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Preparing Teachers for Content-specific Consultations: Perspectives From Four Continents

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ABSTRACT

This paper describes an international collaboration of teacher educators from four countries that developed a method of preparing preservice mathematics and special education teachers to consult to address the mathematics learning needs of K-12 students with special education needs within inclusive classrooms. Researchers from Germany and the United States present case summaries of findings from implementations in their respective countries, and researchers from Brazil, China, Germany, and the United States add their context-specific analysis of the implementations. The researchers identified ways in which they can provide opportunities for general education and special education preservice teachers to learn to synthesize their knowledge to change classroom instruction to support the learning of students with special education needs. The paper concludes by using a communities of practice lens to discuss implications for preparing preservice teachers for mathematics-specific consultations in multinational contexts.

Keywords: Special Education, Consultation, Teacher Learning

Introduction

In 1994, representatives from 92 governments and 25 international organizations signed the Salamanca Statement (UNESCO, 1994) committing themselves to *inclusive* education for all students, regardless of special education status. This document defined *inclusive* education as allowing students with special education needs to attend their regular, local schools. Rather than establishing special education schools, the Salamanca statement admonished countries to build capacity within general education schools to meet the needs of all diverse learners. Therefore, there has been an ethical obligation for the signatory countries to develop and adopt policies that result in effective instruction being delivered to *all* students. Indeed, as part of the capacity-building process, the statement specifically articulated the need for signatory countries to ensure that teacher preparation programs would adequately prepare future teachers to provide effective instruction to students with special education needs within inclusive, general education settings. The policy shift toward inclusion has profound implications for the need to update and revise the preparation of general education and special education teachers.

Despite the fact that international policy documents have continued to emphasize the importance of attending to teacher preparation for inclusion (UNESCO, 2000, 2009), an international survey of teachers reported that teachers across 18 countries identified *teaching special needs students* as their most pressing need for professional development (Schleicher, 2012). As the European Agency for Development in Special Needs Education (2011) explicated, "one of the key priorities for teacher education . . . [is] to review the structure to improve teacher education for inclusion and to merge the education of mainstream and special education teachers" (p. 18). Although the field of teacher preparation has recognized the need to provide integrated opportunities for special educators and general educators to collaborate, research in this area has been slow to emerge. There is currently no consensus as to the ways in which this integration can be accomplished (e.g., Blanton et al., 2014).

In an effort to address this lack of research on preparing teachers for inclusion, the authors of this paper (education researchers from four countries) have formed an international collaboration, which we have conceptualized as a multi-national community of practice (Wenger et al., 2002). Situated in Brazil, China, Germany, and the United States, our research teams hold the common goal of improving the preparation of teachers in our respective countries to meet the needs of students in inclusive settings. Rather than work in parallel and in isolation, we have chosen to cultivate a *shared but given goa*l (Clausen et al., 2009; Quebec Fuentes & Spice, 2017; Quebec Fuentes & Bloom, 2021) for researching one potential way to prepare general education and special education teachers to collaborate to meet the needs of *all* students in the mathematics classroom: specifically, we focus on how to equip special and general education teachers to engage in mathematics-specific consultations and integrate their respective knowledge bases to meet the mathematics learning needs of students with special education needs.

As we have described previously (van Ingen et al., 2016), there are multiple ways (beyond consultation) that general education and special education teachers can collaborate to provide effective instruction for students with special education needs. One type of collaboration is co-teaching, in which both the special education teacher and the general education teacher collaborate together inside the classroom. Although co-teaching can be a powerful form of collaboration, it is not always feasible due to the fact that there have simply not been enough special education teachers to be present in each classroom with students with special education needs (e.g., McLeskey et al., 2004). Additionally, the inclusion of both a special education teacher and a general education content teacher in a classroom does not necessarily guarantee that the nuanced learning needs of a student with special education needs will be met (Moin et al., 2009). Another potentially effective form of collaboration is the consultation (Busse et al, 1995; Medway & Updyke, 1985; Sheridan et al., 1996). Discussion on consultations in education can be found since the 1980's and began with a focus on consultations

around behavioral issues (e.g., McDougal et al., 2005; Noell et al., 2005; Sheridan et al., 2001; Wilkinson, 2005). Much of the cumulative body of research on consultations in education centers around addressing the needs of students with special education needs, especially students with more involved disabilities (e.g., autism, intellectual disorders, multiple disabilities). For example, Ruble et al. (2010) reported on the findings of a study examining the outcome of the Collaborative Model for Promoting Competence and Success (COMPASS) between parents and teachers to improve individual education plan outcomes for children with autism.

The Mathematics-Specific Consultation

Leveraging Diverse Expertise to Create M-SEPACK

Successful consultations occur in the contexts of professional relationships in which the collaborators each have their own areas of expertise (Alpert & Meyers, 1983) and in which there is reciprocity in exchanging knowledge (Sundqvist & Strom, 2015). For teachers, this expertise certainly includes knowledge of the content areas being taught (in this case mathematics and special education), but it also includes the specialized knowledge of *how* to teach content- knowledge that has been named pedagogical content knowledge (PCK, Shulman, 1986; van Driel et al., 1998). PCK is a type of expert knowledge unique to teachers, and it allows them to integrate knowledge of the content area, the use of effective instructional practices specific to that content area, knowledge of the student, and knowledge of the learning environment to improve content-specific learning outcomes for students (Cochran et al., 1993).

