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Research Article

Teachers' perspectives on the mathematics education of gifted pupils in the Czech Republic: A case study

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The paper presents the findings of a case study focusing on the approaches of mathematics teachers towards gifted pupils in two types of educational settings at the primary school level – specifically, in regular heterogeneous classes and in classes with an extended mathematics curriculum. The aim of the study was to describe the supportive measures provided to these pupils within teaching, the challenges teachers face when educating gifted pupils, and the circumstances that influence their pedagogical practice in this context. The data were collected through qualitative research, employing a case study design. Semi-structured interviews with mathematics teachers were used as the method of data collection, and the data were analysed using open coding. The method of "card laying" contributed to the identification of key categories and themes recurring across different classroom contexts. The findings revealed that in the education of gifted pupils in mathematics, teachers encounter a wide range of challenges, from personal and didactic aspects of teaching to its organisation for these pupils. Although each teacher perceived the main challenge differently, they were all united by their effort to respond pedagogically as effectively as possible to the specific needs of these pupils. The findings highlight the need to strengthen teacher education in the field of gifted education, particularly through practice-oriented and reflective professional development that addresses teachers' attitudes and belief systems.

Keywords: Gifted pupils in mathematics; Mathematics teachers; Primary school; Case study; Support measures

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1. Introduction

The education of gifted pupils currently represents a topical and widely debated issue within the field of schooling (Baccassino & Pinnelli, 2023; Federičová et al., 2024; Şakar & Tan, 2024). In the Czech context, this concerns pupils attending primary schools (covering both primary and lower secondary education, i.e. pupils aged 6–15). In this regard, crucial questions arise concerning equality of access to education, differentiated instruction, teachers' awareness of the specific educational needs of gifted pupils, and their willingness to actively recognise and address these needs. Pupils' giftedness often remains hidden from teachers and, consequently, may also be overlooked. As noted by Nordahl-Hansen et al. (2022), many gifted pupils educated in regular classrooms do not fully realise their potential in mathematics. These pupils frequently lack

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targeted support and are sometimes referred to as "academically neglected" (Shayshon et al., 2014).

In Czech primary schools, gifted pupils are predominantly educated in two types of classes: in regular heterogeneous classrooms, where teaching takes place in groups with varying ability levels, and in classes with an extended mathematics curriculum, which place greater demands on pupils' logical reasoning and mathematical skills (Simonová et al., 2023). This situation raises questions about which pedagogical approaches mathematics teachers adopt in these two distinct environments and what challenges they encounter when working with gifted pupils. The aim of the present paper is to explore these questions through a case study of five mathematics teachers working in the aforementioned types of classes. Given the small research sample, the findings cannot be generalised; nevertheless, they provide valuable insights into pedagogical practice and reveal key factors influencing the education of gifted pupils in both regular and selectively oriented school settings.

1.1. Conceptualising Mathematical Giftedness

A mathematically gifted pupil is understood as an individual who spontaneously formulates mathematical problems and demonstrates the ability to generalise and abstract. Such a pupil possesses exceptional memory and the capacity to solve problem-based tasks in unexpected ways (Zübeyde, 2023). They often also display the ability to detect patterns and relationships, while experiencing joy in creating original problems and engaging in mathematical games (Dai et al., 2024). Gifted pupils typically learn rapidly and are capable of sustained concentration on a given task (Shin & Oh, 2024). According to Ngiamsunthorn (2020), their thinking tends to be more complex and more strongly connected to broader contexts than that of their peers, which may at times make it difficult for them to articulate their ideas either verbally or in writing. They may perceive problem-solving as so trivial that they struggle to explain their procedure clearly (Hafsyan et al., 2021). The identification of mathematically gifted pupils requires long-term observation of their abilities, understanding of mathematical concepts, and approaches to acquiring new methods. A pupil may be regarded as mathematically gifted if they consistently demonstrate features of logical–mathematical intelligence, which is closely linked to the capacity to solve problems with ease and insight (Budínová, 2018; Zübeyde, 2023).

2. Literature Review

2.1. Educating Gifted Pupils in School Settings

The education of gifted pupils represents a challenge not only in terms of didactic approaches but also from an organisational perspective within schools. Some teachers, for instance, oppose classes designated exclusively for gifted pupils and prefer an inclusive model, where gifted pupils can be effectively educated in regular heterogeneous classrooms (Çayir & Balci, 2023; Shayshon et al., 2014). This approach requires the application of diverse teaching methods and strategies, which expand in scope with an increasing number of gifted pupils in the class (Pavlas et al., 2022). Teachers play a key role in the successful education of gifted pupils. Research indicates that many teachers perceive their own competencies and professional knowledge as sufficient for working with this group of pupils (Jarrah & Almarashdi, 2019; Shayshon et al., 2014).

At the same time, numerous studies emphasise the need for further professional development, particularly in the areas of identifying giftedness, differentiated instruction, and appropriate support measures (Budínová, 2018; Pavlas et al., 2022; Skourdoumbis et al., 2024). However, findings by Pavlas et al. (2022) highlight that teacher training in this field remains considerably neglected in the Czech context. Only 4 % of teachers from 3,340 primary schools and 3 % of 1,020 secondary school teachers had attended a course or seminar focused on working with gifted pupils in the past two years. According to an expert panel (IPs DATA, 2025), teachers also report low interest in developing pedagogical skills in this area, which is linked to the pressure to cover the

curriculum and prioritisation of other current concerns, such as pupils with special educational needs or the consequences of the pandemic.

The identification of gifted pupils often relies solely on pedagogical observation, without the use of specialised tools or standardised diagnostics. Teachers frequently wait for giftedness to manifest spontaneously, rather than deliberately nurturing or stimulating pupils' potential.

The development of gifted pupils in the Czech inclusive environment is not consistently implemented, even though support for gifted pupils is formally declared in school curricula (Pavlas et al., 2022). The most employed approaches include curriculum enrichment and extension (particularly at primary school level), participation in competitions and Olympiads – which tend to foster self-realisation rather than targeted talent development – and the provision of optional subjects and seminars. Individualised instruction is applied only to a limited extent, and its quality is often highly variable and largely formal (IDEA, 2024). Teachers of specific subjects, such as mathematics, generally become involved only when a pupil demonstrates exceptional abilities in that area, and even then, without systematic methodological support. Overall, teachers lack methodological guidance and there is insufficient high-quality diagnostics, leading to uncertainty regarding which pupils to develop and how. A significant limiting factor is also the lack of time and opportunity for individualised teaching. The pressure to complete the curriculum and the frequent homogeneity of classes, for example due to delayed school entry, further restrict the potential for targeted support of diverse pupil abilities (Pavlas et al., 2022).

2.1.1. Support Measures

In this study, we focus on the support measures provided to gifted pupils in Czech primary schools. Support measures are defined by the Education Act (Act No. 561/2004 Coll., as amended) as necessary adjustments in education and school services corresponding to a child's, pupil's, or pupil's health condition, cultural background, or other life circumstances. These measures are categorised into five levels according to the intensity of support and aim to ensure equal opportunities for all pupils with special educational needs—whether they are pupils with disabilities, social disadvantages, or gifted pupils. Support measures encompass teaching methods, classroom organisation, adaptation of curriculum content and learning outcomes, the need for an individual education plan, personnel support (such as a teaching assistant or additional teacher), assessment, interventions (within the school or educational institution), modifications to admission or completion requirements, extension of study duration, and the provision of learning aids (Ministry of Education, Youth and Sports, 2021, p. 10).

