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Collaboration: An Alternative Approach for Mathematics Teachers' Professional Development and Student Learning

Background

- The Jamaican education system is still failing to prepare and qualify many of the nation's youth for higher educational pursuits or for the work force. It is speculated that this is because of the predominant use to the traditional direct teaching methodology in the classrooms.

Purpose

- The purpose of this study was to *conceptualize, introduce*, and *examine* the development of an alternative approach to the traditional didactic approach for professional development for a selected set of high-school mathematics teachers in Jamaica.

Purpose contd.

- To explore the accommodation of and the translation of this approach to the teaching and learning of mathematics, and
- to further explore students' and teachers' perceptions of their experiences with this approach.

Purpose contd.

- The purpose was also to generate an approach to tap the mental resources of all students in the mathematics classroom and to offer every student the opportunity to develop their mathematical power—through the *mathematics learning experiences* (MLE).

Significance

This study is of theoretical and practical significance to administrators, college and university educators, policy makers, education officers, teachers and students of mathematics and all other subjects at all levels of education in all countries (i.e. not just Jamaica and the other Caribbean islands).

Significance contd.

This study is significant to all these stakeholders **because** of the **key elements of trust, effective communication, and critical thinking** that were embedded and are essential **to optimize learning.** It is also

Significance contd.

- Significant because it helped teachers to become more accommodating of peer collaboration for professional development activities, which led to improved teaching practices, and students' collaboration and learning of mathematical concepts.

Theoretical Framework

- Cognitive Coaching (Costa & Garmston, 1994; 2004).
- clinical supervision (Cogan, Goldhammer & Anderson)
- neurosciences (Damasio & Peart)
- metacognition and intelligence (Robert Sternberg)
- instruction and supervision (Glickman & Sergiovanni)
- staff development (Garmston)

Theoretical Framework

- Collaboration among teachers is an essential element for professional practice (da Costa, 1995; Darling-Hammond & McLaughin, 2011; Ellis, 1990; Garmston, Linder, & Whitaker, 1993; Guskey 1985; Hargreaves & Dawe, 1990; McLymont, 2000; Joyce & Showers, 1995; King & Newman, 2001; Little, 1993; Showers, 1990).

Theoretical Framework

- Professional Development - (Darling-Harmond & McLaughin, 2011; Glickman, Gordon, Ross-Gordon, 2010).

Research Question1

- 1. What elements of the teachers' professional development experiences did teachers view as important for students' mathematics learning experiences?

Research Questions

2. What were students' perceptions of their mathematics learning experiences?

Research Design

- Explanatory qualitative study which incorporated incorporated the voices of the participants (Merriam, 2009; Strauss & Corbin, 1994).

Participants

- All teachers in the mathematics department of the Dominion High School (pseudonym) and
- The teachers' mathematics classes.

Methods of Data Collection

- Interviews: Individual Teachers, teacher focus group, student focus group.
- Teachers' coaching conferences
- Observation
- Students Journal writing

Methods of Data Collection

- Students' small group discourses.

Data Analysis

- Open Coding for categories which generated themes (Berge,1995; 2009).

Trustworthiness (Guba, 1981)

- Multiple modes of data collection
- Referential materials (video tapes and audio tapes)

Ethics

- For the purpose of anonymity pseudonyms were used for the name of the institution and teachers.
- Students were assigned numbers and codes according the class they were in.

The Process

- Phase l – Two stage five-day seminars
- Phase ll –Monthly Professional Development sessions with teachers along with weekly coaching sessions

Process

- Phase 1: After a five-day series of seminars 6 teachers sought to translate their experiences gained during the seminars into their mathematics classrooms.

Research Question1

- 1. What elements of the teachers' professional development experiences did teachers view as important for students' mathematics learning experiences?

Process

- Teachers reflected on their collaborative experiences and activities.
- They made projections for the translation of similar experiences to the classroom context for students' mathematics learning.
- They suggested important pillars on which the students' mathematics learning experiences should be built.

Results

- ***Grouping*** *with* **assigned roles** --*might increase the utilization of the skills within the group and frees up the teacher to effectively answer or deal with the problems that arise* (Newell).
- maximize students' participation and might make "*teaching*" less burdensome (Newell).
- --- *"build trust and rapport" (Lennox)*

Results

- **Questioning that focuses on content and included wait-time**.
- *"The kinds of questions that were asked forced you to think"* (Lennox).
- *Wait-time--one should be given enough time to think about his or her response before answering* (Mrs. Scott

Results

- **Paraphrasing which served to provide clarification and contributed to the building of trust.**
- encourages intentional listening, and gives the person speaking *"an opportunity to hear what he or she had communicated and to clarify anything that he or she said or did not say"* (Mrs. Scott).