With regard to the content area of mathematics, Ball et al. (2008) identified three different types of PCK: knowledge of content and students (KCS), knowledge of content and teaching (KCT), and knowledge of content and curriculum (KCC). Our research team has identified analogous knowledge types in the realm of special education (van Ingen Lauer et al., under review). In the mathematics-specific consultation, the mathematics teacher brings extensive mathematical knowledge for teaching (MKT, Ball et al., 2008), among other forms of knowledge, to the consultation, and the special education teacher provides extensive special education knowledge for teaching (SEKT), among other forms of knowledge, to the consultation. Together, they synthesize a blending of these knowledge bases to form mathematics-special education pedagogical content knowledge (M-SEPACK). This is, by definition, the type of knowledge that is needed to meet the mathematics learning needs of a student with special education needs. Table 1 provides a visual representation of how MKT and SEKT are combined to form the three types of M-SEPACK: (a) Knowledge of Content and Teaching in Special Education, (b) Knowledge of Content and Students in Special Education, and (c) Knowledge of Content and Curriculum in Special Education (see van Ingen Lauer et al., under review, for an extensive discussion of each category and subcategory of knowledge type).

Table 1

Framework for Mathematics-Special Education Pedagogical Content Knowledge (M-SEPACK)

Mathematical Knowledge for Teaching (MKT)	**+**	**Special Education Knowledge for Teaching (SEKT)**	**=**	**Math-Special Ed Pedagogical Content Knowledge (M-SEPACK)**
Knowledge of Content and Teaching (KCT)	+	Knowledge of Teaching and Special Ed (KTSE)	=	Knowledge of Content and Teaching in Special Ed (KCT-SE)

Mathematical Knowledge for Teaching (MKT)	+	Special Education Knowledge for Teaching (SEKT)	=	Math-Special Ed Pedagogical Content Knowledge (M-SEPACK)
Knowledge of Content and Students (KCS)	+	Knowledge of Students and Special Ed (KSSE)	=	Knowledge of Content and Students in Special Ed (KCS-SE)
Knowledge of Content and Curriculum (KCC)	+	Knowledge of Curriculum and Special Ed (KCSE)	=	Knowledge of Content and Curriculum in Special Ed (KCC-SE)

In summary, the mathematics-specific consultation is designed to capitalize on the integration of the PCK in mathematics and the PCK in special education to address the particular mathematics learning needs of students with special education needs. Utilizing the consultation process, the mathematics and the special education teacher can leverage their collective knowledge of the mathematics content, effective mathematics instructional practices generally, the learning environment, and the needs of students with special education needs, including effective instructional practices for students with special education needs, to improve these students' mathematics outcomes.

The Consultation Process

Table 2 shows the step-by-step mathematics-specific consultation.

Table 2

The Mathematics-Specific Consultation Template Used in the German and American Studies

STEP 1: Completed by the Mathematics Teacher- Identify the Student	
Student Pseudonym:	
Grade Level:	
Identify Student Learning Needs- Include information on diagnosed learning exceptionality and/or below level performance. Include description of student participation in math class.	
Target Content Standard:	
Target Mathematical Practice/Process:	
Cognitive (Diagnostic) Interview Questions:	
STEP 2: Completed by the Mathematics Teacher- Post Diagnostic Interview	
OBSERVATIONS	2.1 What did you learn about the student's UNDERSTANDING of the content standard that you targeted? Provide a pictorial depiction of student work and/or paraphrase at least one key moment during the interview.
	2.2 What did you learn about the student's ENGAGEMENT in the mathematical practice that you were targeting? Describe HOW the student engaged in the mathematics activities and the extent to which that did or did not reflect the targeted mathematical practice:
	2.3 Record any other observations about your interaction with this student that may help the SPED consultant better understand the student's needs:

QUESTIONS	2.4 Record at least one question that you have for your SPED consultant regarding understanding your STUDENT and how his or her disability/low achievement affects learning:
	2.5 Record at least one question that you have for your SPED consultant regarding TEACHING actions that you could take to support student learning in regard to the CONTENT standard:
	2.6 Record at least one question that you have for your SPED consultant regarding TEACHING actions that you could take to support student engagement in the targeted mathematical practice:
Meeting #1 for Mathematics Teacher and Special Education Teacher	
STEP 3: Completed by the Special Education Teacher	
Summarize what you learned about the 3 C's: Child, Content, Context.	
Create some instructional hypotheses about what the student is able to do and not do in the math class given the information that was presented.	
ANSWERS	Please answer the Mathematics Teacher's questions. Include:
	Explain how the exceptionality affects the student's learning of mathematics.
	Put research-supported suggestion(s) into the context of the math classroom. Provide examples of how your suggestions might play out with the content and in the context of the classroom that has been presented. Provide the reference for the research.
	Attend to and provide recommendations for supporting student engagement in the mathematical practices. Make suggestions contextualized and specific.
Meeting #2 for Mathematics Teacher and Special Education Teacher	
STEP 4: Completed by the Mathematics Teacher After Second Meeting	
This is what I learned from my consultant:	
This is the plan for working with the student (Be specific about implementation AND explicit about how the research informs this implementation.)	
The Mathematics Teacher Implements the Plan	
STEP 5: Completed by the Mathematics Teacher After Implementation	
Collect data from work with the student. Provide evidence for what worked or did not work.	
Meeting #3 for Mathematics Teacher and Special Education Teacher	
STEP 6: Completed Both Teachers After Meeting #3	
Reflections on the Consultation Process: What worked well in the consultation? What would you want to do differently next time you engage in a consultation?	

In STEP 1, the mathematics teacher summarizes the math-related learning needs of the student including areas of difficulty and observations made in class pertinent to learning math and their identified disability. The math teacher also shares both the *what* of mathematics learning (content standards such as adding fractions or solving two-step algebraic equations) and the *how* of mathematics learning (the mathematical practices—the processes or habits of mind such as making sense of problems or making use of structure). Having identified the target student and target mathematical content, the mathematics teacher prepares questions/prompts for the ensuing cognitive/diagnostic interview centered around the target math content and practices.

