10.3102/00028312030003555

Fennema, E., Carpenter, T. P., Franke, M. L., Levi, L., Jacobs, V. R., & Empson, S. B. (1996). A longitudinal study of learning to use children's thinking in mathematics instruction. *Journal for Research in Mathematics Education*, *27*(4)403–434.

Franke, M. L., Carpenter, T., Fennema, E., Ansell, E., & Behrend, J. (1998). Understanding teachers' self-sustaining, generative change in the context of professional development. *Teaching and Teacher Education*, *14*(1), 67–80. https://doi.org/10.1016/S0742-051X(97)00061-9

Franke, M. L., Carpenter, T. P., Levi, L., & Fennema, E. (2001). Capturing Teachers' Generative Change: A Follow-Up Study of Professional Development in Mathematics. *American Educational Research Journal*, *38*(3), 653–689. https://doi.org/10.3102/00028312038003653

Gallimore, R., Ermeling, B. A., Saunders, W. M., & Goldenberg, C. (2009). Moving the learning of teaching closer to practice: Teacher education implications of school-based inquiry teams. *The Elementary School Journal, 109*(5), 537–553.

Hiebert, J. (2013). The constantly underestimated challenge of improving mathematics instruction. In K.R. Leatham (Ed.), *Vital directions for mathematics education research* (pp. 45-56).Springer.

Hunzicker, J. (2011). Effective professional development for teachers: a checklist. *Professional Development in Education, 37*(2), 177–179, DOI: 10.1080/19415257.2010.523955

Jacobs, J. K., Yoshida, M., Stigler, J., & Fernandez, C. (1997). Japanese and American teachers' evaluations of mathematics lessons: A new technique for exploring beliefs. *Journal of Mathematical Behavior*, *16*(1), 7–24.

Jacobs, V. R., Franke, M. L., Carpenter, T. P., Levi, L., & Battey, D. (2007). Professional development focused on children's algebraic reasoning in elementary schools. *Journal for Research in Mathematics Education*, *38*(3), 258-288

Kazemi, E., & Franke, M. L. (2004). Teacher Learning in Mathematics: Using Student Work to Promote Collective Inquiry. *Journal of Mathematics Teacher Education*, *7*(3), 203– 235. https://doi.org/10.1023/B:JMTE.0000033084.26326.19

Lang, L. B., Schoen, R. R., LaVenia, M., & Oberlin, M. (2014). Mathematics Formative Assessment System–Common Core State Standards: A randomized field trial in kindergarten and first grade. Paper presented at the annual spring conference of the Society for Research on Educational Effectiveness, Washington,DC.

Marshall, C., & Rossman, G. B. (2011). *Designing qualitative research* (5th ed.). Sage Publications.

Saunders, W. M., Goldenberg, C. N., & Gallimore, R. (2009). Increasing achievement by focusing grade- level teams on improving classroom learning: A prospective, quasi-experimental study of title I schools. *American Educational Research Journal, 46*(4), 1006–1033.

Stein, M. K., Correnti, R., Moore, D., Russell, J. L., & Kelly, K. (2017). Using theory and measurement to sharpen conceptualizations of mathematics teaching in the common core era. *AERA Open*, *3*(1), 2332858416680566.

van Es, E. A., & Sherin, M. G. (2010). The influence of video clubs on teachers' thinking and practice. *Journal of Mathematics Teacher Education*, *13*(2), 155–176. https://doi.org/10.1007/s10857-009-9130-3

Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.).Sage Publications.

Tekkumru Kisa, M., & Stein, M. K. (2015). Learning to see teaching in new ways: A foundation for maintaining cognitive demand. *American Educational Research Journal*, *52*(1), 105–136.

Walkoe, J. D., & Luna, M. J. (2020). What we are missing in studies of teacher learning: A call for microgenetic, interactional analyses to examine teacher learning processes. *Journal of the Learning Sciences*, *29*(2), 285–307.

