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Supportive Factors in Inclusive Mathematics Education: Mathematics Teachers' Perspective

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Abstract: The aim of this study is to investigate which supportive factors positively influence inclusive mathematics education so that it is accessible to all pupils in mainstream primary and secondary school settings from the mathematics teachers' perspectives. The study is designed as a qualitative descriptive study. It was conducted by collecting 16 narratives about selected pupils/students provided by mathematics teachers. In them, they described their experiences with inclusive mathematics education. Teachers provided information about their pupils with any form of disability (health, social, or other) or an increased need for support and about their situations in mathematics education and inclusion. The stories were structured by the researchers into units of meaning, numerically coded, content-analyzed, and categorized. Participants in the study were 16 mathematics teachers who were working in mainstream schools. From the stories, we identified 583 meaning units that were assigned a numerical code. Using continuous qualitative analysis procedures, we abstracted five main final categories that describe the support factors in inclusive mathematics education from the mathematics teachers' perspective in terms of including every pupil without distinction, including those who require some level of additional support. The final categories include: 1. Identifying the pupil's/student's internal resources in mathematics education; 2. The mathematics teacher's responsive approach toward the pupil/student; 3. Modifying conditions in mathematics instruction and implementing accommodations for pupils/students; 4. School-family collaboration; 5. Support mechanisms for the school as an institution in the context of inclusive mathematics education.

Keywords: inclusion; inclusive mathematics education; mathematics teacher; qualitative research

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1. Introduction

According to Tan, Pabilla, and Lambert [1], teachers are crucial for humanizing the education of students with disabilities toward systemic transformation. The authors point not only to the persistence of dehumanizing approaches and attitudes concerning students with disabilities but also to significant shifts toward the humanization of mathematical education for students with disabilities. Lambert and Tan [2] report that mathematics education research that includes disability most often takes a behavioral (27%) and a medical (22%) approach to learning, while mathematics education research that has not focused on health disability most often explores teaching and learning through constructivist (33%) and sociocultural (21%) approaches to learning. Lambert and Tan [3] analyzed 408 peer-reviewed journal articles on mathematics education. They found that out of 42 articles that explicitly included students with disabilities, only two were published in mathematics education journals. The remaining 40 articles were published in special education or psychology journals. It follows that the limited knowledge base in mathematics education research aimed at students with disabilities points to alarming inequalities [4].

1.1. Theoretical Foundations of the Inclusive Approach in Education

Booth & Ainscow [5] (p. 32) understand "the concept of inclusion as a principled approach to the development of education and society. In doing so, inclusion is linked to democratic participation within and beyond education. When we speak of inclusive education, we do not mean only the inclusion of a certain group of children in the educational process. We are also concerned with striving for coherence in the activities that the school carries out and in which it is involved, and with promoting the education of all children without distinction, thinking also of the children's family members, the school staff, and all those who come into contact with the school". The authors [5] advocate the introduction of inclusive values into all aspects of school functioning. According to Roos [6], when inclusion is used as an ideological concept, authors focus more on its values and meanings. However, if it is not coupled with the operationalization of inclusion, the vision may have no real impact on the situation in the classrooms themselves. On the other hand, if inclusion is only used to refer to a way of teaching mathematics, it is difficult to justify why we need to work with an overall philosophy of inclusion. In order to promote the sustainable development of inclusion, these two definitions need to be linked. Inclusion can be expressed in variations that express its different aspects, linking the ideological and practical aspects of inclusion. Black-Hawkins, Maguire, and Kershner [7] argue that individual differences between all pupils should be expected and welcomed when understanding inclusive practice, but they also draw attention to the complexity of everyday classroom events. Unfortunately, according to the authors (ibid), research on inclusion has generally focused on different categories of children with special needs and strategies for working with them rather than on the complex interactions that happen on a daily basis in classrooms.

According to the authors Armstrong, Armstrong, and Spandagou [8] (pp. 30–31), the first calls for the introduction of inclusion arose in the mid-1980s and early 1990s and were based on four different theses:

1. Parents, teachers, and advocates for students with disabilities began to support inclusion as a way to challenge the limitations of access and participation for these students in mainstream schooling.
2. According to the social model of disability, which emerged as a counterbalance to the medical or psychometric model, disability is seen as a consequence of the way society organizes, disadvantages, and excludes people with disabilities rather than as a consequence of the disability itself. Such an attitude has had significant implications for inclusive education [9]. Booth & Ainscow [5] point out that if we perceive disability disadvantage as the main reason for the problems that pupils encounter in education, we are less able to perceive the barriers they face for other reasons.
3. With the introduction in the 1990s of market-based measures in schools that promote specific notions of accountability, control, choice, and diversity, the idea of inclusive education became associated with a wider critique of the education reform programs that were underway in many countries.
4. Inclusive education is now linked to the development and, in particular, the provision of educational opportunities for all children within education systems. International organizations have contributed to the construction of inclusion as an international goal [10].
5. In 2010, the Slovak Republic adopted the UN Convention on the Rights of Persons with Disabilities, which imposes a commitment to accessing quality education at all levels for all children with disabilities on an equal basis with others. It is committed to ensuring that children with disabilities are not excluded from the general education system on the basis of their disabilities [11].

In the Slovak Republic, according to Act No 245/2008 Coll. (§2, paragraph ai as amended) [12], inclusive education is defined as the common education and training of all children and pupils carried out on the basis of equality of opportunity, respect for their educational needs and individual characteristics, and promoting their active participation

in the educational activities of the school or school establishment. On 15 February 2021, the Slovak Republic was admitted as the 28th member country to the European Agency for Special Needs and Inclusive Education in Ljubljana, Slovenia. All European countries are committed to working towards more inclusive education systems, but they do so in different ways depending on their past and present contexts and histories. Inclusive education systems are seen as a vital element within the broader quest for more socially inclusive societies, which all member countries of the Agency share both ethically and politically [13]. Rouse [14] points out in his work that there is some concern that inclusion policies are difficult to implement because teachers are not sufficiently well prepared and supported to work in an inclusive way. Inclusion requires policymakers, principals, and teachers to take responsibility for creating schools where all children can learn and feel that they belong within an understanding of inclusion in the sense of 'being all in it together. According to Slee [15] (p. 122), inclusive education, unlike integration, is not just a technical problem that can be solved by various compensatory means but is a radical political project of social change and educational reform at all levels. Armstrong, Armstrong, snd Spandagou [8] state that until recently, the separation between 'mainstream schooling' and 'special education was based on the idea of separate modes of education for different categories of children. Faragher, Hill, and Clarke [16] argue that they have been unable to identify any research that suggests that some groups of students need to be taught separately from other students. On the contrary, strategies or techniques specifically needed for some can be used to enhance learning for all. Furthermore, according to Armstrong, Armstrong, and Spandagou [8], these categorical differences between students are increasingly being challenged. While the rhetoric of inclusion dominates social policy, the reality for many unfortunately remains exclusion.

1.2. Inclusive Mathematics Education

6. In the context of inclusive mathematics education, Roos [6] operationalizes research on inclusion in two basic levels of meaning. The first is the discourse of inclusion in mathematics education presented in terms of social ideology, and the second level is the discourse of inclusion in mathematics education presented in terms of practical solutions or intervention strategies. According to the author [6], in the context of the socio-political-economic discourse of inclusion in mathematics education, the idea that all pupils, without distinction, should have equal access to mathematics education. She describes the equity perspective in mathematics education. Pais [17] talks about the possibility of acknowledging the raw reality that mathematics is not for everyone. The author points out, as uncomfortable as it may seem, that schools are in fact places of choice and teachers are agents of exclusion. Tan and Kastberg [4] point to studies confirming mathematics education researchers' core belief that all humans are mathematical thinkers and doers. Roos [6] emphasizes inclusion in the sense of including students with certain problems, whether they have disabilities or are underperforming, in mathematics education. The present author [6] describes the second discourse on inclusion in mathematics education in terms of practical solutions and intervention strategies.

In the following, we will focus in the context of inclusive mathematics education on the importance of management and collaboration at the school level, on the roles and tasks of the mathematics teacher, on strategies for teaching mathematics, and on the individualization of instruction for students with increased support needs.