In STEP 2 of the mathematics-specific consultation the teacher conducts a cognitive interview with the student. The focus is to learn what the student does and doesn't understand about the target mathematics and what the teacher learned about how the student engaged in the target mathematical

practice(s). We have found it helpful if the math teacher shares at least one key moment or incident during the interview that stood out to them as well as any information that will help the special education teacher consultant to understand the student's needs. Then, the math teacher develops one question they have for the special education teacher about the *student and how their disability/low achievement affects learning,* one question they have for the special education teacher about *teaching actions they could take to support the student in learning the target mathematics content*, and one question they have for the special education teacher about *teaching actions they could take to support the student to successfully engage in the target mathematics practice(s)*. The mathematics teacher uses these questions/prompts to elicit the special educator's expertise about the special education needs of the student, and potential teaching strategies that might be effective given their needs. After STEP 2 the mathematics teacher and special education teacher meet to discuss what the mathematics teacher learned.

In STEP 3, the special education teacher reflects on the information shared by the mathematics teacher and their ensuing discussion during their first meeting together. The special education teacher then considers how this information informs the 3 – Cs, the **C**hild, the **C**ontent, and the **C**ontext. When doing this, the special education teacher writes key insights (two to three sentences each) related to the child/student in terms of learning (how particular characteristics of their learning exceptionality could be impacting their learning – e.g., working memory difficulties), how this might affect learning the target mathematics content and mathematical practice in particular (e.g., perhaps the student would benefit from use of the concrete-to-representational-to-abstract instructional sequence), and what might be possible facilitators and barriers based on the context/environment (e.g., how noise and movement could be distracting for the student). Based on the 3 Cs the special education teacher creates an instructional hypothesis that identifies: 1) the mathematics to be learned, 2) what the student can do given the target mathematics, 3) what the student cannot do given the target mathematics, and 4) why they are having difficulty sharing with the mathematics teacher. This instructional hypothesis becomes the focus of instructional decision-making. Additionally, the special education teacher writes brief answers to each of the three questions posited, and shared by the mathematics teacher in STEP 2, including support from research. At this point, the mathematics and special education teachers meet to discuss the special education teacher's thoughts including possible teaching actions that could be taken regarding the instructional hypothesis.

In STEP 4 and STEP 5 the mathematics teacher writes what they learned from their special education consultant, develops a plan (being explicit about teacher actions and how research supports the plan), and implements the plan). After implementing the plan, the mathematics teacher and the special education teacher meet to discuss how the plan is going and to make any adaptations as needed. In STEP 6, the two teachers meet to reflect on their consultation including what worked well and what they would do differently the next time. This is also time for the two teachers to continue cultivating a positive relationship for future consultations.

Together, the two educators use the specialized knowledge of teaching mathematics (brought to the consultation by the mathematics teacher) and the specialized knowledge of teaching students with special education needs (provided by the special education teacher) to develop a very specific plan to teach the specified mathematical content to the target student. Table 2 defines the step-by-step process we used as a framework in our multi-national collaboration to prepare preservice teachers to engage in mathematics-specific consultation.

Shared Goals and Research Questions

The aims of this article are to (a) briefly describe current teacher preparation policies and practices in each of our countries related to inclusion, (b) present case summaries on data from two implementation studies: Implementation 1 (Germany) and Implementation 2 (United States), and (c) initiate an international discussion about the findings and implications given our four different

contexts. Although we report case summaries from only two of the four research teams, we provide details on the backgrounds and perspectives of researchers from all four countries to accurately reflect our multinational collaboration and to contextualize the ensuing conversations between the four respective research teams.

Our international collaboration began with a shared understanding of the mathematics-specific consultation as a cycle that had been described in van Ingen et al. (2016) and operationally defined in Table 2. We then started developing context-specific interventions to prepare preservice teachers to engage in these consultations. Our shared goal was to prepare our future teachers to leverage consultation to create the M-SEPACK that would be needed to meet the mathematics learning needs of students in their inclusive classrooms. As we designed unique implementations specific to our respective contexts, we shared an overarching research question:

> To what extent were our preservice teachers able to synthesize M-SEPACK during the consultation process?

As a multi-national community of practice, we also extended our *shared but given goal* to a *shared beyond given goal* (Quebec Fuentes & Spice, 2017; Quebec Fuentes & Bloom, 2021) of understanding what consultation looked like in our diverse contexts and how each team made unique modifications to how they thought about preparing teachers for content-specific consultation in their unique circumstances. We were interested in the similarities and differences in how we both implemented our research as well as how we reflected upon our shared and different experiences.

Contexts for Potential Consultations Across Four Continents

Brazil

Concern about inclusive practices in Brazilian schools intensified after the Declaration of Salamanca in 1994. The publication of the National Policy on Special Education for the advancement of Inclusive Education in 2008 was momentous as it initiated a shift in national policy. The document presents and defines various methods of implementing inclusive practices for students with special education needs. One recommended inclusive practice from this document is for the student with special education needs to attend most general education classes and receive specialized educational services through a special education teacher in a resource room. Another recommended practice is the adoption of collaborative teaching. This practice has been researched in Brazil since 2004 (Capellini, 2004; Mendes et al., 2011; Zanata 2004).

As has been acknowledged internationally, in order for collaborative teaching to occur in Brazil, it is necessary that future teachers are prepared to engage effectively in collaborations between general and special education teachers. Thus, teacher educators in Brazil need to closely couple theory, research, and practice related to collaboration to support the skills and dispositions of general and special education teachers to engage in effective collaboration. Currently, Brazilians have focused on the continuous professional development of special education teachers to engage in collaboration. However, as Maturana et al. (2019) point out, this ongoing professional development has not led to significant changes in teachers' practice. Therefore, it is necessary to think innovatively about connecting preservice and inservice teacher professional development. In particular, we suggest that the internship of preservice teachers is a critical juncture for training in one form of collaboration—the consultation. The possibility of partnership between universities and K-12 schools via the internship is a unique moment to implement collaborative consultations. As an example, the Brazilian University X campus has offered courses to teachers of public schools that are integrated with undergraduate courses, enabling the possibility of preservice teachers to consult with special education

professionals in the planning of didactic sequences for the teaching of students with special education needs.