## Appendix

Table 1
*Reported New Instructional Practices*

| | G 1 | G 2 | G 3 | G 4 | G 5 | G 6 | G 7 | G 8 | G 9 | G 10 | G 11 | G 12 | G 13 | G 14 | G 15 | G 16 | G 17 | G 18 | G 19 | G 20 | G 21 | G 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Let students solve problems in their own way | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Understand students' thinking | ✓ | ✓ | | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ | | ✓ | | ✓ | | | | | ✓ | |
| Attend to students' thinking | | ✓ | | | | ✓ | | | ✓ | | ✓ | | | | | ✓ | | | | ✓ | | |
| Track students' mathematical understanding | ✓ | | | | ✓ | | | | | | ✓ | | | | | ✓ | ✓ | | | ✓ | | |
| Interact with students about their ideas | | | | | | | | | | ✓ | | | | | ✓ | ✓ | | | | | | ✓ |
| Monitor student work and thinking | ✓ | | | | | | | | | ✓ | | | | | ✓ | | ✓ | | | | | |
| Ask questions to uncover student thinking | | | | | | ✓ | | | | | | | | | | | | | | | ✓ | |

**G represents Focus Group.*

Table 2
*Frequency Table of Reported New Instructional Practices*

| | Number of transcripts with the code | Percentag e of the code |
|---|---|---|
| Let students solve problems in their own way | 20 | 91 |
| Understand students' thinking | 11 | 50 |
| Attend to students' thinking | 6 | 27 |
| Track students' mathematical understanding | 6 | 27 |
| Interact with students about their ideas | 4 | 18 |
| Monitor student work and thinking | 4 | 18 |
| Ask questions to uncover student thinking | 2 | 9 |

Table 3

*Shifts in Teachers' Views and Expectations Regarding Teaching and Learning of Mathematics*

| | G 1 | G 2 | G 3 | G 4 | G 5 | G 6 | G 7 | G 8 | G 9 | G 10 | G 11 | G 12 | G 13 | G 14 | G 15 | G 16 | G 17 | G 18 | G 19 | G 20 | G 21 | G 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Students are capable of solving problems without direct instruction | ✓ | ✓ | ✓ | | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ | | ✓ | | ✓ |
| Students come up with a wide variety of strategies | | ✓ | | | | ✓ | | | ✓ | | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | | | ✓ |
| Teachers are more confident about their teaching | | ✓ | | | ✓ | ✓ | | | ✓ | ✓ | ✓ | | | | | ✓ | | | | ✓ | | |
| Teachers understand what they are doing in class | ✓ | ✓ | | ✓ | | | | | ✓ | | ✓ | | | | | ✓ | | | | ✓ | | |
| Students can solve ANY problem | | | | | | | | | | ✓ | ✓ | | | | | ✓ | | ✓ | | ✓ | | ✓ |
| The importance of having realistic expectations from students | ✓ | | | | | | | | ✓ | | ✓ | ✓ | | | | | | ✓ | | | | |
| Students need time to learn mathematics | | | | | | ✓ | | | | ✓ | ✓ | | | | | ✓ | | ✓ | | | | |
| Students bring sophisticated mathematical ideas | | ✓ | ✓ | | | | | ✓ | | | | | | | | | | | | | ✓ | |
| Teachers feel less frustration when students make a mistake | | | | | | | | | | | | | | | | ✓ | | ✓ | | | | ✓ |
| Teaching requires responsive instructional decisions making | | | | | | ✓ | | | | | | | | | | | | | | ✓ | | |
| Teaching requires instructional decision making that is responsive to students | | | | | | | | ✓ | ✓ | | | | | | | | | | | | | |

**G represents Focus Group.*

Table 4

*Frequency Table of Shifts in Teachers' Views and Expectations Regarding Teaching and Learning of Mathematics*

| | Number of transcripts with the code | Percentage of the code |
|---|---|---|
| Students are capable of solving problems without direct instruction | 14 | 64 |
| Students come up with a wide variety of strategies | 9 | 41 |
| Teachers are more confident about their teaching | 9 | 41 |
| Teachers understand what they are doing in class | 8 | 36 |
| Students can solve ANY problem | 6 | 27 |
| The importance of having realistic expectations from students | 5 | 23 |
| Students need time to learn mathematics | 5 | 23 |
| Students bring sophisticated mathematical ideas | 4 | 18 |
| Teachers feel less frustration when students make a mistake | 3 | 14 |
| Teaching requires responsive instructional decisions making | 2 | 9 |
| Teaching requires instructional decision making that is responsive to students | 2 | 9 |

**Figure 1**
*Interview Questions*

1) How is math class different this year than previous years? What do you want to do differently next year?

2) How have the weekly meetings changed your instructional practice this year?

3) We are planning to do weekly meetings with teachers next year too. What do we need to know or do to make them more effective?

4) What do principals need to know about this program? For instance, what do they need to know before suggesting teachers sign up for it, or what do they need to know in order to support teachers in the program?

5) If a teacher is thinking about signing up for the CGI PD and weekly team meetings, what does he or she need to know in order to make an informed decision?