2.2. Educating Gifted Pupils from the Teachers' Perspective

Teachers represent one of the key factors influencing the quality of education for gifted pupils. Their attitudes, professional knowledge, ability to differentiate instruction, and, importantly, their willingness to respond to pupils' individual needs significantly shape the environment in which a gifted pupil can develop. However, research by Mukhamadiyeva and Hernández-Torrana (2024) and Setlalentoa Kaloba (2024) indicates that teachers hold differing attitudes towards gifted pupils and are often insufficiently aware of the specific educational needs of this group. This stance is frequently accompanied by a lack of knowledge and practical skills necessary to provide targeted pedagogical support. For example, recent research Arabaci and Baki (2023) has shown differences in the way gifted and non-gifted learners construct mathematical tasks: while most non-gifted pupils created tasks requiring only one variable or multiple independent variables, gifted pupils tended to design more complex problems, likely reflecting their more flexible thinking and perception of task difficulty.

Mukhamadiyeva and Hernández-Torrano (2024) emphasise adaptive learning as an effective tool for individualising instruction for gifted pupils, promoting autonomy, targeted feedback, and facilitating progress monitoring. However, its implementation is hindered by teachers' limited technical training, restricted access to digital tools, the challenge of selecting high-quality materials, and concerns regarding motivation and social interaction. Setlalentoa and Kalobo (2024)

further highlight a lack of material and personnel resources, weak support from school leadership, and the absence of specialised training for identifying giftedness and delivering differentiated instruction. Teachers also report a lack of systematic preparation and targeted professional development focused on identifying gifted pupils and effectively differentiating instruction, which significantly complicates the practical implementation of support measures. The authors stress the need to integrate the topic of gifted education into pre-service teacher training, to develop supportive networks, and to enhance collaboration among schools, parents, and experts as key strategies for improving the situation. Insufficient teacher preparation in the education of gifted pupils is one of the factors that may lead to misconceptions about these pupils and negatively affect their development (Akgül, 2021; Gross & Geake, 2008; Kaskaloglu-Almulla, 2022).

Gross and Geake (2008), in their evolutionary psychological model, identified three main dimensions of teachers' negative attitudes: general perceptions of gifted pupils, social maladjustment, and concerns about antisocial leadership. These attitudes stem from fears that gifted pupils may disrupt social cohesion, leading to reluctance to support individualisation and acceleration. The authors emphasise, however, that further professional development for teachers significantly reduces these negative attitudes, promotes a more positive perception of gifted pupils, and contributes to more supportive teaching practices (Gross & Geake, 2008; Portešová et al., 2007).

Kaskaloglu-Almulla (2022) highlights that insufficient teacher education can result in misinterpretations of gifted pupils' behaviour, where boredom or restlessness is mistakenly viewed as problematic behaviour. Such misconceptions negatively affect pupils' development and social integration, underlining the need for specialised training that addresses both teachers' knowledge and attitudes. Similarly, Akgül (2021) notes that teachers often perceive gifted pupils as unique and fragile but frequently lack the preparation to support their needs effectively. Metaphors such as "an unpolished diamond" or "a delicate flower" emphasise the necessity of a sensitive and individualised approach. The absence of systematic education on giftedness leads to distorted perceptions and inadequate support. In the context of working with gifted pupils, it is therefore crucial to manage the classroom effectively, as this positively influences their academic outcomes. In this regard, providing a structured and supportive classroom environment is essential to facilitate successful learning (Asare et al., 2024).

Teachers' attitudes towards gifted pupils and their education are also significantly influenced by the cultural context, which shapes conceptions of giftedness and approaches to its development. Bourdin and Sambuis (2024) emphasise that there are marked differences across countries in how giftedness is understood, which in turn affects pedagogical attitudes. While in some cultures giftedness is primarily seen as a natural talent and potential that should be purposefully developed, in others it may be associated with elitism or even perceived as conflicting with principles of equality and inclusion in education. These differences influence how teachers approach support measures, such as acceleration or specialised education, and the extent to which they are willing to differentiate instruction for gifted pupils. Similarly, Woo et al. (2022) highlight the specific cultural context of South Korea, where high performance pressure and competitiveness strongly shape prospective teachers' attitudes. Although pre-service teacher education pupils recognise the importance of supporting both the intellectual and emotional needs of gifted pupils, they simultaneously critique a gifted education system that is heavily oriented towards selection and achievement. This tension between ethical and social aspects of gifted education underscores the need to reconsider the content and scope of teacher preparation, ensuring it more fully reflects the complexity of giftedness within specific cultural and social conditions.

Teachers' attitudes towards the education of gifted pupils thus represent a key factor in the successful implementation of support measures and the development of effective instructional strategies. Research examining different groups of educators, from pre-service teacher pupils to experienced primary school teachers, reveals both commonalities and significant differences in

these attitudes. Tuysuz et al. (2023) assessed the attitudes of prospective teachers through a quantitative cross-sectional survey among pre-service teacher education pupils. The results indicated an overall positive attitude towards the education of gifted pupils, with future teachers generally recognising the importance of targeted support for this group. Gender was not found to be a statistically significant factor, suggesting that male and female respondents share similar views. However, a more detailed analysis identified certain nuances, particularly regarding support for the specific needs of gifted pupils. These discrepancies highlight the need for targeted awareness-raising and further professional development for future teachers, enabling them to respond effectively to the challenges of gifted education. In contrast, a study of experienced Finnish primary school teachers conducted by Laine et al. (2019) provided insights into the attitudes of practising educators. Here, too, overall attitudes were mildly positive, with teachers emphasising the social value of gifted pupils and the importance of support through special educational measures. Strong support was expressed particularly for differentiated instruction, which allows adaptation of content, pace, and level of teaching to meet the needs of individual pupils. Conversely, reservations were noted regarding acceleration and the segregation of gifted pupils, with teachers favouring integrative educational models. The practical implementation of differentiated approaches, however, is constrained by a lack of resources, preparation, and administrative support.

The findings presented above indicate that insufficient professional training of teachers, coupled with unaddressed implicit attitudes, significantly contribute to inappropriate perceptions and suboptimal pedagogical practices, which in turn limit the optimal development of gifted pupils. A key prerequisite for the effective support of this group is therefore systematic and reflective professional development, encompassing both the deepening of subject-specific knowledge and work on the value-based and affective components of teachers' attitudes. At the same time, the importance of the cultural context, which shapes both conceptions of giftedness and pedagogical approaches, must be considered. It is thus essential to develop flexible and culturally sensitive didactic strategies. Comparative analyses show that, although both pre-service teacher pupils and experienced teachers generally report positive attitudes towards gifted pupils, they share similar challenges, particularly regarding acceleration and the implementation of support measures, which are often constrained by systemic limitations. Furthermore, evidence from classrooms employing metacognitive integration within interdisciplinary contexts of Science, Technology, Engineering, and Mathematics [STEM] indicates that differentiated instruction enhances pupils' behavioural engagement, as they concentrate more, exert greater effort, and experience increased enjoyment in learning when their interests are taken into account (Insorio, 2024).

3. The Aim

The aim of this study was to describe the approaches adopted by mathematics teachers in the education of gifted pupils in mathematics, as well as the circumstances they encounter in teaching this group of pupils. Within the framework of this qualitative study, the following two research questions were formulated:

RQ 1) Which specific support measures do teachers utilise in the education of gifted pupils in mathematics lessons?

RQ 2) What challenges do mathematics teachers face when educating gifted pupils?