China

Starting in 1978, a program of economic reform and the opening up of the economy to foreign investment have had an influence on educational policy in China. China's special education policy has been influenced by both international trends in special education development and ensuing domestic educational reform. Prior to the 1980s, very few general education schools in China supported students with special education needs. During the 1980s, the Learning in Regular Class program (LRC program), in which children with special education needs would be taught in regular education settings, was formally proposed and supported. This meant segregated special education schools were not the only placement option for children with special education needs, and some of these students were placed in regular schools or special classes in regular schools. By 2012, 52.7% of students with special education needs in the years of compulsory education had participated in the LRC program (Ministry of Education, 2012). China now has the goal to prepare prospective teachers for inclusive classes and to foster corresponding competencies. It is desirable that all prospective teachers acquire subject knowledge, general pedagogical competencies, and participate in opportunities for teaching in inclusive settings. Up to this point in time, cooperation between different teaching professions has been emphasized, but there has been no consensus on how to prepare teachers to engage in collaborations in China. (Ma & Tan, 2010). The possibility of preparing preservice general education and special education teachers to engage in consultation is a promising new direction that can help educators fulfill the LRC program and other policy requirements.

Germany

The ratification of the Convention on the Rights of Persons with Disabilities (United Nations, 2009) led Germany to intensify efforts of inclusive learning and to widen their previous considerations for an integrative school system. Concurrently, preservice teacher preparation for inclusive classes has been brought into focus. The standing Conference of the Ministers of Education and Cultural Affairs (KMK, 2015) commits Germany to prepare prospective teachers for inclusive classes and to foster corresponding competencies. This implies that all preservice teachers should develop general pedagogical competencies for dealing with diversity of learning needs and basic competencies for working with students with special education needs (KMK, 2015). Interdisciplinary cooperation between different teaching professions is emphasized as a central condition of success for inclusive learning (KMK, 2015). The preparation of preservice teachers for inclusive teaching is seen as a cross-cutting task for all related disciplines (KMK, 2015). In order to implement these requirements for teacher education, the German government initiated an extensive program, called "Qualitätsoffensive Lehrerbildung." Fourteen out of 16 of the projects funded by this program explicitly emphasize inclusion as one of their research priorities. At the German University X, the state-funded project "ProfaLe" pursues the goal of preparing preservice teachers for inclusive mathematics teaching. As a part of this effort the content-specific consultation template presented in this article was integrated into a university course for prospective teachers of primary, secondary, and special education, which accompanied a field-based internship.

United States

In 1975, the passing of the first Individuals with Disabilities in Education Act (IDEA) established the expectation in the United States that general education and special education teachers

would share responsibility for educating students with special education needs. This law, updated in 2004, has set the expectation that students in the United States will be educated in the *least restrictive environment* which most often means general education classes in public schools. In fact, in 2015 (the most recent year for which data is available), about 95% of students aged 6-21 served under IDEA (students with special education needs) were enrolled in general, public education schools, and of those students, 63% spent the majority of their day (>80%) in general education classrooms (National Center for Education Statistics [NCES], 2017).

Recognizing the central importance of general education teachers being able to meet the needs of students with special education needs, the Interstate Teacher Assessment and Support Consortium (Council of Chief State School Officers [CCSSO], 2011) included in their definition of teacher effectiveness Standard 2f which stated that "the teacher accesses resources, supports, and specialized assistance and services to meet particular learning differences or needs" (p. 11). Clearly, legislative and policy documents in the United States have made a strong commitment toward inclusion and the expectation that teachers will collaborate to meet the needs of students with special education needs. Unfortunately, there is no consensus in the United States as to how to prepare teachers to engage in these collaborations (Blanton et al., 2014; McKenzie, 2009). Consultations represent a new possible avenue for teachers to leverage in order to meet the needs of students with special education needs.

Although the contextual details of the commitments to inclusion in Brazil, China, Germany, and the United States are unique, the summaries above show remarkable similarities. Each country has acknowledged that the commitment to inclusion necessitates changes to teacher preparation. However, none of the countries has yet to articulate fully the path to prepare general education and special education preservice teachers to collaborate with each other to address the needs of students with special education needs. Each context shows the potential for innovation by introducing collaboration opportunities in teacher preparation.

Preparing Preservice Teachers to Engage in Mathematics-Specific Consultations: Summaries of Two Studies

In this section, we provide summaries of two studies conducted within this international collaboration, one conducted in Germany and the other in the United States. The purpose of reporting on these two particular studies is to highlight the type of research in which we are engaging within our different teacher preparation contexts and to provide the context for an international discussion among researchers from our four countries about the findings and implications of our international research collaboration. In both studies, preservice teachers engaged in a form of consultation, and the researchers examined the extent to which this consultation process enabled the preservice teachers to generate the M-SEPACK needed to teach mathematics effectively to students with special education needs.

Study 1 Summary: Germany – A University-Based Approximation of Mathematics-Specific Consultation

This summary reports the initial findings of using the mathematics-specific consultation template (Table 2) in a course at German University X immediately prior to the preservice teachers' internship. The focus of this implementation study was to gain an initial understanding of how university-based faculty, initially implementing the mathematics-specific consultation, can prepare teachers for consultation through an approximation of the practice.