1.2.1. The Importance of School-Level Leadership and Collaboration in Inclusive Mathematics Education

Khaleel, Alhosani, and Duyar [18] explored the role of school governance in the context of inclusion in schools. Kungelmass & Ainscow [19] concluded from a comparative analysis of case studies from the USA, England, and Portugal that leadership in inclusive schools is characterized by the creation of a collaborative atmosphere. Lambrecht et al. [20] argue,

for example, that an important factor in establishing an Individual Education Plan (IEP) is to ensure collaboration between teachers, other professional staff, and school leadership. Regarding inclusive mathematics instruction, authors Gaffney and Faragher [21] state that sustained improvement in mathematics literacy outcomes for all students requires a focus on two complementary areas: (1) the practice of effective mathematics instruction and (2) high-level school management capacity.

In order to achieve long-term development of student achievement in mathematical literacy, there is a need to identify and develop effective mathematics instruction and to align collaboration at the classroom, school, and school board levels. Hubbard and Livy (2021) [22] state that school principals may have difficulties supporting mathematics teachers in planning differentiated instruction in mathematics classes in primary schools. Their study points to the possibility of supporting external mathematical consultants and coaches for mathematics teachers in planning differentiated mathematics teaching.

1.2.2. Teacher Roles and Tasks and Mathematics Teaching Strategies in Inclusive Mathematics Education

According to Rouse [14], teachers play a central role in promoting pupil participation and reducing underachievement, especially for pupils who might be perceived as having learning difficulties. The author states (ibid) that most mainstream teachers do not believe they have the skills and knowledge to work with students with diverse needs. They believe that there is an army of 'experts' who deal with specific groups of students on an individual basis or in small, more manageable groups. Rouse [23] argues that developing effective inclusive practice is not just about increasing teachers' knowledge but also about encouraging them to do things differently and motivating them to rethink their attitudes and beliefs. In other words, it should be about "knowing", "doing", and "believing". Knowing means: teaching strategies; the specifics of different disadvantages and the resulting special needs; how children learn; what they need to learn; how to organize and manage the classroom; where to get help when needed; how to identify and assess difficulties; how to evaluate and monitor children's learning; the legislative and policy context. Doing means: turning knowledge into action; reflecting on your teaching practice and moving beyond your established teaching practices; undertaking action research and using evidence to improve your practice; learning how to work with colleagues as well as children; becoming a professional activist. Believing means: that all children are worth educating; that all children can learn; that teachers have the capacity to make a difference in children's lives; that such work is their responsibility and not just the role of specialists.

According to Kováčová et al. [24], in contradiction with effective inclusive practice, children's difficulties may be exacerbated by the low professional competence of people working in schools in different positions. In such cases, problem behavior is a reaction to an unprepared environment in the school institution. Hugo and Hedegaard [25] found that from the students' perspective, teachers who are receptive, affirming, and understanding are key to promoting inclusion. Teachers who understand students and provide explanations in an understandable way are positively influential. In all their interactions, educators should be able to use strategies and resources that enable effective communication and inclusion for as many people as possible, to the greatest extent possible [26]. According to Hugo and Hedegaard [25], the teacher-student relationship and the attitude that teachers care about students as people is key. DeSimone and Parmar [27] interviewed mathematics teachers in the US, and one respondent said: "I felt very much that these are my children, and they belong in my classroom". The authors refer to this ability as "teacher relational competence". Kobelt Neuhaus & Refle [28] emphasize the ability to treat the pupil as a co-constructor of his or her experience and action in the world. In the context of inclusion, Clarke & Faragher [29] found that there is evidence to suggest that, for example, pupils with Down syndrome are more likely to benefit from concrete and visualized number symbols rather than verbal abstract counting without visual support. Other pupils in the

classroom may also use strategies originally developed for children with disabilities (for example, visualization).

DeSimone and Parmar [27] focused their research on mathematics teachers teaching students with LD (Learning Disabilities) in inclusive classrooms in an effort to understand their perspectives on implementing inclusion in their schools. The result of the research was the extraction of three primary outputs: 1. some teachers did not understand that students with LD have a range of individualized needs related to mathematics teaching; 2. teachers considered cooperation with colleagues and other professionals to be an essential support resource in inclusive mathematics education; 3. teachers did not feel sufficiently professionally prepared to handle the challenges of inclusive mathematics education. Moreira and Manrique [30] mapped mathematics teachers' attitudes or social representations regarding inclusive mathematics teaching. They found various social models of teachers' attitudes towards students with disabilities in inclusive mathematics teaching. This varied from accepting attitudes and high expectations regarding the inclusion of students with disabilities, responding to their individual needs, offering adequate education, paying attention to diversity, and using a different set of teaching strategies that were able to satisfy the needs of the entire group of students to the opposite pole.

On the other hand, the authors identified the opposite pole of social representations of mathematics teachers. The study's authors express concern regarding this opposite pole of the findings that they discovered social representations of teachers that deviated from the framework of the "politically correct" stereotype, entangled in a complex network of spreading discrimination, prejudice, and non-acceptance of what is different. Schwab, Sharma, and Hoffmann [31] investigated the opinions and views of secondary school students on the inclusive teaching of their teachers in the subjects of mathematics and English/German. According to students' perceptions, they found that teachers used some inclusive practices but did not consider them highly inclusive. Mathematics teachers were seen as more inclusive than German teachers.

Roos [6] provided an exhaustive review of diverse teaching strategies with the goal of including all students in mathematics education (see [6] for more details). According to Faragher, Clarke, and Hill [16], the strategies or techniques needed for some students are subsequently applicable to improve learning for all. Gaffney & Faragher [21] cite research by McDonough & Clarke [32], in which they describe the characteristics of effective teachers practicing effective mathematics teaching. The authors of the research identified the following characteristics, which they classified into several categories:

7. "mathematical goal focus and task characteristics", which the authors describe as teachers' focus on the supporting mathematical ideas; structuration; and selection of tasks that engage students and keep them engaged;
8. "materials, aids and presentations" in the context of teachers' skills to use a variety of materials and presentations; to use appropriate moments for learning as soon as they occur;
9. "adaptations and connections" in terms of teachers' skills to make connections to mathematical knowledge from previous lessons or experiences;
10. "organizational styles and teaching approaches" in the context of engaging and focusing pupils' mathematical thinking through an introductory whole group activity; selecting from a range of task types—individual and group;
11. "classroom interactions" in terms of using different types of questions to activate pupils' mathematical reasoning; refraining from the teacher telling pupils everything; encouraging pupils to explain their mathematical reasoning over tasks; encouraging pupils to listen to and evaluate the mathematical reasoning of classmates; listening carefully to individual pupils; building on individual pupils' mathematical reasoning and strategies;
12. 'Expectations' in the context of setting high but realistic expectations of mathematics for all pupils; encouraging and rewarding pupils' effort, perseverance, and focus;

13. 'Reflection' in the sense of drawing out key mathematical ideas during and/or towards the end of the lesson; post-lesson reflection on the whole content of the lesson;
14. 'assessment methods' in the context of collecting data by continuously observing and/or listening to pupils and taking notes on it; using different assessment methods; adjusting the planning of the next lesson based on the assessment of the previous one;
15. 'Teacher personal attributes', which represent a teacher's belief that learning mathematics can and should be enjoyable; a teacher's confidence in his or her own mathematical knowledge at the level he or she is teaching; showing pride and joy in the achievements of individual pupils.

In a sense, these characteristics extend the framework of teacher mathematical proficiency according to Kilpatrick et al. [33], who identified five interwoven strands: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. These five strands, however, do not capture the role of the teacher in the educational process, but they do point out what he or she should develop in mathematics classrooms, what he or she should pay attention to and emphasize so that students do not only become mathematically proficient but are able to transfer these skills to other areas of their lives (whether in school or outside of school). In particular, these last three competencies are related to reflection, interaction, communication, the ability to present ideas, and persevere in trying (for instance, in trying to complete a problem or solve a problem).

1.2.3. Individualization of Teaching for Pupils with Some Form of Disability (Health, Social or Other) or with an Increased Need for Support

It is widely recognized that in the context of teaching pupils with diverse characteristics and needs, individualization of both the overall and didactic approaches should be used. Hugo & Hedegaard [25] found a positive impact from teaching focused on the needs and abilities of the learner, not only on the content of the subject itself. For example, the authors looked at teaching individuals with ASD (Autism Spectrum Disorder). They emphasize that teaching is also a form of participation and a focus on the individual learner, not just on the topic being discussed. It is a holistic perspective that, in this context, relates to the overall life situation of the learner. For example, learners with ASD should be able to work at their own pace and not be stressed by having to complete a task within a set timeframe. One area is the arrangements that teachers make in the classroom, and the other is the support that is given to students outside the classroom—in terms of individual academic support or socio-educational support or assistance. A supportive environment for formal and social learning is crucial for inclusion. Social and educational competencies need to coexist in order to improve learning conditions.