4. Method

4.1. Research Design

Given the nature of the research problem and the study's aims, a qualitative research strategy was adopted, allowing for an in-depth understanding of the phenomenon from the perspective of the actors themselves—in this case, teachers. A multiple case study design was selected, providing the opportunity to compare several cases within their natural settings and to identify both

commonalities and differences across individual cases (Stake, 2005). This approach was chosen primarily because the research questions aim to clarify how and why certain phenomena occur within specific contexts of everyday educational practice. According to Yin (2003), a case study is an appropriate design when the researcher investigates a contemporary, real-life phenomenon in its natural context, seeking a comprehensive understanding of the dynamics of the case under study (Creswell & Poth, 2016).

4.2. Participants

The study involved a total of five mathematics teachers from five different primary schools [PS], as presented in Table 1. The participants were selected using purposive sampling based on predetermined criteria. Mathematics teachers who work with pupils diagnosed as gifted, with confirmation from an educational counselling centre [ECC], particularly a pedagogical-psychological counselling centre [PPC], were invited to participate. Participants were contacted via email, and their participation was contingent upon voluntary consent and willingness to cooperate.

Table 1
Overview of the Research Sample (N = 5)

Type of Primary School	*Class Type*	*Teacher*	*Teaching Experience / Subject Qualification / Education in Working with Gifted pupils/ Teaching Experience with Gifted pupils*	*Gifted Pupil*
Rural nine-year complete primary school (capacity: 335 pupils)	Regular, non-specialised	Hannah	24 years / Mathematics, Basics of Technology, Geography for lower secondary level, Primary School teaching / no / 2 years	Frank: diagnosed with exceptional giftedness at the PPC before entering Grade 8 at the initiative of parents. Level 2 support measures; no specific interventions applied.
Urban nine-year complete primary school (capacity: 700 pupils)	Class with extended mathematics curriculum	Ivy	26 years / Mathematics and English for lower secondary level + Educational Counsellor / no / 21 years	Viktor and Alex (Grade 9): diagnosed as gifted at the PPC. Level 2 support measures; no specific interventions applied.
Urban nine-year complete primary school (capacity: 530 pupils)	Class with extended mathematics curriculum	Walter	2 years / Mathematics, Descriptive Geometry, and Czech for secondary level / no / 1 years	Ryamond (Grade 8): diagnosed as gifted at the PPC. Level 2 support measures; no specific interventions applied.
Urban primary school (school with multi-year gymnasium status) (capacity: 130 pupils)	Class with extended dance curriculum	Mary	12 years / Mathematics for lower secondary level / no/ 10 years	Linda (Grade 7): diagnosed as gifted at the PPC. Level 2 support measures; Individual Education Plan created in cooperation with PPC.
Urban nine-year complete primary school (capacity: 550 pupils)	Regular, non-specialised	Eve	10 years / Mathematics for lower secondary level / no / 5 years	John (Grade 6): diagnosed as gifted at the PPC. Level 2 support measures; Individual Education Plan created in cooperation with PPC.

4.3. Ethical Considerations

All participants were provided with detailed information about the research purpose prior to data collection and were fully informed about the nature of their participation, including the measures in place to ensure confidentiality and data handling. Based on this information, participants gave their informed consent to take part in the study. All data collected were anonymised, thereby ensuring the protection of personal information in accordance with ethical principles of educational research and applicable legislation.

4.4. Data Collection

Data were collected using semi-structured interviews with mathematics teachers who educate pupils diagnosed with mathematical giftedness (N = 5). Data collection took place between May 2024 and May 2025. Each interview lasted approximately 45–60 minutes, was audio-recorded, and subsequently transcribed for analysis. The interviews focused on the following areas: the characteristics of gifted pupils in mathematics, identification procedures, obstacles and challenges in teaching, teaching methods, forms and organisation of instruction, effective strategies, and teaching aids and materials. The aim of this exploration was not only to understand specific instructional strategies but also to gain insight into the broader conditions in which gifted pupils are educated. This included teachers' subjective reflections on the support available, as well as the opportunities and limitations that the school environment presents in this regard. Subsequently, the participants were re-contacted to verify the accurate interpretation of the analysed data, thereby ensuring the validity of the interview findings.

4.5. Data Analysis

The recordings were transcribed verbatim. Open coding (Strauss & Corbin, 1999) was employed to analyse the interview data. Subsequently, thematic analysis (Braun & Clarke, 2006) was employed to structure the data according to categories of meaning. Inductive coding was employed, whereby codes and categories were generated directly from the data, rather than relying on a pre-existing theoretical framework. This approach involved moving gradually from the specific statements of the participants to more general themes and concepts (Braun & Clarke, 2006). Regarding the research question, the data were analysed and categories were identified. Based on the coding process, subcategories were identified, from which broader categories were derived. These categories are descriptively presented in Table 2. To ensure the authenticity of the statements, the study includes verbatim quotations from teachers in the interviews. These direct quotations support the findings.

5. Findings

The following section presents the categories that emerged from the data analysis. Each category is described and interpreted in detail.

Table 2 provides a structured overview of the main categories and subcategories identified through the coding of the data. It presents the key codes relating to the characteristics of gifted pupils, their identification, support measures implemented in mathematics instruction (including organisational forms, teaching methods, curriculum extension, teaching materials, and assessment), and programmes for gifted pupils. The table also outlines the challenges encountered in teaching gifted pupils. It serves as a systematic framework for the subsequent interpretation of the qualitative data.

5.1. Characteristics and Identification of Gifted Pupils in Mathematics

The teachers' accounts indicate that mathematical giftedness is most frequently perceived in practice through performance, speed, logical and creative thinking, as well as the ability to think differently from most other pupils. This is exemplified by Hannah, who characterises a

Table 2
Categories Emerging from Coding

Category and Subcategory	*Code*
Characteristics and identification of gifted pupils in mathematics	
Characteristics of gifted pupils	Faster pace, creativity, originality in aprroaches, non-traditional problem-solving strategies, handling challenging tasks, difficulties in verbally expressing the solution process, multiple ways to solve problem
Identification of gifted pupils	Various approaches, widespread testing (e.g., Invenio), individual teacher observation
Support measures implemented in mathematics instruction	
Organizational forms and teaching methods	Independent, group, individual work, graded tasks, differentiated tasks, extend the curriculum, deepening existing content
Course of a mathematics lesson	differentiated instruction, pupil autonomy, group work, traditional vs. constructivist approach
Extending the mathematics curriculum	Enhancing and expanding learning content
Materials and teaching aids	Standard textbooks, worksheets, online platforms (umimematiku.cz, Khan Academy), specific tools (algebra tiles, fraction towers, and traffic-light cards), tasks by teachers
Assessment	Written work (often graded); oral examinations; process-based assessment, monitoring pupils' thought processes and collaboration
Programmes for gifted pupils	Mathematics competitions, mathematics clubs, mathematics camps
Challenges in educating gifted pupils	The time demands of individualising instruction; reconciling the needs of gifted pupils with the class pace; understanding pupils' original solutions; meeting pupils' specific educational needs

mathematically gifted pupil primarily based on their performance and strategic traits when solving tasks. She emphasises the speed of thinking, the ability to tackle more challenging tasks, and a creative approach to problem-solving:

> They will respond more quickly to tasks, they will solve additional tasks, handle more demanding tasks better than other children, and in tasks where they can choose the method, they will come up with a different solution than the other children.

This conception reflects Hannah's pragmatic experience, which understands mathematical giftedness not only as above-average performance but also as an expression of cognitive flexibility and original problem-solving strategies. A similar view is shared by Walter: "A gifted pupil uses different thought processes than other pupils. Primarily those that would not occur to most – not even to the teacher."