Context

We, the German research team, began our study with a commitment to prepare future teachers for interdisciplinary collaborations that integrate the perspectives of special education and mathematics education (e.g. Wang & Fitch, 2010; Wolfswinkler et al., 2014). To reach these objectives, we applied a newly designed teacher preparation concept at a German university (Bock & Siegemund, 2017; Siegemund & Bock, 2018). Undergraduate-level preservice teachers from both disciplines, mathematics education (primary education) and special needs education, who were enrolled in university-based courses were paired in interdisciplinary teams to work on case studies focused on teaching students with special education needs. In subsequent field experience practicums at local schools, the preservice teachers gained first-hand teaching experiences as part of their collaboration in interdisciplinary teams.

Methods

We introduced the consultation template (Table 2) directly before the preservice teachers started their internship. In session 12 of 14 of the university course, we explained the goals and the structure of the template to the preservice teachers. We then gave them a case study which they explored in interdisciplinary pairs (teams). The case study included information according to STEP 1 of the template and an additional transcription of a corresponding diagnostic interview. The case centered around the problems of an eight-year-old boy in his second year of school. Diagnostic procedures showed that the student performed in the bottom 2% of students in both mathematics and literacy. In mathematics class, he was often distracted by many objects and showed only short periods of on-task behavior. The preservice teachers, working in teams, then completed STEP 2 of the consultation template together. This step was focused on summarizing the information learned from the case (STEPS 2.1, 2.2, and 2.3 on Table 2) and generating targeted questions (Questions 2.4, 2.5, and 2.6 on Table 2) about the student's specific special education needs and teaching actions that might be effective at meeting those needs. Subsequently, we collected the written documents and discussed the case as a class. These documents became Data Set 1 for this study. Based on the content of these documents, the two course instructors role played the first consultation (Meeting #1 on Table 2) to act as a model for the preservice teachers. Then, in preparation for session 13 of the course, the preservice teachers filled out STEP 3 in the role of the special education consultant answering the questions generated in STEP 2 (Answers to 2.4, 2.5, and 2.6 on Table 2). This set of documents made up Data Set 2 for this study.

In the following course session, the preservice teachers discussed in small groups the result of their homework to prepare for the second meeting of the consultation. Then they engaged in a role play as an approximation of practice (Grossman et al., 2009) for Meeting #2 of Table 2. One course instructor took the role of the teacher and participants of the course took the role of the special education consultant. During class, the role play was enacted multiple times, with a different preservice teacher acting as consultant each time, with the other students observing. The second lecturer helped to steer the role play according to the aims of the consultation. In session 14, some additional time was given to answer questions about the consultation and how it should be applied in the internship.

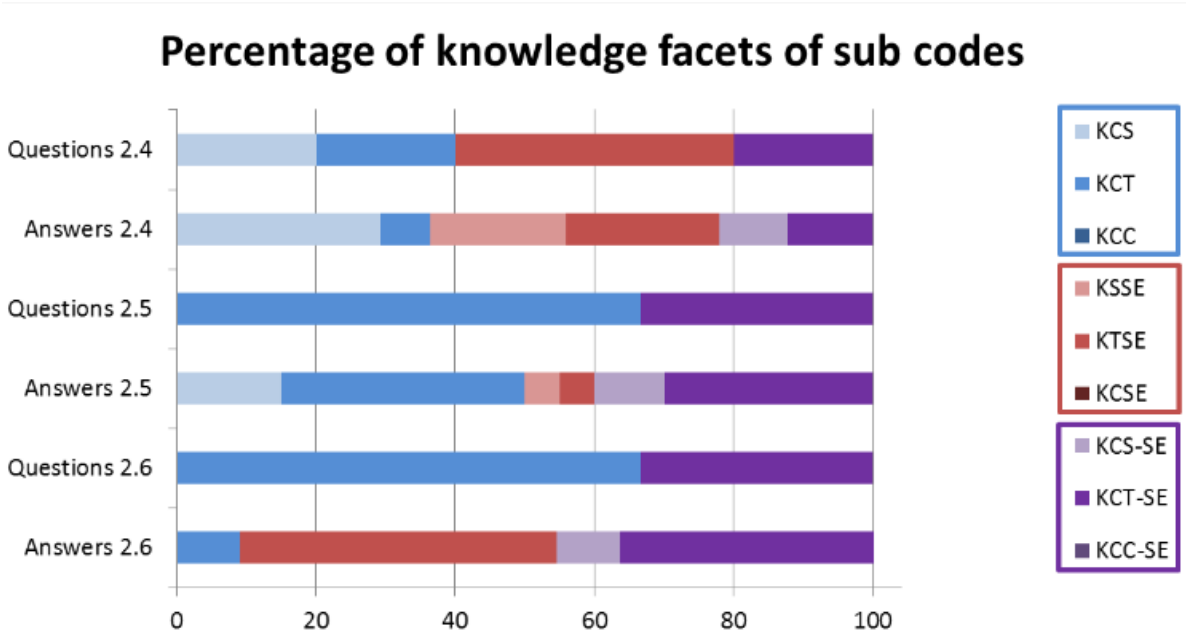
Findings

We analyzed Data Set 1 (the questions generated by the preservice teachers) and Data Set 2 (the answers generated by the preservice teachers) by using the M-SEPACK framework (see Table 1) in order to understand the types of knowledge generated in the role-play consultations. Two researchers coded both data sets according to the type of M-SEPACK knowledge the preservice

teachers used in generating or responding to the questions. We present the findings from a qualitative content analysis (Kuckartz, 2017) in which we analyzed the written questions of one mathematics preservice teacher that corresponded with questions 2.4, 2.5, and 2.6 in Table 2 and the answers to 2.4, 2.5, and 2.6 of one special needs education preservice teacher that corresponds to STEP 3 in Table 2. Overall, the mathematics preservice teachers formulated 11 questions corresponding to steps 2.4, 2.5, and 2.6 of the template. There were 11 corresponding answers from the special education preservice teachers. The three types of M-SEPACK knowledge that were generated in these questions and answers are presented in Figure 1.