An important part of a student's social learning is to learn about themselves and others, as well as to develop their social competence. According to Mitchell, Morton & Hornby [34], individual learning programs have long been a key element of inclusive education in most Western education systems. Hugo & Hedegaard [25], for example, found that from the perspective of students with ASD, individualized instruction with structure and predictability has a significantly positive impact. This sense of security allows students to truly focus on their studies and gives them the opportunity to succeed. According to Križo & Ďurčová [35], creating an invidious learning plan is similar to creating a work of art. According to the Slovak legislation (Act No. 245/2008 Coll., §7a) [12], the individual education program contains adjustments of individual parts of the school educational program according to the pupil's special educational needs. This is in particular a modification of the content, methods, forms, or manner of assessment and cooperation with professional staff. In Slovakia, special educational needs refer to three categories of pupils: 1. pupils with health disadvantages for example, ADHD (Attention Deficit and Hyperactivity Disorder), learning disabilities, ASD, FASD (Fetal Alcohol Spectrum Disorder), visual, hearing, physical disabilities, or chronic illness), 2. pupils with social disadvantages, and 3. pupils with intellectual talent.

However, the law set up in this way does not actually take into account the diversity among all the children in the classroom and does not allow for professional, individualized support for truly all the pupils who need it. The creation of an individual education plan, together with the provision of overall specialist support for the pupil, is thus only possible for pupils falling into these three narrowly defined categories. Lambrecht et al. [20] speak of a holistic view of the learner from the perspective of all stakeholders in the development and implementation of an IEP. The aim is to ensure that the learner receives the maximum possible support in the classroom. Vlček et al. [36] recommend collaborative consultations in this context. A key defining aspect of this model is the sharing of knowledge and information among support team members to ensure that support strategies, including those that meet the needs of students with disabilities, are consistent across school, individual therapy, and home environments.

Garcia-Melger et al. [37], in their research on teamwork in schools, cautioned that individual therapy should be consistent with broader supports within the school rather than isolated. Kováčová, Šefčovič, and Valachová [38] state that therapeutic support needs to be individualized in relation to the pupil's health status. According to Vlček et al. [36], support persons in the education of students with disabilities include school staff (principals, teachers, and teaching assistants), allied health professionals, and legal guardians. Including parents on the team strengthens positive partnerships between the home and school to achieve goals through the implementation of consistent support strategies across settings [36]. Kalogeropoulos et al. [39] talk about the so-called "built-in models" of assistant teachers in mathematics classes. It is about sharing space in the classroom to learn mathematics, which requires effective communication and cooperation between the teaching assistant and mathematics. In this way, their mutual professional relationship is better built, which is the basis for a better understanding of the pupils and their perception of their abilities to "keep up" with the rest of the class. Good communication between the teacher and the teaching assistant is necessary for planning mathematics lessons.

A study by Garcia-Melger et al. in their research in Australia [37] found that four critical factors influenced teamwork among stakeholders tasked with developing support strategies to improve the inclusion of a child with disabilities in mainstream primary school: access to diagnostics and funding, team communication mechanisms, practical ways of working together (for example, joint goal-setting so that all stakeholders work toward common coordinated goals), and a shared understanding of inclusion issues. Diagnostics and access to funding were the starting points for teamwork and had a major influence on decision-making processes. In Slovakia, legislation (Act No. 414/2021 Coll.) [40] allows for the existence of support teams directly in schools, which include professional staff (for example, school psychologists, special educators, therapeutic educators, speech therapists, and social educators) and pedagogical assistants. Some schools have large teams; others have only one or two professional staff members. The aim is to create a support service for students, teachers, and parents. Counseling, health, and therapy services outside the school should also be helpful. However, again, we stress that other pupils may also need specialist support, not just those with disabilities.

Therefore, our study's aim was to search for supporting factors in inclusive mathematics education, including a comprehensive understanding of this extensive issue. The philosophy of inclusion is practically reflected in the functioning of schools, down to the level of inclusive teaching of individual subjects. In our study, we are specifically concerned with mathematics. We are a team of female researchers who offer an intersection of disciplines: therapeutic pedagogy and mathematics education. Our study makes a contribution to this specific topic. Through qualitative research, it brings findings from the field that present the current situation with inclusive mathematics education in Slovakia from the mathematics teachers' perspective. They provided information about their pupils with some form of disability (health, social, or other) or an increased need for support and about their situations in mathematics education and inclusion. The aim is to search for

supporting factors in inclusive mathematics education by incorporating a comprehensive understanding of this broad issue.

2. Research Methodology

In our research, we applied a qualitative methodology. According to Silverman [41], the methods used by qualitative researchers convey a deeper understanding of social phenomena. The emphasis is on "immersing oneself" in naturally occurring events in order to gain first-hand knowledge. According to Gavora [42], qualitative research aims to reveal how people interpret the world. In qualitative research, an inductive approach that moves from data to theory is prevalent. Each individual or group study is a unique case for the researcher. Generalization is only possible if it involves other individual cases that have been deeply, comprehensively, and/or intensively studied. Silverman [41] recommends the use of qualitative methods when researchers choose to study people—their life story. Those methods can provide a "deeper" understanding of social phenomena. They favor analysis of words rather than numbers; observation over experiment; unstructured observation/interview rather than structured; meanings rather than descriptions of behavior; and inductively linked research rather than deductive research.

2.1. Characteristics of the Research Population

The research sample of the qualitative study consisted of 16 research participants—mathematics teachers in mainstream primary and secondary schools across Slovakia, who described 16 stories of selected pupils with a particular problem or with an increased need for support in the context of mathematics education. The selection of the research sample was deliberate and involved experienced teachers as well as teachers at the beginning of their teaching careers.

Most of the schools where the teacher participants in the research were based were schools with larger pupil populations (over 300 pupils), with the exception of four. Teachers submitted their experiences of inclusive mathematics education through written reports and narratives. There were 14 female and 2 male teachers. Each of them described the story of a selected pupil with certain problems or an increased need for support in the context of inclusive mathematics education. These were descriptions of pupils ranging in age from 11 to 20 years, of whom there were 3 girls and 13 boys. Some pupils had a cumulative number of other problems in addition to the supporting problem (see Table 1 for details). Two teachers reported a worsening of the pupil's situation during distance education during the pandemic. These were one pupil with Asperger's syndrome and one pupil who had not previously been observed to have any difficulties. The pupils' difficulties related to deterioration in the social-emotional domain, which in turn affected their learning and performance in mathematics. Out of the total number of pupils, only two pupils did not have an officially recognized SEN (Special Education Needs) status (according to the current Slovak legislation, pupils have this status recognized by specialists with the right to develop and implement an IEP). Of the total number of stories described, only three teachers had the opportunity to work with the assigned teaching assistant. The pupils were from complete families with the exception of two who were from incomplete families; one was from a 'patchwork' family, and we have no information about it. All teachers reported the presence of professional staff working directly in the school, with the exception of one case. See Table 1 for more details on the characteristics of the participants.

Table 1. Sociodemographic data relating to the 16 pupils' school narratives.