The topic of non-standard strategies in problem-solving is also highlighted by Ivy. She notes that gifted pupils often choose original and unconventional approaches, particularly when working on word problems, and prefer their own problem-solving paths over classical algorithmic procedures. She also points out the didactic challenges associated with this phenomenon, specifically the difficulties related to formulating and communicating their own thought processes:

> …gifted pupils often have very non-standard solution methods, especially with word problems. They also often dislike working according to an algorithm and seek their own path, but

> unfortunately quite often they have difficulty describing their methods in a way that is understandable, clear, and traceable.

This observation corroborates findings in the literature (Sheffield, 1999) that creativity and originality in mathematical thinking are frequently associated with lower levels of formalisation and increased difficulty in verbally communicating the process, which can complicate teacher feedback and assessment. This statement also emphasises the capacity for divergent thinking, which in gifted pupils often manifests as seeking unconventional approaches to problem-solving (Arabacı & Baki, 2023; Sarıaltın & Baran, 2025).

Mary describes mathematically gifted pupils as curious, creative, and reflective. According to her experience, these pupils ask questions that go beyond the standard curriculum, actively seek alternative solutions, and explore various possibilities: "For example, they might ask: 'What if it were different? Could it be done another way?' – and then they themselves find perhaps three different solutions to a system of equations." Mary perceives in these pupils a joy of discovery, a desire to find connections, and a pursuit of deeper understanding. Similarly, Eve characterises a gifted pupil primarily by their ability to quickly grasp new concepts, independently apply them, and reason logically without the need for prior explanation: "Giftedness lies in having excellent logic. Something is shown to them in mathematics, they immediately understand it and can apply it straight away. They know material that has not yet been taught and come up with tricky questions." These manifestations align with scholarly descriptions of mathematical giftedness, as noted by Zübeyde (2023) and Arabacı and Danişman (2023), who emphasise not only exceptional abilities in logic and abstraction but also originality and diversity in problem-solving strategies.

Walter expands the perspective on gifted pupils by including both performance and psychosocial dimensions. On the one hand, he emphasises the ability of gifted pupils to achieve above-average results; on the other hand, he recognises the need for increased pedagogical support: "…they are used to thinking about these things and simultaneously achieve above-average results in terms of their thought processes but often make mistakes due to inattention. They also require attention and my care." Walter thus highlights that high cognitive potential is not always accompanied by equally developed self-regulation, diligence, or concentration—factors that necessitate targeted pedagogical intervention. On the topic of psychosocial needs, Mary adds that, in her experience, gifted pupils can also be impatient, work at a fast pace, and make errors due to haste, which needs to be pedagogically balanced by emphasising careful checking and self-monitoring: "…they are very quick, and consequently make mistakes out of haste, so I teach them to slow down and check their results."

In the context of identifying gifted pupils in mathematics, Walter employs a combination of performance analysis and individual reflection on problem-solving. He examines written work through one-to-one discussions with pupils, during which he observes not only the outcomes but, more importantly, their thought processes and original strategies:

> My usual practice is to go through each pupil's written work individually and talk about it, and based on these individual discussions, I am able to tell that a gifted pupil thinks completely differently than the others, or how it manifests during the lesson…

This approach highlights the importance of a qualitative perspective on pupils' work, which goes beyond the mere result and focuses on the problem-solving process – a factor that is particularly significant in the diagnosis of giftedness (Yazgan-Sağ & Argün, 2024). Similarly, Eve relies on principles of pedagogical diagnostics when identifying gifted pupils, considering not only high performance but also rapid work pace, the ability to independently formulate questions, and to propose original solutions as indicators of giftedness: "A teacher notices that this child is very quick and gets everything correct immediately. So it is rather pedagogical diagnostics." However, Eve also points out organisational and time constraints that hinder systematic identification of gifted pupils in regular classrooms: "There isn't much time for teachers to search for this otherwise; for that, we would need someone else."

Both Hannah and Ivy report that there is currently no systematic collaboration among colleagues regarding the identification of gifted pupils—pupils are either diagnosed by the school counselling service or informally selected for classes with extended mathematics instruction. Walter confirms the same approach. In this context, Ivy states: "…or each mathematics teacher handles it on their own. They may know the child is 'without paperwork', but it is clear where the child belongs, and they manage it themselves." At Walter's school, support for gifted pupils is partially facilitated through a gifted coordinator. This coordinator actively communicates with teachers, encourages them to identify gifted pupils, shares examples of good practice, connects mathematics teachers with colleagues from the lower grades who have experience working with gifted pupils, and strives to pass on effective teaching methods to fellow staff. Walter also reflects on his personal uncertainties regarding teaching gifted pupils and perceives a low level of interest in this issue among some colleagues: "…I worry that I am one of the few teachers who actually reflects on this." He critically addresses the widespread assumption that placing mathematically gifted pupils in selective classes is, in itself, a sufficient strategy: "…here, it is assumed that if there is extra maths, the more able pupils will be there, and the approach is simply to give them more exercises," which, in his view, is not an adequate pedagogical strategy. Furthermore, Walter highlights the lack of supportive materials, such as identification scales. Nevertheless, he appreciates the partial initiatives of the gifted coordinator, such as sharing materials focused on myths about gifted pupils, which he perceives not only as a tool for increasing teacher awareness but also as a resource for pedagogical diagnostics, as they help to challenge stereotypical perceptions of gifted children.

Teachers perceive pupils' mathematical giftedness primarily through performance, speed of thinking, creativity, and original problem-solving strategies, noting differences in cognitive processes, curiosity, and the ability to independently apply new knowledge. Beyond these cognitive strengths, they also highlight challenges such as impulsivity, hastiness, or difficulties in articulating problem-solving procedures, which require targeted pedagogical support. Teachers' accounts further indicate that the identification of gifted pupils relies mainly on pedagogical diagnostics, occurs less frequently in a systematic manner, and that collaboration among teachers tends to be individual rather than institutionally embedded.

5.2. Support Measures Implemented in Mathematics Instruction

5.2.1. Organizational forms and teaching methods

Eve, Ivy, and Hannah share similar, though differently articulated, views regarding appropriate organizational forms of instruction for gifted pupils. All three emphasize the need for social inclusion of gifted children and express concerns about the potential negative consequences of segregating these pupils into homogeneous groups. Eve explicitly warns against the risk of social isolation: "If these children are separated into a special group, that might not be ideal either, because in life they will live among regular people and need to learn to interact with them," and she considers the most appropriate approach to be "a regular class with the possibility of something extra." This perspective reflects an inclusive approach that integrates intellectual development with a natural social environment.

Although Ivy prefers classes with an extended mathematics curriculum, she simultaneously warns against creating classes composed exclusively of gifted pupils. She specifically states: "I cannot imagine a class with only gifted children, even from a teacher's perspective, because each gifted child is focused in a different direction," adding:

> I think this is often related to the fact that they are not completely socially adept, so I think it would be more a group of individuals rather than a proper school class. These children benefit from being with other, regular children because they learn completely different skills from them.

Ivy also values the instructional potential of a heterogeneous group of pupils: "There are both gifted children and so-called capable, diligent children who are often able to achieve very good results through their hard work, even if they are not gifted." Hannah clearly rejects the extraction

of gifted children from the collective: "It is important that these pupils are not removed from the group." She proposes an alternative form of enrichment in which gifted pupils "would have one extra mathematics lesson per week, where these children would meet and work on more engaging tasks.".