Figure 1

The Types of M-SEPACK Knowledge That Were Generated in the German Mathematics-Specific Consultations



Regarding mathematics teachers' questions and special education teachers' answers (STEPS 2 and 3 of the protocol in Table 2) we noted that the nature of the questions by the mathematics teachers and the answers of the special education teachers were qualitatively different. Mathematics teachers were more focused on knowledge of teaching (KCT, KTSE, and KCT-SE). For example, questions developed by the mathematics teachers in STEP 2, 2.4 of the protocol intended to utilize knowledge of the special education needs of the student - Knowledge of Students in Special Education (SEKT). The mathematics preservice teachers prioritized questions focused on teaching actions, Knowledge of Content of Teaching (KCT) and Knowledge of Teaching Special Education (KTSE), rather than questions focused on understanding Knowledge of the Student Special Education. In other words, the mathematics teachers tended to not focus on the student and their exceptionality-based learning needs. In contrast, for questions raised by the mathematics teacher, the special education preservice teachers, when answering the questions (STEP 3 of the protocol), tended to provide knowledge related to the student and their special education needs (KSSE) and knowledge of teaching in special education (KTSE; KCT-SE) despite the mathematics teacher not asking for information focused on the student and the special education needs. Thus, although the mathematics preservice teachers failed to ask questions that focused on the impact the student's special education needs have on learning (as

evidenced by the lack of questions coded as Knowledge of Students in Special Education), some special education preservice teachers still provided this specific information. The same trend is true for STEP 2, 2.5 questions from the mathematics teachers and the related answers by the special education teachers.

We also observed that most of the answers to the questions from 2.6 (which were designed to elicit the integrated M-SEPACK knowledge) involved only special education knowledge. The special education preservice teacher did not contextualize the answers to the specific content area of mathematics but gave general teaching recommendations. We also found that there were no statements that referred to the coordination and sequence of learning steps in a longer-term perspective of the curriculum (Code: Knowledge of Content and Curriculum, Knowledge of Content and Special Education, Knowledge of Content and Curriculum for Special Education). It seemed to be difficult for the preservice teachers to analyze and to discuss the case in a long-term perspective. Additionally, some parts of the transcript could be categorized as general pedagogical knowledge (Shulman, 1986), as a fourth main category.

Overall, this case analysis exemplifies the differing facets of knowledge of both the special education and mathematics preservice teachers. Whereas the special education preservice teacher preferentially attended to aspects concerning student and teaching actions addressing their learning needs (KSSE, KTSE; KCT-SE), the questions of mathematics preservice teachers refer primarily to content and teaching (MKT). Nevertheless, we did find evidence of the integrated M-SEPACK knowledge in each question/response for categories 2.4, 2.5, and 2.6. We interpret this finding as evidence that the consultation template (Table 2) does provide opportunities for mathematics and special education preservice teachers to integrate their respective knowledge bases. These results provide one piece of promising evidence that this intervention for preservice teachers in the university classroom may indeed increase future teachers' abilities to consult to meet the needs of students with special education needs.

Study 2 Summary: United States – Engaging Preservice Teachers in the Mathematics-Specific Consultation During a Linked Course and Field Experience

The study that took place in the United States used the same consultation template (Table 2) as the study in Germany. To complement the German team's overall analysis of the types of knowledge that emerged in their university-based approximations of consultations, the United States team provides an in-depth look at one consultation case between a special needs education preservice teacher and an elementary education mathematics preservice teacher engaged in fieldwork at a local elementary school. This provides an in-depth look at some of the nuances in the type of knowledge that is co-created within the consultation space.

Methods

This implementation study was conducted in the context of teacher preparation programs at a large teaching and research university in the southern United States. The participants were 16 special needs education preservice teachers and 14 elementary education mathematics preservice teachers. The special needs education preservice teachers were enrolled in an undergraduate mathematics methods course that was part of programs for both the special education and mathematics preservice teachers. The mathematics preservice teachers were concurrently participating in a full-time internship (fieldwork) for which they were working in elementary classrooms alongside full-time elementary school teachers. The mathematics preservice teachers were asked to identify a student in their classroom who had been identified as having a special education need. They then conducted a cognitive interview (Hunting, 1997; Moyer & Milewicz, 2002) with the student and took notes

regarding the student, the classroom environment in which he/she was learning, and the specific mathematical content the student would be learning (STEP 1 of Table 2).

The two preservice teachers then met and discussed the student, their learning needs, and the other information the mathematics preservice teacher garnered from the interview. After this, the special needs education preservice teacher researched the student's specific learning needs and provided a written response to the mathematics preservice teacher's questions that included recommendations for working with the target student. The two preservice teachers then met again to discuss the recommendations and created a plan for teaching the specified mathematics to the target student. Next, the mathematics preservice teacher implemented the plan, collected evidence regarding how the student responded to the implementation of the plan, and shared this with the special needs education preservice teacher. Both preservice teachers then reflected on the student, the recommendations, the implementation of the plan, and the overall process.

Findings

For purposes of this paper, we discuss the findings from one of the 14 consultation teams to provide a qualitative illustration of the mathematics-specific consultation process and its impact on two preservice teachers— the mathematics preservice teacher Charity and the special needs education preservice teacher Gabriella (pseudonyms). We analyzed the questions and recommendations generated by the two preservice teachers and the types of specialized knowledge each question or recommendation represents.

