Final Report for the Literacy and Numeracy Secretariat:

Niagara Catholic District School Board's Junior Interventions Project

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EXECUTIVE SUMMARY

Background

Teachers hold distinct beliefs about how the relationship between the teacher, the student and the content affects the instructional core (Elmore, 2009). Educational research points to the need to support junior level teachers' professional learning in mathematics problem-solving teaching methods while attending to their beliefs and attitudes about mathematics instruction as well as honouring their content knowledge and experience. Reflection enables teachers to improve their skills, beliefs and perceptions of mathematics teaching and is an overall facilitator of teacher development (Turner, 2009). It is commonly held that supporting the practice and confidence of teachers to instruct mathematics through problem solving takes time.

The Niagara District School Board (NCDSB) *Junior Interventions Project* focused on developing teachers' effective use of diagnostic assessment to identify student misconceptions and drive their instruction of mathematics. This program of professional learning sought to build on junior level teachers' mathematics content and pedagogical knowledge while bearing in mind their beliefs and attitudes about mathematics instruction and how students learn mathematics.

Methodology

The NCSDB's intervention design drew on aspects of the "Seven Foundational Principles for Improvement in Mathematics K-12" document. Operationally, the intervention design included three key components: facilitated teacher professional learning sessions, collegial teacher professional learning, and student intervention coaching. The Facilitators led all professional learning sessions and offered ongoing support for the individual needs of teachers throughout the project. There were two, full day plenary sessions that were attended by all teacher participants and were co-facilitated by the Intervention Coach and three Facilitators. There were four, half day sessions that were guided by one of the Facilitators at each of the school sites and included the grade 3-6 teachers and their administrator. Each of the participating teachers was granted eight half days to engage in collegial professional learning with their same-grade/division colleagues. The Intervention Coach was devoted to providing one-on-one mathematics instruction for students targeted by their classroom teachers.

The research was an evaluative case study with the purpose to inquire into an educational program in order to determine its effectiveness. There were five research questions that related to teachers' practices and beliefs, and students' achievement. Quantitative and qualitative data (surveys, interviews, fieldnotes, journals, report card scores) were collected from three sets of participants: teachers, facilitators and students. There were 22 teachers (grades 3 to 6) at five schools that participated in the program and their students indirectly participated as recipients of the teachers' professional learning and intervention coaching. All participants (teacher participants, facilitators, parents/guardians of students) signed informed consent forms.

Findings

Beliefs and attitudes about mathematics learning and teaching were shared by the teacher participants. Acknowledging and altering such deeply entrenched prior learning experiences as a student is a challenging prospect for any teacher. These beliefs inform teachers' conceptualizations of the relationship between the teacher, the student and the content. The Facilitators of this project honoured and worked with teachers` beliefs systems and teacher shifted toward problem-based methods.

From the beginning of the Junior Interventions Program, the Facilitators recognized that they needed to offer explicit content knowledge support for the teachers and the teachers responded favourably to how this was incorporated into sessions. The Intervention Coach worked with targeted students, and he also recognized the co-dependent nature of supporting teachers` math content knowledge and instructional practice to address students` learning needs.

Teachers talked about the challenges of releasing responsibility for their students` learning back to their students. After a few months, they recognized that the students were not only assuming ownership for their own learning, the students were more motivated to enhance their mathematics skills too. As a result, the teachers were less likely to contend that their role is to transmit and verify mathematical knowledge. The teachers now appreciate the key role that students have in their own learning and that students are capable of much higher levels of mathematical thought.

Many of the teachers expressed how they used the numeracy nets for differentiating instruction to support the learning of students with similar misconceptions in mathematics. The teachers perceived that their students` learning was significantly impacted by the co-planning, numeracy nets, three-part lessons, and co-teaching. Some of the teachers noted that these mathematics instructional methods were especially poignant at contributing to the learning of their struggling students in math. An unexpected outcome was that teachers were surprised by the realization that teaching from a textbook resource is not as effective or efficient as they believed.

Some teachers noted that their students were uncomfortable with the open-ended nature of the mathematics tasks presented to them. The teachers patiently encouraged peer collaboration and consequently witnessed students working through the problems together. Teachers remarked on the need for their students to have the necessary skills to work in such collaborative groups. Grades 3 and 6 teachers also expressed a heightened amount of angst with respect to preparing their students for EQAO testing; they failed to recognize the embedded benefits of the instructional methods in addressing these assessed skills.

Growth in students` achievement was evident in all strands of mathematics based on analyses of report card grades (Term 1 and Term 2). Statistically significant student achievement has been summarized for each school site and interpreted in a series of tables. Influential factors such as gender, grade, teacher, school and tutoring were calculated.

Implications

Based on the findings, implications for practice and future research are offered. Teachers are calling for a continuation of the program of professional learning that was facilitated within NCDSB. Refinements might include development of a repository of resources, strategies for student collaborative group work, support for curriculum mapping, release time for co-planning and co-teaching and the support of an intervention coach for students.

Author Note:

Dr. Tiffany L. Gallagher is an educational researcher and Associate Professor in the Department of Teacher Education at Brock University. Her research expertise is in mixed methods research designs that investigate assessment and teaching strategies and students with exceptional learning needs. A request was made by NCDSB to the Research Officer at Brock University Faculty of Education for a researcher to investigate the *Junior Interventions Project* and Dr. Gallagher elected to assume this role. Throughout the 2011-2012 school year, Dr. Gallagher was at arms-length to the design and facilitation of this project. The research of this project was vetted through the Research Ethics Board at Brock University and NCDSB. Dr. Gallagher independently and confidentially collected and analyzed all of the data contained in this report. Dr. Gallagher has never been employed by Niagara Catholic District School Board and was not remunerated for the research or writing of this report; consequently she has remained an objective evaluator throughout this process.