Although each teacher holds a different initial organizational preference – Eve advocates for a regular class with the possibility of individual enrichment, Ivy works with classes offering an extended mathematics curriculum, and Hannah proposes supplementary support within the regular school setting – they all converge on a key idea: a gifted pupil needs not only instructional support but also social inclusion. Their statements align with the scholarly literature (Albargi, 2025), which warns against the risk of social deprivation when gifted pupils are excessively segregated and emphasizes the importance of enriching and differentiated educational strategies within a natural classroom environment. Together, these perspectives represent a balanced approach that respects both the intellectual and socio-emotional development of gifted pupils.

Walter considers the most suitable organizational form for educating gifted pupils to be specialized classes for the gifted. He states that this approach "significantly simplifies the teacher's work" because he can educate pupils at a faster pace and does not need to insist as much on group work. At the same time, he points out the risk of limited development of social competencies and skills among pupils in such classes, which aligns with the views of Ivy and Hannah. Another possible risk Walter mentions is that a gifted pupil may not receive sufficient attention in a heterogeneous class due to the diversity of pupils. Nevertheless, during the interview, Walter adds that he would not exclusively place a gifted pupil in a class for the gifted, which contradicts his previous statement. He justifies his opinion with similar arguments to Ivy and Hannah and emphasizes the importance of social development for these pupils: "…but at the same time, I see it so that if the gifted are somehow isolated, they stop having an overview of the surrounding world and just go on in their own way…" He further notes the high level of mathematical ability of pupils educated in such classes but warns that this may come at the expense of developing social interactions and intelligence:

> Yes, they will be really good mathematicians, but then it may be at the expense of social interactions and their social intelligence… the fact that they are in this kind of mixed class means that not only are they gifted when someone works with them individually, but they also have social interaction and somehow learn other skills and competencies as well…

The teachers agree that the social inclusion of gifted pupils is crucial and warn against the risks of segregating these pupils into homogeneous groups, which can lead to social isolation and limit the development of social competencies. While Eve prefers inclusive education in a regular classroom with the possibility of individual enrichment, Ivy emphasizes the importance of heterogeneous classes with extended mathematics instruction that combine gifted and capable pupils, and Hannah proposes supplementary clubs as a form of support without the need for separation. In contrast, Walter sees the advantages of specialized classes for the gifted, which allow for a faster pace of instruction and simplify the teacher's work; however, he also points out the potential negative impact on social intelligence and stresses that gifted pupils should not be isolated from the general environment. His stance underscores the need to balance the individual development of giftedness with the support of social interactions in a heterogeneous setting. The teachers concur that effective support for gifted pupils must respect both their intellectual needs and socio-emotional development, thereby reflecting current findings in the literature on inclusive education and differentiated instructional strategies.

5.2.2. Course of a mathematics lesson

Hannah describes a traditional lesson structure with motivational tasks, whole-class instruction, note-taking, and subsequent practice in groups or pairs. She emphasizes: "There are things in mathematics that need to be drilled, learned…" – highlighting her focus on mechanical practice and mastery of basic algorithms. Ivy, in contrast, emphasizes a constructivist approach, where

pupils actively discover new concepts: "…when it's new material, I give them a hint, and in some groups, they have the task to figure out how they could solve it." Her account underscores pupil autonomy and collaborative solution sharing: "Then there is mutual sharing among pupils regarding their findings or the results of the exercises." Walter structures the lesson clearly: "At the beginning, I summarize what we will do and remind them what we did in previous lessons…". He consistently works with terminology and repetition, applying a flexible combination of group and individual work, often according to pupils' choice. He adapts worksheets to different paces: "Worksheets are graded so that each pupil can proceed at their own pace." Mary highlights systematic use of differentiation and readiness to respond to the speed and ambitions of gifted pupils: "In mathematics, I always have more challenging tasks ready in case someone finishes quickly…". Eve focuses on fostering autonomy and exploring multiple solutions: "I teach so that the child can look for more than one solution…" and actively supports individualization in instruction.

Ivy and Walter report systematic application of differentiated instruction principles. Ivy explicitly states: "They take tasks from the folder… there are calculation tasks… fun ones like sudoku… tasks for gifted children." She adds: "They choose what they want to solve…" This approach supports pupils' intrinsic motivation while allowing individual choice according to their current disposition. Mary reflects on the high expectations gifted pupils place on themselves: "The gifted always take the hardest ones – they would almost be ashamed to take the easier one…" She emphasizes the need to balance challenge and accuracy: "Sometimes I even have to slow them down… they want to be fast – but then it comes at the expense of concentration and checking." Eve uses graded tasks with the option to choose the level of difficulty: "I work with graded tasks where the pupil can choose how to approach a complex task." Hannah applies differentiated tasks only selectively: "…in some mathematical topics (motion tasks and collaborative work problems)," but otherwise does not implement differentiated tasks in her math lessons.

Ivy perceives the needs of gifted pupils as follows: they often prefer independent work and adjust their engagement according to the group composition: "…when the pupil is close in intellect, they naturally get involved… if a classmate isn't as strong mathematically, they won't engage." When asked to help, they tend to simplify the task: "…they tend to slack off thinking that the (classmate) won't understand it anyway… that they can't explain it properly." Walter reflects on the specific needs of gifted pupils and the tension between giftedness and learning difficulties: "He (the gifted pupil) prefers working in a group, but I find it better when he works independently. I suspect attention deficit disorder." He also addresses the myth of perfection in gifted pupils: "…he is a gifted pupil, but this is exactly one of those myths – he isn't perfect at everything." Mary highlights the high intrinsic motivation of gifted pupils: "They have high expectations of themselves." She also notes their overload and the influence of extracurricular activities: "This memory shows itself even in mathematics." Eve emphasizes the importance of autonomy and personal preferences: "He has a special hobby… he likes columns of exercises." She also positively evaluates the development of cooperation: "…then he would exactly mimic me – when I helped someone, he would help someone next to me."

Regarding group work, Hannah gives an example of a gifted pupil who is mostly passive: "No, I haven't noticed that he isn't very active, he won't go to the board on his own." This illustrates her lower support for active engagement of all pupils. Ivy emphasizes the importance of group composition: "It depends on how the group comes together or who sits next to whom…" She notes that gifted pupils are willing to share solutions only if they have intellectually balanced partners.

Eve provides an example of successful modelling by the teacher: "He was able to advise… he mimicked me… he enjoyed that." Walter sometimes works individually with a gifted pupil outside the group due to attention difficulties, showing a differentiated approach based on current needs.

From these statements, it is evident that Ivy, Walter, Mary, and Eve share common features of a modern approach to mathematics teaching – emphasis on differentiation, pupil choice, graded

tasks, and reflection on the needs of gifted pupils. They also recognize the importance of respecting cognitive, emotional, and social specifics of these pupils, whether regarding pace, motivation, or peer interaction. In contrast, Hannah represents a more traditional teaching approach with less individualization and a focus on drill and frontal instruction, perceiving gifted pupils as less active and not strongly supporting their potential through differentiated or group work.

5.2.3. Extending the Mathematics Curriculum

Hannah does not deliberately extend the curriculum in her class, mainly due to her focus on consolidating existing material and concerns about overloading pupils: "I do not extend the curriculum in the class because I focus in this grade on consolidating the material so that pupils do not have problems with subsequent topics." She also identifies the extensive content of the curriculum in the given grade as an additional obstacle to enrichment. This approach is therefore guided by the aim of stabilizing the basic competencies of the whole class, with gifted pupils not being systematically supported in this area of instruction.