Charity had noticed that Edward, one of the students in her kindergarten classroom, was struggling with counting and number sense. Edward was six years old, had already been diagnosed as having Attention Deficit Hyperactivity Disorder (ADHD), and was taking medications for this condition. After conducting a cognitive interview to understand which specific standards were difficult for Edward, Charity filled out the consultation template. When the template (2.4) prompted Charity to ask a question about the student and their exceptionality (Knowledge of Students and Special Education), she instead asked "How can I increase engagement when the student is in a group setting?" (Knowledge of Teaching in Special Education). Instead of following the prompt to better understand the *student* this preservice teacher wanted to jump right to focusing on her own teaching actions. Then, when the template (2.5) prompted Charity to ask a question about teaching actions to promote content learning for this student (Knowledge of Content and Teaching-Special Education), Charity instead asked about general teaching strategies: "Once he masters the objective, what are some ways to allow him to stay engaged and not distract other students from learning?" We suggest that this sheds light on how difficult it is for the preservice teachers to keep the content of mathematics at the center of the consultation.

Despite the fact that Charity didn't maximize her opportunities to ask questions related to M-SEPACK, her special education consultant Gabriella still provided key information about how ADHD might be interacting in unique ways with Edward's actions in the mathematics classroom. Gabriella backed up her teaching recommendations with a research article that Charity found to be very useful in modifying her teaching for Edward. Charity was able to provide tactile number sense activities with snap cubes and intermittent opportunities to use fidget toys in order to keep Edward engaged for short bursts of number sense learning. After the classroom implementation, Charity noted, "the article that was shared provided me with a lot of beneficial information. I will continue to incorporate this strategy into my classroom practice in the future." After reflection upon the consultation process, Gabriela noted how much she learned about the consultation process in general and how she learned that the elementary education teachers "are very eager to learn about this topic (special education strategies for mathematics)."

We share this case because we believe that it simultaneously illustrates the difficulty preservice teachers encounter when learning how to engage in content-specific consultations, and also the benefits to preparing them for this complex practice. Our research team is also engaged in multiple follow-up studies to further understand the impact of this method of preparing preservice teachers to engage in mathematics-specific consultation.

International Discussion and Implications

The focus of this paper is on an international collaboration among teacher educators/researchers from four universities in four different countries, Brazil, China, Germany, and the United States, who are engaging in a common research and teacher preparation purpose – how the mathematics-specific consultation can positively impact general education and special education preservice teachers to work together to generate the M-SEPACK needed to teach effectively for students with special education needs. An important aspect of this work is how our collective and unique perspectives and experiences can enhance what is learned through our international research collaboration, and in this way, we have both a s*hared but given goal* and a *shared beyond given goal* (Quebec Fuentes & Spice, 2017; Quebec Fuentes & Bloom, 2021). Therefore, we found it to be important that the voices of researchers from all four countries are included in the discussion even though the case summaries were based on data from two of the four countries in this international collaboration. In this section, the teacher educators/researchers from each country share their reflections on the findings of the two studies described in the case summaries above. The paper concludes with our thoughts about the implications of this work.

Brazil

In Brazil, there are frequent calls by both education professionals and researchers for co-teaching and coaching situations involving special education professionals. This collaboration typically takes the form of a general education teacher receiving help from a special education teacher, (which can be either from the same school or a guest specialist). This often results in a hierarchical dispute over knowledge, and usually the responsibility for student learning ends up falling solely to the special education specialist.

The consultation model used in the German and Unites States studies may address some of the issues found in other forms of teacher collaboration by favoring a more equitable sharing of power in the relationship of the preservice teachers. In this case, both act with the same goal. The examples presented by the researchers conducted in the United States and Germany demonstrate that the consultation model can be adopted by different cultures and adapted to reflect the unique aspects of each country's context. Many Brazilian studies corroborate the German research indicating the focus of the regular classroom teacher with content, the attention of special education teachers with content, and students' unique learning needs. As the United States research points out through the case of Charity and Gabriella, consultation can foster a practical, evidence-based learning that has proved quite useful in their professional performances, something that traditional teaching methods have not been able to achieve.

In Brazil, most of the work in special education happens due to partnerships between a university and other education networks. In the past, these networks have concentrated their research on elementary inservice teachers. Based on the findings presented here, we suggest that work with preservice teachers can promote innovative exchange between teachers, technicians and students, and that these can contribute to the advancement and strengthening of our schools' specialized human resources.

China

Although we do not yet have sufficient empirical evidence on how to prepare preservice teachers to engage in collaborations in China, the consultation template has been shown in Germany and the United States to provide preservice teachers with good opportunities to collaboratively address the specific learning differences of students with special education needs. From the German study, we conclude that the consultation process appears to make a sustainable contribution to preservice teachers' preparation for inclusive teaching. However, we recognize that there will be some difficulties implementing consultations in university courses. It is important that course instructors gain experience engaging in the consultation process themselves so that they have the knowledge necessary to support this type of content-specific consultations. For preservice teachers, additional time may be needed to introduce the template and explain the steps during the university course. When implementing the co-constructed plan, the preservice teacher may need additional support balancing the need to engage in consultations while simultaneously attending to the full-time compulsory education mathematics curriculum standards in China and incorporating the U.S. Common Core Standards for Mathematical Practice (CCSSO, 2010) (Question 2.6 of Table 2).

Germany

The transfer of the template, created by the United States team, to the German University X has offered preservice teachers an opportunity to collaborate and to take a deep look at how to meet the learning needs of individual students. This appears to be a sustainable contribution to prepare preservice teachers for inclusive teaching. Nevertheless, there were and are difficulties within the implementation in the university course. The interaction with the preservice teachers during the preparation for the consultation revealed that it requires a substantial amount of time to explain the many steps of the template. Additionally, some of the preservice teachers' questions and difficulties in engaging in the consultation process may be a result of translation issues from English to German. Other difficulties may be caused instead from a different conceptualization of students' competencies in the U.S. Common Core State Standards for Mathematics (CCSSO, 2010) and the German conceptualization in the governmental "Bildungsplan". Nevertheless, the preservice teachers felt that demonstrating the consultation process in the form of role play was very helpful. Based on our experience, we suggest that more time should be used to introduce the template during the university course.