The Order of the Story	Sex of the Pupil	Age of the Pupil	Difficulties and Disabilities of the Pupil	Type of School	SEN (Special Educational Needs) (According to Slovak Legislation)-Yes/No	Family Ituation	Teaching Assisant-Yes/No/ Occasionally	Mathematics Teacher Gender	Presence of Support Team/ Professional Staff in the School
1.	Boy	17	ASD, other pervasive developmental disorder without intelectual disability	Large state school-Gymnasium	Yes	Complete family	No	Woman	Yes
2.	Boy	15	Social disadvantage Multicultural environment	Large state school-Gymnasium	No	Complete family	No	Woman	Yes
3.	Boy	15	SLD (Specific Learning Disorders)	Large state school-Elementary school	Yes	Complete family	Occasionally	Man	Yes
4.	Boy	16	SLD	Small church school-Secondary vocational school	Yes	Complete family	No	Woman	Yes
5.	Boy	12	ADD (Attention deficit disorder)/ Asperger's syndrome	Large state school-Primary school	Yes	Complete family	Yes	Woman	Yes
6.	Boy	14	ADD	Large state school-Primary school	Yes	Complete family	No	Woman	Yes
7.	Boy	16	SLD	Large private school-Bilingual gymnasium	Yes	Complete family	No	Man	Yes
8.	Boy	20	Unspecified learning disability/ Asperger's syndrome	Large state school-Secondary vocational school	Yes	Incomplete family—a child in the care of relatives	Yes	Woman	Yes
9.	Girl	12	Reduced IQ level	Small private school-Primary school	Yes	Complete family	No	Woman	Yes
10.	Boy	12	ADD	Small private school-Primary school	No	Incomplete family	No	Woman	Yes
11.	Boy	18	ADD/ SLD/ Serious accident	Large state school-Gymnasium	Yes	The "patchwork" family	No	Woman	Yes
12.	Girl	16	Visual impairment-blindness	Large state school-Gymnasium	Yes	Family situation unknown	Yes	Woman	Yes

Table 1. *Cont.*

The Order of the Story	Sex of the Pupil	Age of the Pupil	Difficulties and Disabilities of the Pupil	Type of School	SEN (Special Educational Needs) (According to Slovak Legislation)-Yes/No	Family Ituation	Teaching Assisant-Yes/No/ Occasionally	Mathematics Teacher Gender	Presence of Support Team/ Professional Staff in the School
13.	Boy	13	Asperger's syndrome	Large state school-Elementary school	Yes	Complete family	No	Woman	Yes
14.	Boy	11	SLD/Social disadvantage	Large state school-Elementary school	Yes	Complete family	No	Woman	Yes
15.	Girl	18	SLD	Small private school-Gymnasium	Yes	Complete family	No	Woman	No
16.	Boy	11	Asperger's syndrome	Large state school-Elementary school	Yes	Complete family	No	Woman	Yes

2.2. Research Aim and Research Questions

The aim of the research was to identify the supportive factors of inclusive mathematics education from the perspective of 16 mathematics teachers who spoke about their pupils with some form of disability (health, social, or other) or an increased need for support and about their situations in mathematics education and inclusion. We formulated the following research question: What are the supportive factors in inclusive mathematics education from mathematics teachers' perspective?

2.3. Methods of Data Collection and Processing

Data collection was completed through stories written to us by mathematics teachers regarding their experiences of inclusive mathematics education in mainstream primary and secondary schools. Each teacher wrote one story—his or her personal experience of inclusive mathematics education for a pupil with a particular difficulty or an increased level of support that he or she had taught as part of his or her practice.

The teachers themselves chose the pupil to describe the school story based on their subjective judgement according to the criteria specified in the request for collaboration. We turned to mathematics teachers with the following request: "We are engaged in research on inclusive education. We are interested in the views and experiences of mathematics teachers with pupils in mainstream education with some form of disability (health, social, or other) or an increased need for support. We would like to invite you to anonymously participate in this research by writing a "school story" of your chosen pupils with difficulties whom you teach or have taught mathematics. Teachers submitted their stories anonymously to the researchers via MS Forms (Microsoft Forms).

Teachers were introduced to the issue through seven stimulus strands: (1) basic data about the pupil (age, gender), (2) school profile of the pupil (issues of integration or inclusion of the pupil, existence of an individual education plan, what information the teacher has about the pupil from other colleagues-teachers and professional staff of the school, or other specialists outside the school environment), (3) a description of the specifics of the pupil's learning and behavior in mathematics lessons, (4) a description of the mathematics teacher's teaching approach to the selected pupil, (5) the communication between the family and the school, (6) the manifestations of the pupil's behavior and learning in school, (7) the climate of the school. Each story was anonymized (we changed the pupils' names), then broken down into discrete units of meaning (583 in total). We assigned a numerical code to each unit of meaning that defines or carries one meaning. This can be a word, a sentence, or a larger section of text, as even ref. [41] has listed. For each unit of meaning, we have kept analytical notes in parentheses, along with a suggestion for classifying the unit of meaning into the primary emerging categories. We named each emergent category with a working name and included it in the table of lower (second) order categories. The first number of the numerical code denotes the story number, and the second number denotes the order of the particular unit of meaning. Example of an incomplete category table with second-order categories for a single story (see Table 2). We have processed all stories in the above manner.

With each additional story analyzed, new second-order categories were added, and we gradually began to group them into first-order categories that were not yet final (Table 3).

In the final step, five final first-order categories were extracted, and we present these extracted categories comprehensively in the text in Section 3. As part of the categorization process, two researchers read the texts and placed them under emergent categories, which were discussed, reread, and reordered when necessary. A third researcher conducted an independent audit of whether the texts assigned under the overarching categories fell within the context.

Table 2. Example of incomplete first-step categorization.

Inclusive climate (accepting atmosphere, support team for the pupil . . .)	1.8; 1.15; 1.16; 1.36;
Transinstitutional cooperation	1.9; 1.23;
Relief from certain situations within the overall process (relief in assessment, relief from situations that are insurmountable, burdensome, hurtful for the pupil, in order to prevent problems for the pupil)	1.10; 1.11; 1.12; 1.23; 1.31;
Positive personal qualities of the pupil (positive/negative personality reserves)	1.13; 1.14; 1.33;
Teamwork within the school	1.16;
Problematic personality prerequisites of the pupil	1.17; 1.18; 1.34;
The pupil's compensatory mechanisms resulting from his/her primary diagnosis	1.18; 1.20; 1.21; 1.25;

Table 3. Recategorization and restructuralization of categories.

Internal support resources of the pupil himself (Circumstances related to the support of the pupil himself)	
Positive reserves of the pupil Building on the pupil's positive personal reserves (knowledge, skills, talents)-mechanical memory, Above-average pupil abilities Building on the pupil's excellent above-average abilities in one area Pupil's compensatory mechanisms Pupil's compensatory mechanisms resulting from his/her primary diagnosis (ability to look something up on the internet, use a mobile phone, calculator, spreadsheets)	1.13; 1.14; 1.19; 1.33; 2.24; 2.27; 2.34; 3.80; 7.12;7.23; 8.14; 8.16, 8.17, 9.6; 9.9; 9.11; 9.12; 9.13; 9.23; 11.15;11.30; 12.10; 14.11; 14.24; 14.25; 14.26; 14.27; 15.10; 15.18; 15.21; 15.23; 16.21; 16.25; 16.26; 1.19; 3.4; 5.10; 1.18; 1.20; 1.21; 1.25; 4.19; 5.32; 9.18;

3. Research Results

Based on processed written stories from mathematics teachers, we identified their intuitive inclination toward the social model of perception of disability or other types of disability (for instance, medical). Teachers try to overcome barriers, find ways to get closer to the pupils, prepare an environment for learning mathematics, make mathematical content accessible, and individualize teaching based on the specific needs of individual pupils.

Within the research, we identified five categories related to supportive factors in inclusive mathematics education from mathematics teachers' perspectives. We will look at them in more detail in the following text.

3.1. Identifying the Pupil's/Student's Internal Resources in Mathematics Education

This category presents the pupil's positive personal reserves, the identification of which is essential for learning in general. Qualities such as goal-orientedness, ambition, willpower, activity, industriousness, diligence, speed, promptness, perseverance, creativity, showing interest, and courage to apply and ask questions have emerged as significant positive resources in pupils' mastery of mathematics. It was important that teachers were able to recognize these as beneficial factors for the child themselves. If teachers identified positive skills in cognitive functions, such as good long-term, mechanical memory, the ability to concentrate, and the ability to apply learned procedures, they saw this as a mainstay for children with difficulties or for children with increased needs for support in learning mathematics. The pupil's well-developed social-emotional characteristics also emerged as significantly helpful. For example, teachers noted pupils' willingness to help, emotional sensitivity and social responsiveness, willingness to integrate into the classroom

collective, ability to show leadership in a group, and ability to communicate their opinions and express their needs assertively.