Results

- **Body Language ---Conscious effort to convey non-judgmental messages.**

Summary

- The elements from the teachers' professional development experiences that were viewed as important pillars that the teachers would want to apply in the classroom for students' learning of mathematics were:
- Grouping with structure
- The questioning technique inclusive of wait time
- Paraphrasing
- Consciousness of messages conveyed through Body Language

Research Question2

2. What were students' perceptions of their mathematics learning experiences?

Results

- Students working with peers in small groups with assigned roles stated that the experience provided them with opportunities:
- To share mathematical concepts that they understood,
- To share information they did not know that they knew.
- To reinforce what they knew as they shared.
- To think on their own,
- To help others to understand mathematics concepts
- To help themselves and others to experience success,
- To experience fun while learning mathematics.

Results

Student grouping with assigned roles influenced understanding of mathematical concepts and problems and the generation of mathematical solutions.

Voices of the Students

- *"Even when you are explaining something to someone, you are actually recalling what you have learnt and understanding it better"* (24GA).
- 17GA's state: *"We pooled our ideas in solving the problems."*

Results

- Student grouping with assigned roles influenced positive attitudes.

Results

- Students developed confidence in expressing themselves as each is given voice and respect and each is listened to in the small group setting.
- They experienced courage to engage in problem solving activities.
- The push to strive for excellence becomes a driving force.
- A likeness for mathematics is generated as skills are developed to solve problems.
- Students feel comfortable working with their peers as they talk and reason with one another.
- They also learn from each other and feel appreciated.

Voices of the Students

- After the introduction of grouping with assigned roles during the seminars, one student stated, *"If this **initiation** has helped me to **stop fear math** a little, then if the class continues to be like this, I know it would be good for me"* (Seminar, Sept. 4).

Voices of the Students

- *The group had a very great impact on getting me to understand. The members of my group have also given me the courage to move on and to strive for excellence in mathematics. I liked the way my group behaved; they are very attentive and co-operative in all aspects (*Student 15A*).*
- *"My group also gave me a sense of* ***courage in myself*** *and is helping me to* ***develop a likeness for mathematics***" (17 A).

Voices of the Students

- *Most of all, it has helped to **build my self-confidence** as I showed my group members things I didn't even think I knew* (8A).
- *My group made me **feel more comfortable to be wrong** about something and correct it. It made me feel confident especially **when they asked me what I think.** I think I like math more now and I understand the problems better. You feel comfortable working in a **friendly environment** and more relaxed, making you want to work. They were friendly and understanding even when members did not understand.* (Student 8GA,Oct.16)

Voices of the Students

- Student 14GA, *"I also loved the **attitude displayed** because no one turned their minds away from the problems."*
- Student 23GA provided a further elaboration on this point. She stated, *"Because whenever I made a mistake one of my group members was always there to see it and make me correct it **without telling me the answer**"* (23GA).

Results

Student grouping with assigned roles influence collaboration.

Results

- Students worked together solving mathematics problems, they provided explanations responding to why, how, etc.
- No one was afraid to seek clarification in the small group setting.
- No one had to struggle by himself/herself without the opportunity to seek help.
- The discourses generated in the collaborative setting provided the opportunity for each to express himself/herself without fear.

Results

- Each gained clear understanding of concepts and principles.
- Students' also projected their thoughts to the workplace and saw such acts of collaboration as they experienced it an opportunity to build skills for the workplace.

Voices of the Students

- *"This approach has **given me more confidence** in math"* (5Sec).
- Student 1Sec noted that *"When you are **working or studying at higher levels**, and if you have to work in groups if you are co-operative **you won't have a problem.**"*

Summary

- Students' perceptions of their small group activities revealed:
- how students developed of positive attitudes,
- how they were taught to collaborate and to engage in acts of collaboration,
- how their understanding of mathematical concepts and problems and the generation of mathematical solutions were impacted.

Recommendation

That educators and researchers learn the simple tools involved in the coaching approach and apply them in the teaching and learning context and note the impact on student learning, student collaboration, and teacher collaboration.

Thanks

Ladies and Gentlemen I thank you.

I will be happy to answer your questions.

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