United States

Considering the German study of mathematics consultations, as well as the work we have done in the United States, there is much that United States teacher educators can apply to their contexts. The work by the German teacher educators included the use of role playing to help prepare their preservice teachers to engage in consultations. This type of approximation of practice, also referred to as "rehearsals", has been used to prepare novice mathematics teachers in other aspects of their work (Lampert et al., 2013). As noted in the case highlighting the work in the United States as well as our initial work with mathematics consultations (van Ingen et al., 2016), the focus on the mathematical content is often lost as the two consultants get drawn toward a discussion of general teaching practices. Engaging consultants in role-play of a consultation, as was done in the German study, would provide teacher educators the opportunity to provide feedback related to this and may help the consultants to keep a focus on the mathematical context along with a focus on the student's learning needs.

Both the German and United States examples of mathematics-specific consultations involved work being done with preservice teachers at the elementary school level. How might this work be similar and what differences would there be if the consultations were for teachers working at the secondary level? One of the authors has begun an initial exploration into these questions (Eskelson & Hughes, in preparation). Initial analyses indicate that preservice teachers at the secondary level also struggle to maintain a focus on mathematics during the consultation. As with their counterparts teaching elementary grades, the consultations often slipped back to a more general discussion of teaching and students. Additional research should explore how the important differences between teaching elementary and secondary mathematics might impact teachers' engagement in mathematics consultations and teacher educators' efforts in engaging teachers in this work.

Implications

Based on the findings we have presented from two cases of the mathematics-specific consultation implementation in two countries, and the reflections on those implementations from four different countries, we believe that the consultation template shows promise for being a helpful tool to prepare preservice teachers for opportunities in which they can leverage their respective areas of expertise to generate the M-SEPACK needed to teach effectively for students with special needs. Across countries and contexts, the mathematics-specific consultation template has provided an opportunity to help general education and special education preservice teachers learn how to engage in content-specific conversations. The template provides preservice teachers with the opportunity to integrate their respective knowledge bases and generate a teaching plan that is specific both to the mathematics being taught *and* to the unique special education needs of a specific student. With that in mind, the template and the consultation can be seen as an opportunity to bring different disciplines together and to broaden preservice teachers' perspectives on the advantages of interdisciplinary collaboration.

Each of our four research teams, spread across four continents, has benefited greatly from the opportunity to consider the commonalities among our contexts (*shared but given goal*) as well as the unique differences (*shared beyond given goal*) (Quebec Fuentes & Bloom, 2021; Quebec Fuentes & Spice, 2017). Our international research collaboration has pushed each team to consider its own work in teacher preparation from different angles. We recognize that the need to prepare teachers for inclusive classrooms is truly a global imperative. Rather than attempt to solve this problem in isolation, we are exploring the boundaries of our similarities and differences in seeking a common solution. We recognize that in studying the role of context in the consultation template, each of our four teams will develop a more nuanced and flexible approach to the work that we do in our own countries. Furthermore, it is our hope that this shared international research agenda will ultimately produce a robust knowledge base of a practice that can be leveraged globally to push the field forward in our shared priority to prepare preservice teachers for meeting the needs of *all* students.

There is a great deal of further research to be done on preparing preservice teachers for mathematics-specific consultations. In this paper, we have begun to explore what the preservice teachers preparation intervention (use of the consultation template) looks like in two different countries and have begun to examine the types of knowledge that preservice teachers have generated in the consultations. In future studies, we will test this intervention with larger sample sizes and across additional settings. Preparing preservice teachers to engage in mathematics specific consultations to meet the needs of special needs students and researching how this can best be done internationally is a complex undertaking. This work not only requires expertise from multiple education disciplines (i.e., mathematics education and special needs education), it also requires understanding different international contexts, preservice teacher education certification/credentialing requirements, and the nuances of the mathematics curriculum for individual countries. The promise of this area of research

is that through continued international collaboration, we will gain deeper understanding of how mathematics specific consultations can promote the mathematical success of special needs students across countries and cultures. Through our preliminary work, we have begun to actualize this promise. For example, we have found that utilizing role-play as a method of modeling the mathematics specific consultation process for preservice students is an effective practice for initially engaging students in the process. Both the German and United States teams have utilized role-play in both case teaching and application of the mathematics consultation process for actual special needs students during preservice teachers' clinical field experiences. We have also observed that the mathematics specific consultation process provides both mathematics preservice teachers and special needs education preservice teachers experience in how professionals with both similar and different areas of expertise can equitably contribute. This occurs by addressing the needs of special needs students rather than the traditional mindset that one professional's expertise is more important than another's leading to teachers teaching is silos rather than collaboratively. Barriers include finding the instructional time needed to integrate teaching the mathematics specific consultation within existing university course curricula/coursework. For example, we agree that more time is needed to initially introduce the steps of the mathematics specific consultation process in order for students to implement the process with more fidelity. An important outcome of mathematics specific consultations is to engage teachers in more in-depth and targeted discussions about the mathematics learning needs of students. The data suggest that this occurred at different levels within and across the German and United States studies. It is important that we continue to develop and test out new ways to coach preservice teachers to utilize their common and unique areas of expertise to move from more general to more targeted and in-depth consultation discussions. Finally, we wonder how the mathematics specific consultation can be applied at both early childhood and secondary levels and how it may or may not need to be differentiated compared to its implementation at the elementary level.

Teacher educators around the globe who are reading this article and who are interested in preparing preservice general and special education teachers for collaboration, can use the consultation template documented in this article along with the knowledge gained from the brief reports and reflections to plan for their own implementations of preparing preservice teachers to engage in mathematics-specific consultations. This article both reflects upon and launches a global conversation about one specific way in which teacher educators can prepare preservice teachers with consultation skills to teach in the global era of inclusion.

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