Another interesting factor mentioned by the teachers was the specific talents of the pupils, for example, artistic, musical, and sporting talents, which contributed to a positive self-image of the pupil himself/herself. In the following, we provide examples from the stories of mathematics teachers falling under this category:

1.13. Marek is very ambitious and wants to achieve excellent results. 1.33. Marek is very active during lessons. 2.24. Since he likes to paint and paints very nicely, I asked him to paint three pictures for the mathematics classroom according to his imagination. 2.27. Many people have also commissioned him to paint the whole family according to the photograph. They were blown away by the result. The pupil was getting positive feedback on his artistic ability. 3.80. He was also struggling in other lessons, but we were able to work together as a team to support the pupil in his artistic talent; we created a space for him on more than one occasion by organizing a concert for the whole school where he played the drums himself. He was a star for a while then, and we were all proud of him. 8.14. He excelled in his subjects in that he was able to remember the material he had already learned permanently compared with his classmates. 8.16. In mathematics, based on his excellent mechanical memory, he was able to solve more complex mathematical problems. 8.17. In problems for which he knew the procedure, he was faster than his classmates. 9.6. The pupil was very diligent. 9.9. The pupil did not seek relief on his own and wanted to know everything like his peers in the class. 9.11. A very nice, polite, hardworking, and sensitive girl popular in the group. 9.12. She got along better with younger children, as she was a little behind in development. 9.13. She got a B or an A for the enormous effort she always put in and tried to manage everything like the other pupils. 9.23. Initiative, kindness, willingness, to help teachers or classmates. 11.15. Good at counting from memory, which he had apparently mastered before the accident. 11.30. However, he quickly established very good relationships with his classmates, mainly through sports. 12.10. The pupil's strengths include purposefulness, perseverance, tenacity, and a willingness to fit in with the class. 14.26. Popular and involved in the boys' group due to his sporting talents. 15.18. When unclear during class, has no problem speaking up and asking questions. If we work in groups, he shows himself as a leader. When tested on a lesson, if she does not master the material, she admits that she has not learned. 15.21. Annie is very hardworking. She is quiet during the lesson, but if there is a debate, she can express her opinion. 15.23. She likes to design her own clothes, which is interesting and sometimes overlooked. 16.26. All I know about art is that she is good at it and creative.

3.2. Perceptive Approach of the Mathematics Teacher toward the Pupil/Student

We identified the following supportive factors on the part of mathematics teachers as key in this category: responsiveness in their approach to pupils, use of a one-to-one approach, and building a secure teacher-pupil relationship. Teachers also built on pupils' specific talents seemingly unrelated to mathematics teaching (for example, a pupil painting pictures for the mathematics classroom), recognized pupils' strengths and positive reserves, and supported pupils' intrinsic motivation. On the other hand, they were perceptive and sensitive to the specificities of some pupils, able to identify, understand, and respect their particular expressions. For children with disabilities, there were problems based primarily on their diagnosis, such as obsessive-compulsive behavior and pedantry in a child with Asperger's syndrome. These manifestations were also evident in the mathematics teaching itself, where, for example, the pupil strictly demanded consistency in the teacher's expression, the use of precise mathematical concepts, and rigid adherence to the conditions of problem solvability. It was important for the teacher to understand what was causing such behavior. It was not a manifestation of the teacher's insolent behavior but compensation for his anxiety resulting from his primary diagnosis.

A human, responsive, sensitive, respectful, friendly, and creative approach on the part of the teacher helped to overcome the difficulties and barriers in teaching mathematics

to individual pupils. Participatory observation of the pupil's behavior and learning style proved crucial in order to get to know the pupil better, understand his/her specific expressions, recognize early signs of possible problems, and prevent the situation from getting worse. Teachers also responded to the current mood of the whole class, not only to the content of the curriculum. In order to facilitate the processes of inclusive mathematics teaching, it is crucial that the teacher, in addition to taking into account the content of the subject taught itself, also take into account the broader context relating to individual pupils and the dynamics of classroom relationships. In the following, we provide examples of stories from mathematics teachers falling into this category:

2.29. We encouraged pupil creativity through a buddy approach and gained pupil confidence and interest in coming to school. 2.37. When explaining, I naturally notice and observe his behavior, and I can already recognize signs that he does not understand. 2.42. I alternate methods depending on the current mood in the classroom and the content of the curriculum. 2.47. I organize many competitions in which clever pupils measure their mathematical and science skills, and pupils who are not fond of mathematics help me organize them. They often find it motivating and discover that math can be fun too and is not just about formulas in the way many people prefer. 5.7. Based on our observations, we recommended that parents go for a rediagnosis, where our assumptions that the child did not just have an attention deficit disorder were confirmed. 8.11. When the pupil was negative, it was often necessary to positively motivate and redirect them. 8.18. He was more comfortable with activities where he was not distracted and could work independently. 8.25. Over time, after frequent classroom sessions, there was a change, on the part of his classmates, towards understanding a classmate with a disability and on his part to improve his respect for the needs of others. 16.20. In the meantime, however, I have attended online webinars on the topic of integrated pupils, Asperger's Syndrome, etc. It has helped me a lot to open my eyes, to possibly find my lost energy again, to put aside my anger at Martin and his parents, and to change my attitude towards Martin. Martin's change was radical. During the last month of the school year, I gave him individual attention, explained the material over breaks, and had him write simple remedial papers, his grades improved a lot, and he was willing to go to the blackboard. It was good. 2.15. In his maths workbook I discovered drawings of people holding knives, a person's heart is pierced, and various depressing pictures. 2.16. At the same time during the week I was contacted by the Slovak language teacher who had me read the pupil's essay work. In it, he described a favorite book that described committing suicide with his best friend. 8.21. Individual problems that arose were dealt with as soon as possible so that there were no misunderstandings, and the pupil was not negative and enjoyed coming to school. 3.52. In mathematics, the goal was not so much to get a straight A as to take responsibility for one's own growth. I am a facilitator of classroom processes. 3.40. Fortunately, there was no significant frustration in the sense of having a lot of stress and dislike of math. 4.13. The student has improved in logical thinking and in working in graphing software during the first year as he is studying computer graphics. I also notice an improvement in his independence in his work. 4.29. He definitely needs to be checked continuously as he loses concentration quickly, sometimes starts well, and suddenly stops counting after a few intermediate calculations. Therefore, he then needs to be kick-started again. 2.40. I could see the signs of stress in the examples that the pupils had to solve on the blackboard. He works best when he is confident that he will not go to the blackboard. 3.33. I very much avoided any exposure to stress or answering him in front of the blackboard. 3.20. Classroom work was therefore primarily focused on the collective and relationships, which later proved crucial because by Year 8 and 9 Alex was a full part of the class, regardless of the fact that he was falling behind in his learning.

3.3. Modifying Conditions in Inclusive Mathematics Education and Implementing Accomodations for the Pupil/Student

In the context of this category, we identified modifications of teachers' approaches to inclusive mathematics teaching in the following areas: the spatial arrangement of the classroom; innovative and alternative ways of accessing the material; and reviewing knowledge. To promote inclusion in mathematics teaching, mathematics teachers applied various spatial modifications in the classroom, for example, placing school desks or making changes to the seating chart, etc. Teachers also allowed pupils to co-create the seating chart so that they themselves could learn well. The methods of testing and reviewing knowledge varied according to the needs of individual students. They often chose an individualized form of examination. For example, if a pupil had difficulty with an oral examination, they allowed them to respond in writing. More difficult mathematical tasks were analyzed and explained in more detail by teachers for selected pupils. Unnecessary failures and setbacks were prevented by allowing pupils to revise and correct written assignments and tests.

Some teachers also chose unconventional ways of marking; for example. they did not give a mark on a paper with many errors but only wrote explanatory comments. They reduced the number of assessments during the school year. Tests were allowed to be written not only in class directly with classmates but also outside the classroom with an assistant or with another professional staff member, often with more time or in a simplified version of the content. Mathematical examples, both in class and on the examinations, were differentiated according to pupils' abilities. Often, additional in-depth explanations of some of the more difficult problems were chosen for some pupils. In mathematics lessons, teachers encouraged peer learning-mutual support between classmates. One teacher even attempted to introduce peer learning for younger pupils from pupils in the upper years.