Walter also does not formally extend the curriculum, but he describes a deeper processing of the material: "I do not extend the curriculum, but I deepen it." This approach reflects an effort to achieve deeper understanding and consolidation within a broader context, rather than introducing new thematic areas beyond the standard syllabus. Compared to Hannah, however, Walter provides a certain advancement—although he does not add new content, he works with greater depth, which can be beneficial for gifted pupils in some cases. Unlike the previous two teachers, Ivy, Mary, and Eve actively incorporate curriculum extension in mathematics instruction. Their approaches vary according to pupil age, the form of implementation, and the degree of support for independent exploration. Ivy specifies areas of extension for the 9th grade: "I extend the curriculum to include rational expressions, quadratic equations, additional types of functions, and the concept of inverse proportionality." This represents a systematic inclusion of topics that go beyond the standard curriculum, thereby fulfilling the need for intellectual challenge for gifted pupils in the final year of primary school.

Mary implements curriculum extension primarily through inquiry-based and cooperative tasks that allow for independent exploration: "For some pupils, I extend the curriculum, especially through inquiry-based and cooperative tasks that support independent discovery and deeper understanding of the material." She also emphasizes the need for regulation: "Sometimes it is necessary to hold them back if they rush at the expense of accuracy or if they repeatedly fail to manage more complex tasks." Mary thus balances challenge with pupils' cognitive limits and the need for accuracy, supporting not only skill development but also metacognition and self-regulation for gifted pupils. Eve extends the curriculum in a differentiated and creative way—incorporating thematic tasks, workbooks, and recommended reading: "When it turns out that they can handle something extra, I then extend the teaching. For example, I give them a book on factorials to read, and then we discuss it, and I check whether they understood it." This approach links mathematics with further learning and discussion, enriching both cognitive and language competencies. She adds: "I include interesting tasks and use workbooks with additional exercises, but it is time-consuming for me to find something extra." Eve thus highlights the significant time demands on teachers when preparing advanced materials, which is a common practical constraint.

Teachers' approaches to curriculum extension differ significantly. Hannah and Walter emphasize consolidating and systematically mastering the standard curriculum, with Walter focusing on deepening the content. In contrast, Ivy, Mary, and Eve deliberately support curriculum extension, fostering independence and intrinsic motivation in gifted pupils, both thematically and methodologically. Teachers respond flexibly to the diverse needs of pupils and are willing to invest additional effort in preparing more challenging and stimulating tasks.

5.2.4. Materials and teaching aids

Hannah primarily relies on traditional mathematics textbooks, selecting exercises according to the specific class: "They do not solve all exercises, I choose them for the pupils." She also uses collections of problems, worksheets, and online tasks. A key aspect is the adaptation of materials: "I always adjust them according to the specific class, I do not use the same materials every year, and I have to plan math lessons individually based on the needs of the grade." This approach demonstrates a flexible but predominantly teacher-directed use of standard resources, aimed at tailoring the lesson to the class as a whole. Ivy also works with textbooks, noting: "…because the textbook includes non-standard tasks, which are always after the given topic and are suitably interdisciplinary." She supplements this with her own or inspired tasks, worksheets, Khan Academy, and umimematiku.cz. Ivy thus combines quality traditional materials with digital resources and personally created tasks, emphasizing cross-curricular connections and task variety.

Walter makes extensive use of 3D-printed teaching aids: "He uses in large quantities various 3D-printed aids (algebra tiles, constructive proof of the Pythagorean theorem, sticks, and others)." For feedback, he uses a simple but effective visual tool: "To check how pupils are doing with a task, he uses the so-called traffic light system." Walter's approach merges technological innovation with formative assessment methods, focusing on visual, concrete, and manipulative tools. Mary uses a wide spectrum of resources aimed at gifted pupils – from tasks in specialized publications (e.g., Fraus), through digital tools like GeoGebra, to thematic projects connected to real-life contexts.

Eve systematically works with graded tasks that allow individualization and pupil-directed learning: "Working with graded tasks from which the pupil chooses according to the difficulty level… so the pupil can explore multiple solutions, find how many solutions exist for the task'" She incorporates enrichment and competition tasks: "I regularly include extension tasks and interesting examples, for instance from competitions like the Mathematical Kangaroo or the Mathematical Olympiad." Eve's teaching thus combines differentiated, stimulating, and competitive tasks, providing a strong developmental and motivational dimension.

5.2.5. Assessment

Interviews with Hannah, Ivy, Mary, and Eve indicate that, although each teacher approaches assessment differently, their practices consistently emphasize formative evaluation, individualization, and developmental aspects. A shared feature is the effort to reflect pupils' individual needs, support autonomy, and foster intrinsic motivation, sometimes even at the expense of traditional grading.

Hannah emphasizes practical understanding over rote memorization: "I'm not in favour of memorising rules, but of pupils being able to apply the subject matter in practice. "Her assessment is predominantly formative, focusing on weekly written work. She includes simpler exercises as a tool to support less successful pupils, highlighting an adaptive approach that responds to individual learning needs. Ivy bases her assessment system on regular written checks complemented by diagnostic tests without grades, administered twice a year. These tests allow for reflection: "They write down the areas they are doing well in and those they are struggling with, and six months later they go through the same process again. "This approach fosters metacognitive awareness and continuity in monitoring progress. Motivation is supported through a point system for homework, optional tasks, and competitions: "If they don't do well in a test, they can make up for it with the optional tasks (...), but they do them in their own free time. "

Mary systematically considers pupils' differing abilities using differentiated tasks and choices in difficulty. She treats assessment not merely as grading but as a process that promotes personal growth. Pupils can retake tests upon request: "If they come and ask, I always give them a new test." At the same time, she maintains fairness and rigor: "I don't give top marks away for free; they have to earn them." Her approach balances high expectations with the provision of second chances and respect for individual needs. Eve applies differentiation principles and supports

intrinsic motivation through tiered tasks. She approaches assessment reflectively, fostering confidence and autonomy academically and psychosocially. Collaborating with the school counselling service, she uses mindfulness and imaginative strategies to reduce anxiety: "He had everything correct, but he was terribly worried that he'd got it wrong. So, we tried breathing exercises and mindfulness. He said he should make a 'basket' and throw it all in there, and apparently it works. "For Eve, assessment is not only feedback but also a tool to support psychological safety and self-regulation.

From the teachers' accounts, it is evident that a formative approach to assessment is not an exception but, in many cases, constitutes a fundamental strategy for evaluating pupils. The teachers converge on several key principles that align with contemporary pedagogical trends. One such principle is an emphasis on practical understanding of the subject matter, demonstrated by a rejection of rote learning and a focus on enabling pupils to apply their knowledge in real-world situations. This approach is highlighted by Hannah and Ivy, for whom comprehension of the content in the context of everyday life is a more significant goal than merely mastering theoretical definitions: "I am not in favour of learning rules by heart, but rather that pupils are able to use the subject practically." Another important aspect is reflection on personal progress, as described particularly by Ivy and Eve. These educators enable pupils to record areas in which they succeed or struggle, thereby creating a personal understanding of their own learning: "They write down the areas in which they succeed or do not succeed, and after six months they repeat the same." This practice not only strengthens metacognitive skills but also promotes taking responsibility for one's own learning. Differentiation and the option to select tasks of varying difficulty also play a critical role in assessment, systematically implemented by teachers such as Mary and Eve. Pupils are allowed to choose between tasks of different levels of complexity, which respects their individual abilities, fosters intrinsic motivation, and simultaneously helps prevent failure. This approach is particularly effective when working with gifted pupils, providing intellectual challenge without the risk of stigmatisation: "I work with tiered tasks, where the pupil can choose how to tackle a complex problem." The formative nature of assessment is further manifested in the provision of alternatives to traditional testing and opportunities to revise grades. As noted by Mary and Ivy, pupils have the possibility of reassessing their knowledge through new tests or supplementary tasks, thereby compensating for potential shortcomings: "When they come and ask, I always give them a new test." This approach maintains fairness while providing space for further development and motivation.