Teachers also used a variety of approaches to externally motivate pupils—for example, facilitative-reflective learning. Technical modifications in the classroom were also approached; for example, pupils could use computers to take notes or copy notes from the internet to record explanations of the material for additional study at home. Teachers used interactive whiteboards, various computer programs, or computer applications. There was also a need to modify access to new knowledge through interactive internet platforms, for example, the use of EduPage, a school-based platform for school and family communication. Increased monitoring of some pupils' progress during lessons was required by the teacher to capture their uncertainty with the curriculum. For some pupils, it was also necessary to modify the learning materials themselves, for example, to increase the font size, leave only one example on a page, leave more space for completing the assignment, etc. Some of the teaching texts had to be reworked into a less extensive form with specific sample examples and solution procedures. It was also advisable to color-code the teaching material for better orientation of the pupil. It was necessary to make the material more concrete—to link it to examples from everyday life (for example, working with money models). Teachers also considered the provision of one-to-one consultations outside the classroom to be an important support in the teaching of mathematics. Teachers also took the approach of creating their own support tools, such as help summary notes and guides, tables, mind maps, etc. Teachers were forced to reduce some very challenging topics for selected pupils—sometimes even omitting them altogether or not assessing them for a given pupil. In the following, we give examples of stories from mathematics teachers falling into this category:

1.24. In mathematics lessons, pupils do not sit at desks of two but may move their desks at will. 2.31. He did not want to answer orally, and the teachers accepted this and only tested him in writing. 2.36. There was a problem in geometry, especially in construction problems and in combinatorics, where the problems had to be analyzed verbally in more detail. We solved this problem by having him gradually do only the write-ups of the problem, then I would sit at the desk with him for a mathematical chat and assess the correct problem-solving procedures with a motivational mark. 2.45. In the case of a failure, the pupil could correct the write-ups. 3.37. He also sat alone for some of the lessons, but

that was rather dysfunctional; it was very good when he sat next to someone who could support him and guide him. 3.61. I also developed a lot of intergenerational learning, so we did lessons here and there with other classes where they had the opportunity to teach the younger pupils as well. 10.7. He was helped by a classmate and a friend. 12.20. The pupil tries to fit in with the group. Her classmates also help her with her learning, either in moving around the school or at school events; the class really tries, but such pupils have their own world of topics and problems, and they get along better with young people with similar problems 3.62. I gradually individualized the assessment by taking the scale very loosely, marking by eye at first as needed, then later on, when there were more mistakes, I preferred not even to mark, just to write comments. 3.63. For Alex, it was enough to have 2–3 marks; he didn't need to have everything marked. 3.64. I differentiated the examples if necessary or didn't mark them if they were difficult. 4.7. In languages, he got easier tests, mostly in the form of make-ups; in math and vocational subjects, the teacher would come by more times and possibly explain or help him solve something. 4.10. He gets the grades he needs, but individual problems are usually taken into account. For example, if they are assessed in a subject by writing notes, pupils with dyslexia and dysgraphia may have them written on a computer or copied from the internet. 5.24. They always write notes outside of class with an assistant. 5.25. They are not reduced in content; the pupil has more time to work them out. 6.7. The pupil is graded with marks and has more time set aside for written work. 7.9. Due to this, he has had, for example, extended times for writing matriculation tests and so on. 7.23. However, I have tried to make more use of the dialogic form of explanation of the curriculum in his classroom. Sometimes he would even record the lessons so that he could come back to them at home—he would not be able to take notes effectively. 7.24. If I needed to test, I modified the assignments for Lukas so that they were concise; he had them printed on A3 and had more space in them. 7.25. He was given time compensation. 8.22. For the pupil, as a tutor, I would produce teaching texts so that the material was not extensive, with sample examples and solution procedures. The problems were color coded for better orientation in the text. The pupil was also given the opportunity to clarify the material by tutoring if necessary. 9.5. When testing and writing revision work, the pupil had more time to work it out and tended to be given oral feedback. 9.10. The real-life examples she was able to imagine were very helpful. 11.10. Since a reduction of the curriculum was not necessary, we adapted the way we made new knowledge available—for example, notes on EduPage, sample assignments, and opportunities for individual consultation. 11.11. Furthermore, when testing the pupil, we modified the wording of assignments, took into account the need for more time, did not take into account inaccurate drawings, etc. 11.16. When guided, he could work calmly on the blackboard and write in the notebook. 11.18. While sitting at the front, he tried to keep up with the pace of the work with the class. 11.24. He was given individual counseling many times. In tests, he had simply worded assignments, fewer problems, and more time to work them out. 14.16. Connecting mathematics with opinion and practice. 14.17. Counting with money. 14.18. Creating and using his own tools and pull-ups. 14.19. Using movement and experiential learning. 14.22. Using the interactive whiteboard—and tutorials. 1.23. According to the statement of the pedagogical-psychological counseling office, the pupil should not be evaluated in this subject unit. 2.30. As the problem was caught early, the pupil was assessed on the half-term report card like the other children except for the oral answers. 2.31. He did not want to answer orally, and the teachers accepted this and only tested him in writing. 12.8. We have had to significantly reduce thematic units, for example, functions, and omit some structural geometry altogether. 12.11. The pupil was assessed with a mark of 2 (in Slovakia, the grading system in primary and secondary schools is determined on a scale of 1 to 5, with 1 being the best rating and 5 being the worst (rated as insufficient)). Secondary school mathematics is difficult; there are many topics that are unmanageable for such children; certainly, geometry is included: both planimetry and stereometry—where there are many lines, the blind person gets lost, in secondary school these topics are unmanageable. 3.42. We worked a lot in

the classroom on accepting and setting our own limits, the challenge ticket, where pupils set themselves a target, an assessment they wanted to achieve, and if they got close to it, they were happy. 4.25. The assignment always needs explaining in more detail and, most importantly, without disturbing fellow pupils. 6.19. He has the opportunity for individual consultations if necessary. 3.51. Later on, I also worked more often with group work. The essence of the method of work, which I increasingly refined, was facilitative-reflective learning built on freedom and responsibility. I often reflected with the pupils on their work together in a circle; we met every morning in the morning circle. We went on a dozen field trips, camps, and outdoor schools together. We also went somewhere together 2–3 times a year. Building relationships in the classroom was my priority. 2.38. Of course, I would explain the lesson to him again on the blackboard so that I would not draw the attention of all my classmates to the problem. 3.81. Teachers, following my guidance, were able to step back from the subject requirements and require less rather than requiring more so that the student would not fail the subject.

3.4. School-Family Cooperation

In the context of teaching mathematics, teachers highlighted the important aspects of communication and cooperation with the student's family. It was important to share information with the pupil's parents/guardians about how the pupil was performing in school. It proved helpful to come to some consensus with parents on how to support the pupil. In addition to face-to-face interviews, teachers also used telephone or online consultations when communicating with parents. Parents were contacted not only in cases of problems but also in cases of successes, which shows an effort for friendly contact from the teacher to the family. Contact with the family proved to be optimal to conduct on a regular basis, constantly inviting parents to communicate.

Teachers reported that it was important to remind parents of the need for regular attendance at school so that the pupil does not unnecessarily skip new material and to take measures to improve the pupil's homework. Teachers also communicated as beneficial consultations for parents in the presence of not only the teacher but also other professionals from the school support team, such as a psychologist or a therapeutic educator, which were aimed at addressing the pupil's overall situation. During the consultations, teachers were advised to map out the possibilities of supporting the pupil in his/her whole ecosystem. In some cases, only one parent communicated better with the teacher. In those cases, the teachers accepted him/her as a supportive communication partner between the school and the pupil's family.

It was found to be ideal if parents could communicate with other members of the support team at the school in addition to the teacher. Openness and cooperation from the pupil's parents with the teacher proved to be essential for improving the pupil's behavior and overall functioning at school. Another effective way of teacher-parent consultation was when the pupil himself was invited to join in. Not all teachers used this method, but from our point of view, the voice and presence of the pupil when making decisions about their learning is significant. Not only supporting the pupil himself but also encouraging his parents and pointing out his progress, however small, proved to be important. The following are examples of stories from mathematics teachers falling into this category:

2.11. I was informed by the child's mother about the pupil's disinterest and refusal to come to school. 2.1. In the mathematics workbook I discovered drawings of people with a knife in their hand, a person's heart pierced through, and various depressing pictures. 2.2. At the same time during the week, I was contacted by the Slovak language teacher, who gave me the pupil's essay work to read. In it, he described a favorite book that described committing suicide with his best friend. 2.3. I contacted the pupil's mother, and she confirmed that he also painted depressing pictures at home (I had not yet stated that the pupil had attended the Art Department of the Primary School for 7 years). 2.18. I had the mum read the essay work, drawing attention to the pictures in the exercise books. 2.19. We agreed to see a psychologist, and I informed colleagues at school again. 2.51. In

case of any problems but also praise, I contact parents by phone or via Edupage. I prefer a personal conversation. Therefore, all parents have my telephone number. 3.21. The family was in regular contact with me as the class teacher. 3.23. It was necessary to call them to the school on an ongoing basis. 3.24. To draw attention to the pupil's attendance at school, unnecessary absences, or very poor homework. 3.77. However, the father communicated more with me most of the time. 5.26. Parents cooperate with teachers and the assigned aide. 5.27. They are cooperative in problem-solving. 5.28. They are open to suggestions from the special education teacher on how to improve the student's behavior and overall functioning in school. Family support—positive communication. 6.20. Parents are cooperative with the school. 7.29. Otherwise, what I like about our school is that we provide a teacher-parent-student triad consultation; this student also used it. 8.20. The student was not educated by parents but by relatives who cooperated with the school in an exemplary manner. 9.20–9.22. The parents did not expect great achievements; they knew their child and were grateful for any praise that was given to the pupil. 11.27. At the parent-teacher association, both the mother and pupil Z were present, and the teacher told the mother about the pupil.

3.5. Support Mechanisms of the School as an Institution in the Context of Inclusive Mathematics Education

Identifying the internal resources of the pupil himself, the approach of the mathematics teacher, the collaboration with parents, and the modifying conditions of the inclusive school climate have emerged as key supporting factors in inclusive mathematics education. However, teachers could not imagine successful inclusive mathematics education without creating an overall inclusive school climate. For example, they utilized the services of the school's special educator for the individual student during and outside of school hours. Teachers also cited support from outside counseling services as important. Teachers found it helpful to be able to approach their colleagues and/or school management with confidence. A supporting aspect was the teachers' communication with each other about specific pupils, which was friendly and reciprocal.

Teachers also identified respectful relationships with pupils as helpful, and if the school as a whole was set up in a supportive way towards meeting pupils' individual needs. In addition, to support for learning itself, comprehensive support was not neglected in terms of improving classroom relationships, which teachers considered to be an important factor in the school success of individual pupils. They tried to convey a sense of equality to all pupils, not to define them in terms of difference, otherness, or specialness, but to see each of them as unique individuals with their own specific needs. Everyone needs some form of support, not just pupils with SEN status. Creating an atmosphere where every pupil is supported has proved important. An open door and participation policy were communicated by the school. Parents were invited to step in and get involved in the school in a variety of non-traditional ways, not just being invited into the school when something needed to be addressed.

The inclusive school consciously worked to build a school support team as a service for pupils, teachers, and parents. Emphasis was placed on the early detection of emerging problems, and this was completed through teamwork. The school's overall setting towards pupils with SEN status, but also pupils with increased support needs in some specific areas, also proved important. Instead of pressure for exclusion from school, the available support mechanisms were activated. In the following, we provide examples from the narratives of mathematics teachers falling under this category:

9.26. She worked on her own or with the teacher's help in class; if she could not keep up, she worked out the examples at home or with the special education teacher. 7.26. If she was still not successful in the tests, I tested her individually after class verbally and in the presence of the school psychologist. 8.87. The pupil was allowed to sit as close as possible to the teacher and as far away from the window as recommended by the Centre for Educational Psychological Counselling and Prevention for sufficient concentration in class. 1.8. In the event of problems in the educational process, he could refer to the class teacher,

the educational counselor, and the school management. 1.16. Teachers discuss, consult with each other, and find the right strategies to teach Marek. 3.25. A lot of consultation has taken place. 1.36. There is a friendly, communicative atmosphere in the school. The relationships between teachers and pupils are equal. 2.53. I think we are a very open school for children, and there is a rather friendly atmosphere in the teacher-pupil relationship. 3.13. We are pupil-friendly. 3.14. He had sufficient support mechanisms set up, many of them directly supporting the family environment, better relationships, and reflection on the mother and son relationship. 3.67. I did not distinguish whether someone was integrated or not. 3.69. Alex had no outward specifics of support because all pupils had them. 3.76. I once managed to talk mum into coming to mentor the class in making a fish ray. She created a life-size Raja with the children, which was a magnificent piece of work. I was very happy that mom was involved and had the opportunity to show the kids her talent as well as support her son. 5.35. The school is inclusive—it has a special education teacher, a psychologist, and teaching assistants. 8.6. The pupil was supported by a teaching assistant, educational advisor, and the school's special education teacher in the teaching process. 8.21. Individual issues that arose were dealt with as early as possible so that there were no misunderstandings and the pupil was not negatively adjusted and enjoyed coming to school. 12.9. The school did not put pressure on the pupil to drop out rather the opposite, it tried to help her to manage her studies. 14.30. Most of the staff had their hearts in the right place and tried to teach and support such children

4. Discussion

Stories from mathematics teachers in the form of texts provided us with a lot of material and were the subject of reflection on how mathematics teachers understand inclusive mathematics education. The research data collected was extensive, and through qualitative analysis, we abstracted 5 main categories—themes that described the supporting factors of inclusive mathematics education from mathematics teachers' perspectives. Teachers provided information about their pupils with any form of disability (health, social, or other) or an increased need for support and about their situations in mathematics education and inclusion. Within some of the categories, we also found similar findings in related scholarly sources.

In the context of category 1, "Identifying the pupil's/student's internal resources in mathematics education", teachers communicated the importance of identifying positive personal reserves in individual students that they could then build upon in inclusive mathematics education. They cited two key areas on which they could build, namely cognitive and social-emotional skills. Identifying these proved crucial throughout the process. Similar to Tan, Padilla, and Lambert [1], we also focused on whether mathematics teachers draw on, for example, the pupils' personalities, their courage, creativity, ingenuity, unique perspectives, and their different or specific ways of knowing in contexts of teaching and learning mathematics. DeVries, Voßb, and Gebhardt [43] found that students with special needs have lower levels of academic self-esteem, social inclusion, and emotional inclusion than their typically developing peers. However, these differences narrow between grades 6 and 7 in inclusive schools.

In the context of category 2, "Perceptive approach of the mathematics teacher toward the pupil/student" in our research, teachers mainly emphasized responsiveness in approaching the pupil, building a secure relationship, and using an individual approach in terms of knowing the pupil. Hugo & Hedegaard [25] state that, from a student perspective, receptive, affirming, and understanding teachers are key to promoting inclusion. The authors place emphasis on the relationships between teachers and students and call this ability relational competence. During the interviews, DeSimone and Parmar [27] identified the importance of the mathematics teacher's personal responsibility to the students in inclusive mathematics education. They described, for example, an interview with a New York teacher who believed she was the primary person responsible for her students and their grades. McDonough & Clarke [32] consider that one of the characteristics of

effective teachers practicing effective mathematics teaching is showing pride and joy in the achievements of individual students, which also strengthens their relationships with each other.

Our research shows that teacher sensitivity in the context of students' expressions and their specificities in terms of not only their problems but also the way they learn is an important aspect of inclusive mathematics teaching. Rouse [23] makes a similar point when he says that "knowing" means knowing not only the specifics of different disadvantages but also the ways in which individual children learn. Our research revealed the importance of teachers understanding the causes of problem behavior in pupils, as highlighted by Kováčová et al. [24]. The author states that problem behavior can be exacerbated by unprepared teachers.

An interesting experience in our research was shared with us by one participant, a mathematics teacher, who only realized that she had to completely change her approach to her pupil after receiving specialist training on autism. She literally wrote: "I managed to find the lost energy and put my anger at Martin aside". The teacher in question communicated to us how the knowledge she had gained about the specifics of autism had changed the way she viewed the pupil in question. The consequence was also a radical change on the part of the pupil. The teacher writes: "He improved a lot, he was willing to go to the blackboard, which he refused to do before, it was good". Our research thus highlights the importance of considering a wider context than that contained in the subject of mathematics alone.

Similarly, Hugo & Hedegaard [25] found a positive impact from teaching that also focused on the needs and abilities of the student, not just the content of the subject itself. They also see teaching as a form of participation and a focus on the individual learner, not just as a focus on the topic being covered alone. This is confirmed by the teachers' statements in our research, where they abandoned their role as just a mathematics teacher and redirected their attention to more important matters concerning the learner himself. For example, the teacher drew attention to unusually depressing drawing content in the workbook, which indicated a deterioration in the pupil's emotional state. This is in line with Tan and Kastberg [4], who recommend moving from a medical model to a social model of understanding disability.