A distinctive element of assessment, emphasised especially by Eve, is the support for self-regulation and psychological safety. In collaboration with the school counselling service, she employs techniques such as mindfulness and imaginative strategies to help pupils manage stress and anxiety related to assessment: "He had everything correct, but he was terribly afraid that it was wrong. So we tried breathing, mindfulness. He said he should make a bin and throw it in there, and it worked." This represents a shift in the conception of assessment – not merely as a tool for measuring performance but also as a means of enhancing pupils' well-being.

5.2.6. Programmes for gifted pupils

From the interviews with the teachers, it emerges that support for gifted pupils is in most cases provided within the regular classroom or through participation in competitions. Specialised programmes are organised to a lesser extent, either based on individual teacher initiative or as one-off events, such as mathematics workshops or camps. However, the approaches of individual teachers show significant differences, both in their perception of giftedness and in the degree of systematic support offered. Hannah reports that the school primarily supports gifted pupils by encouraging participation in competitions such as Šmoula, Brloh, or the Mathematical Olympiad. In the case of a gifted pupil she teaches, she encounters a lack of interest on the pupil's part: "He didn't want to do it, when I told his mother that he is gifted, but where would he show it, if not in the Olympiad, so then he did it." She further questions whether the pupil is truly gifted: "I don't

see that he is gifted in mathematics, that he would stand out from the others." This statement reflects one of the persistent myths about gifted pupils – that gifted individuals must be exceptionally high-performing and spontaneously proactive (Sternberg, 2024). If this is not the case, their giftedness is often underestimated or overlooked. Moreover, there is a lack of systematic differentiation or an individualised approach, and support is conditional on the pupil's willingness to participate in competitions.

Ivy notes that the school currently does not offer specific programmes for gifted pupils, primarily due to organisational constraints: "The pupils have a lot of their own activities, they often have afternoon classes, and I perceive that as problematic." However, a three-day mathematics camp is held annually for classes with extended mathematics instruction, including logical and activity-based tasks. She herself observes: "Gifted pupils don't really like those activity-based things." This statement may reflect a stereotypical perception of gifted pupils' learning styles, who are often unfairly viewed as focused solely on abstract or theoretical tasks. From the perspective of supporting gifted pupils, there is a lack of individualisation in everyday lessons, and follow-up activities are not differentiated according to the current needs of specific pupils. In contrast, Mary demonstrates a highly proactive and targeted approach to supporting gifted pupils, both at group and individual levels. She initiated the creation of a mathematics club: "That I pushed through myself. So I went, for example, to Cermat, where there are more complex problems, or I found some websites for gifted pupils." She also engages in individual work with gifted pupils beyond regular lessons: "Once I had a gifted pupil who asked me about derivatives, so I explained it to him during the break." Mary is also aware that giftedness is not universal and that a pupil may not excel in all areas: "He wasn't like perfect; in some things he excelled, and in others he simply stumbled." This sensitive view of the diversity within a gifted pupil's profile counters the common myth of the "genius child," who is expected to be without weaknesses (Winner, 2000).

Eve integrates support for gifted pupils directly into regular classroom teaching, deliberately enriching it with tiered tasks, supplementary reading, and opportunities for independent work. Walter highlights the availability of a logic club, which a particular gifted pupil does not attend due to fears of failure linked to attention difficulties. The pupil also does not participate in competitions for the same reasons. This case demonstrates the importance of connecting gifted support with other aspects of a pupil's development, such as neurodevelopmental differences. Without such an approach, there is a risk that the pupil may remain without adequate stimulation or support, and their potential may remain undeveloped. The accounts indicate that approaches to supporting gifted pupils vary significantly among teachers. While some teachers respond to giftedness intuitively and base its recognition on performance (for example, participation in competitions), others adopt a differentiated, individually oriented, and developmental approach that reflects the diversity of gifted behaviours. It also becomes apparent that mere participation in competitions or the presence of extracurricular clubs is insufficient if systematic support within everyday teaching and sensitivity to pupils' psychological or specific needs are lacking. The examples provided by teachers Mary and Eve illustrate the benefits of an active, reflective, and empathetic approach, which can serve as inspiration for wider pedagogical practice.

5.3. Challenges in Educating Gifted Pupils

The teachers' accounts indicate that educating gifted pupils in a regular classroom presents a wide range of challenges, which concern not only the content of instruction but also the teacher's personal approach and their ability to respond to diverse educational needs. The teachers repeatedly emphasise that, although they strive to create a stimulating environment for all pupils, working with gifted learners involves specific demands that cannot be fully addressed through standard teaching methods.

Hannah perceives the greatest challenge as overcoming the demotivation of a gifted pupil, which she partly attributes to herself as the teacher: "…if he had that enthusiasm, but I didn't

awaken it in him, I really don't know whether it's because of me…" At the same time, she emphasises her strong focus on preparing all pupils for entrance examinations and her responsibility towards the entire class cohort.

In contrast, Ivy identifies as a challenge situation where a gifted pupil presents an alternative method for solving a mathematical problem that deviates from the standard explanation. Although she acknowledges the correctness of the result, she is not always certain whether the pupil is reasoning from a deeper understanding of the principles or if it is merely by chance: "…I really have to take it home and calmly go through it." This reflective approach indicates her concern for the quality of understanding and her effort to respond to the individual cognitive style of the gifted pupil, aligning with a formative view of assessment, where the learning process is considered more important than the outcome.

Walter describes a major challenge in integrating gifted pupils with their peers. He highlights the emotional impact it has on him when he is unable to sufficiently develop a gifted pupil's potential within a regular classroom: "…I leave feeling sad when I am unable to devote time to the (gifted) pupil or help them progress to the level they are capable of reaching." Walter's reflection demonstrates a high degree of professional introspection and a commitment to differentiated instruction that benefits not only gifted pupils but also those without diagnosed giftedness and those experiencing difficulties: "The greatest challenge for me, then, is the integration of gifted pupils." This statement illustrates personal dedication and professional reflection characteristic of educators striving for individualised teaching and respect for diversity. Mary highlights specific challenges in working with the diverse manifestations of giftedness. Her account includes contrasting examples – from a hyperactive, dominant pupil who nonetheless makes errors in basic calculations, to an introverted gifted girl who works independently and engages minimally in class. Mary strives for differentiation not only in content but also in strategy: "Then I have one gifted pupil who gets upset when I call on her…" These experiences support the notion that giftedness is not one-dimensional and that supporting gifted pupils must also address personality traits, including emotional regulation, communication styles, and the fostering of self-regulation.

Eve integrates support for gifted pupils directly into regular lessons, deliberately enriching them with tiered tasks, supplementary reading, and opportunities for independent work. Walter highlights the availability of a logic club; however, a specific gifted pupil does not participate due to fear of failure stemming from attention difficulties. The pupil also does not take part in competitions for the same reasons. This case illustrates the importance of linking gifted support to other aspects of a pupil's development, such as neurodevelopmental differences. Without this consideration, there is a risk that the pupil may remain without appropriate stimuli or support, and their potential may not be fully realised.

Nevertheless, all accounts highlight ongoing assessment, feedback, an emphasis on understanding, support for autonomy, and reflection—key principles of the formative approach. Teachers strive not only to recognise the needs of their pupils but also to adapt the content and format of lessons accordingly, even while balancing external demands (e.g., preparation for entrance examinations) with the individual needs of pupils. The testimonies further indicate that working with gifted pupils is not merely a matter of providing more challenging tasks; it requires overall sensitivity to diverse learning styles, personality traits, and emotional needs. This complexity underscores the necessity of additional teacher support through professional development focused not only on pedagogy but also on managing diversity in a broader sense.