In the context of Category 3, "Modifying conditions in inclusive mathematics education and implementing accommodations for the pupil/student", we collected a variety of data that included modifications and variations in how teachers make mathematics content accessible to all students without discrimination. Many of the practices they used, created, and innovated in their teaching overlapped with the characteristics of effective teachers articulated by McDonough and Clarke [32]. We found agreement, for example, in the use of visual aids, different organizational styles and teaching approaches, assessment methods, and the setting of realistic goals. In our research, consistent with the authors, teachers used a reflective approach in their teaching—i.e., reflecting on the flow of the lesson, whether all students understood the content, whether it could be taught in other ways, etc. Our research has also highlighted the importance of preventing student failure and setbacks. Pupils were invited to co-create what was happening, for example, by designing the spatial layout of the classroom, monitoring their progress, etc. Kobelt, Neuhaus, and Refle [28] emphasize the teacher's ability to invite pupils to co-construct and participate in their learning. Teachers tried to lead pupils out of the passive role of information receivers and towards active participation.

In our research, we also observed teachers' use of various modifications and concessions in their teaching based on students' IEPs (for example, simplifying texts, not assessing certain topics, reducing the curriculum, extending the time for completing assignments, modifying tests, etc.). Pupils' mathematical understanding, for example, with LD, can be supported by encouraging these pupils to "discuss, critique, explain and, if necessary, justify their interpretations and solutions" [27]. According to Faragher, Clarke, and Hill [16], the teaching strategies and techniques needed for selected students are ap-

plicable to all students. For example, the teacher re-explained the material once more and more explicitly for the sake of one student, but several other students benefited from this repetition, according to the teacher. The use of familiar and effective teaching strategies, such as differentiated instruction graded according to students' abilities, peer teaching, facilitative-reflective learning, intergenerational learning, experiential learning, individual consultations, model tasks, and group learning, also emerged in the mathematics teachers' narratives in our research.

Among technological devices, teachers used various applications, interactive whiteboards, and specialized teaching programs. Faragher, Clarke, and Hill [16] talk about the positive role of using technology-enhanced learning in mathematics. The positive aspects of the meaningful use of technology in teaching in the preparation of future mathematics teachers are also discussed in several pieces of research, for example [35,36].

In the context of category 4, "School-family collaboration", our research found that communication and collaboration with students' legal guardians were strong supportive factor in inclusive mathematics education. Booth and Ainscow [5] say that linking inclusive values to practice—the educational process and to communication (including communication with the pupil's parents)—is important in an inclusive school philosophy. According to Money et al. [16], inclusive communication is about eliminating communication barriers. It means sharing information in ways that everyone understands and in all forms of communication (face-to-face, written, online, and telephone). Caby and Caby [44] say that the knowledge, experience, and cultural context of the family—which may be different from that of the teacher—must also be taken into account, and the way we communicate and collaborate must be adapted accordingly. Our research has shown that some schools or individual teachers already involve parents and pupils as members of the support team. In their work, Vlcek et al. [36] and Booth and Ainscow [5] also discuss this important aspect. They emphasize the important role of the parent/guardian in the support team. Vlcek et. al. [36] stress the importance of achieving goals through the implementation of important, consistent support strategies in a variety of settings, including the home. Our research confirmed that mathematics teachers perceived the need to support students in their entire ecosystem, not just at school, and sought different ways to do so.

In the context of category 5 "Support mechanisms of the school as an institution in the context of inclusive mathematics education", our research found that in order for teachers to translate an inclusive philosophy into mathematics education in the sense of making "mathematics for all" accessible, it is important to create an inclusive climate at all levels, including the school management, the principal, and the whole community of parents and students. Garcia-Melger et al. [37] discuss the need for a consensus understanding of inclusion among all stakeholders. Roos [6] stresses the consistency between an inclusive vision and its practical implementation in the classrooms themselves.

Our research has highlighted the need for teachers to collaborate with professionals and seek their support services. They also sought to create a multidisciplinary approach. DeSimone and Parmar [27] pointed out that the most valuable support resources for mathematics teachers in inclusion programs were other people, primarily special education teachers, assistants, educational counselors, and/or school psychologists. In their research, research participants met 1–2 times a week with special education professionals at their school or sought advice from other colleagues who taught inclusively. Collaborative strategies and a true team mentality were the main reasons why general educators were able to meet the challenges of their mathematics classrooms and turn those challenges into some level of success" [27].

All of the schools included in our research had some form of on-site professional support available, with the exception of one smaller school. However, we should note here that access to funding for these in-school support services is inadequate in Slovakia. In line with Garcia-Melger et al. [37], access to funding has a non-negligible influence on decision-making processes about how to support individual pupils with difficulties. Our research, as mentioned above, has highlighted the great importance of creating friendly

relationships within the school as well as open and collaborative communication between the school as an institution and all stakeholders. Teamwork and cooperation help teachers master their work. [27] The need for an open-door policy was voiced. Teachers stressed solving problems right away or preventing them and not creating negative pressure on the school as an educational institution. We conclude with a statement from a teacher in our research that captured the philosophy of inclusive mathematics education very well, "I didn't distinguish whether someone was integrated or not".

Our results confirm what DeSimone and Parmar [27] formulate: that the most valuable support source for general educators who taught mathematics in inclusion programs were other people—primarily special education teachers, assistants, educational counselors, and/or school psychologists.

5. Limits

A limitation of the research was the limited number of participants—16 mathematics teachers. A written form was chosen for the data collection procedure. In the future, it would be interesting to deepen this research through face-to-face interviews with mathematics teachers. It would be possible to discuss with them and clarify in more depth the different circumstances and their thought concepts.

Due to the nature of qualitative research, it is about mapping teachers' subjective views and opinions, ideas, and experiences from inclusive mathematics teaching. It was field research, a view from actual practice in Slovak mainstream primary and secondary schools, which, however, due to the limited number of research participants and the nature of the qualitative type of research, cannot be generalized (which is the limit of this type of research). On the contrary, the benefit is the acquisition of original ideas from both experienced and novice mathematics teachers through the practice of inclusive mathematics teaching. At the same time, we have gained a particular picture of the functioning of the actual practice of inclusive mathematics teaching in Slovak conditions.

6. Conclusions

In the research, we focused on supporting factors in inclusive education from the point of view of mathematics teachers. In the narratives and the main 5 themes, we identified mathematics teachers' intuitive leaning towards a social model of perception of disability/disadvantage and health, which is in opposition to a medical model of understanding disability/disadvantage.

For teachers, it is important to combine knowledge from the didactics of mathematics and its individual modifications adapted to individual students with knowledge that is somewhat outside of their primary role—or identity as a mathematics teacher. Inclusive practice requires lifelong learning and expanding one's knowledge beyond the original role of being "just" a math teacher. A combination of knowing, doing, and believing is required [23]. Building support teams proved to be necessary so that the teacher does not remain alone in the process of inclusive mathematics education. Teamwork, interdisciplinarity, trans-departmentalism, openness, communication, and a holistic approach are essential. In practice, however, for various reasons (political, financial, personnel, etc.), it does not always work out perfectly, but we should not give up on the principle of inclusion because of these obstacles but rather work on their elimination.

Burton and Pace [45] emphasize the improvement of attitudes toward pupils with disabilities in mathematics among future general education teachers. That's why it's important to pay more attention to the education of future teachers in general. It should not only be a formal familiarization with the possible diagnoses and the status of SEN according to the legislation but also a deeper understanding of the interconnectedness and complexity of the development of pupils with different types of problems and disadvantages and their impact on their learning processes and the course of their teaching. Slavíčková and Novotná [46] say that the presence of children with SEN in mainstream education in mathematics classes has a positive effect on the preparation of lessons and on the better

implementation of appropriate digital tools in teaching. Examining this phenomenon could be the impetus for further research.

Our research was an exploratory study of the current state of inclusive approaches among mathematics teachers in Slovakia, and it can serve as the foundation for further research. Our next study aims to identify existing barriers to inclusive mathematics education and propose measures and support for teachers in practice as well as for the preparation of future mathematics teachers in Slovakia.

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