5.4. Answering the Research Questions

5.4.1. RQ1: Which specific support measures do teachers utilise in the education of gifted pupils in mathematics lessons?

Teachers employ a range of support measures for gifted pupils, including differentiated instruction with tiered tasks, opportunities for independent and inquiry-based learning, curriculum extension beyond standard topics, use of varied teaching aids (textbooks, worksheets,

digital tools, 3D-printed materials), formative and reflective assessment, and participation in competitions or enrichment programmes such as clubs and workshops. They also adapt lesson pace, provide individualized feedback, encourage autonomy, and emphasise social inclusion, ensuring that gifted pupils are intellectually challenged while supported emotionally and socially.

5.4.2. RQ2: What challenges do mathematics teachers face when educating gifted pupils?

Teachers encounter multiple challenges, including addressing diverse cognitive abilities and learning styles, supporting pupils' impulsivity, hastiness, or difficulties in articulating problem-solving strategies, and balancing the needs of gifted pupils with those of the rest of the class. They also face organisational and time constraints, a lack of systematic identification and collaboration among colleagues, limited resources for gifted education, and the need to reconcile social inclusion with intellectual enrichment. Moreover, teachers must manage external demands, such as examination preparation, while providing tailored support that fosters both cognitive and socio-emotional development.

6. Discussion

The aim of this research was to describe the approaches adopted by secondary-level primary school mathematics teachers in educating gifted pupils within two settings: regular heterogeneous classes and classes with extended mathematics instruction. The research questions focused on identifying the specific support measures teachers employ when working with gifted pupils in mathematics lessons, and the challenges mathematics teachers encounter in educating these pupils.

Although each of the participating teachers in the study adopts a slightly different approach, they converge on one fundamental idea: a gifted pupil requires not only intellectual stimulation but also social integration within the classroom community. For instance, Eve believes that a gifted pupil can be effectively educated in a regular class if opportunities for individualised extension of the curriculum are provided. Ivy works in classes with extended mathematics instruction, while Hannah advocates supplementary forms of support within the regular school framework. All emphasise the importance of balancing academic support with the development of social bonds. This stance aligns with findings from various authors, who argue that segregating gifted pupils into specialised classes is not always the most appropriate approach (Basister & Kawai, 2018; Shayshon et al., 2014). According to these studies, effective teaching can also take place in a regular heterogeneous classroom if the teacher employs differentiated instructional strategies (Asare et al., 2024).

A similar view is held by the teacher Walter, who recognises the benefits of specialised classes in terms of deeper curriculum development but simultaneously highlights the risk of weakened social interactions. He acknowledges that in a heterogeneous environment, the development of social intelligence may, in fact, be better supported. This perspective aligns with Albargi (2025), who cautions against the risk of social deprivation arising from excessive segregation of gifted pupils and emphasises the importance of enriching and differentiated approaches within the natural classroom setting.

Regarding the actual teaching of mathematics, there are differences among the teachers, but some recurring elements can also be observed. Ivy, Walter, Mary, and Eve prefer a modern approach to instruction, which is based on task differentiation, allowing pupil choice, working with graduated exercises, and ongoing reflection on the needs of gifted pupils. These teachers consider not only the cognitive but also the emotional and social needs of their pupils—for example, work pace, level of motivation, and the quality of peer relationships. In contrast, Hannah represents a more traditional teaching approach, focused on frontal instruction, emphasis on drilling, and systematic consolidation of the curriculum. While she does identify gifted pupils, she does not significantly support their potential—individualised teaching or group work appears only occasionally in her practice.

Significant differences can also be observed in curriculum extension. Hannah and Walter focus primarily on consolidating the core curriculum, with Walter additionally deepening certain sections of the material. In contrast, Ivy, Mary, and Eve deliberately focus on extending and enriching the curriculum, fostering independence and intrinsic motivation. These teachers are willing to invest time in creating more challenging and stimulating tasks that match the abilities of gifted pupils. This approach aligns with the principles of so-called enrichment, a form of instruction widely recommended in the literature (Arabaci & Baki, 2023; Renzulli, 2005; VanTassel-Baska & Stambaugh, 2006).

Regarding assessment, most teachers prefer a formative approach, which is more individualised and reflects the learning process rather than solely the outcome. Opportunities to redo unsuccessful work are common, allowing pupils to experience success and use mistakes as tools for development. This approach aligns with trends recommended in research (Black & Wiliam, 2009). In terms of teaching aids and educational materials, teachers most frequently cited mathematics textbooks with graded tasks, problems from mathematical Olympiads, and various didactic tools – such as models of solids and 3D visualisation aids – that facilitate a clearer understanding of the subject matter. In some cases, teachers create tasks tailored specifically to individual pupils or draw on open educational resources and databases Across the interviews, it becomes apparent that, although there is no single ideal model, teachers working with gifted pupils respond flexibly to their needs, adapt their teaching, and seek ways to support not only their intellectual development but also their social well-being and inclusion. In this respect, they confirm that the key to effectively supporting gifted pupils is not the specific type of class or formal measures, but primarily the attitude and professional preparedness of the teacher.

Teachers encounter various challenges when educating gifted pupils in mathematics. One of these challenges is determining whether a gifted pupil's solution process is mathematically correct, which Ivy identifies as her greatest challenge. Hannah struggles with providing appropriate motivation and ensuring the active engagement of gifted pupils during lessons. A similar issue is noted by Walter, for whom the main challenge is effectively integrating a gifted pupil into the class while providing sufficiently demanding tasks. Mary focuses on addressing the diverse manifestations of giftedness and tailoring her approach to individual pupils. Eve perceives her greatest challenge as the need for precise communication, which gifted pupils particularly expect from her.

The teachers' statements indicate that educating gifted pupils in a mainstream classroom presents a wide range of challenges, which relate not only to the content of instruction but also to the teacher's personal approach, ability to respond to diverse educational needs, and classroom organisation. Teachers repeatedly emphasise that, although they strive to create a stimulating environment for all pupils, working with gifted pupils entails specific demands that cannot be fully addressed through standard methods. The accounts also reveal that teaching gifted pupils is not merely a matter of providing more challenging tasks, but requires overall sensitivity to different learning styles, personality traits, and emotional needs. This complexity underscores the necessity for additional professional development for teachers, focused not only on didactics but also on working with diversity in a broader sense. Educating gifted pupils brings a spectrum of challenges for teachers, ranging from personal aspects of the educator to didactic decisions and classroom organisation. The statements of five teachers - Hannah, Ivy, Walter, Mary, and Eve - illustrate diverse approaches as well as specific difficulties encountered when working with gifted pupils. While each teacher identifies a different primary focus of challenge, they are united by a commitment to providing the most appropriate pedagogical response to the needs of these pupils.

The teachers' statements demonstrate that teaching gifted pupils is far from a uniform pedagogical task; rather, it constitutes a complex challenge encompassing motivation, didactic preparedness, individualised approaches, and the teacher's personal reflection. Understanding the needs of each pupil, maintaining flexibility in instruction, and the teacher's willingness to engage in ongoing professional self-development—adapting, reflecting on the impact of their teaching,

and balancing individual support with the cohesion of the whole class—emerge as key elements. For the development of gifted pupils, it is essential that teachers actively stimulate their potential (Insorio, 2024). It is insufficient to passively wait for talent to manifest spontaneously, as illustrated by the case of teacher Hannah, who relied on the pupil's own initiative. Giftedness can remain hidden and underdeveloped (Pavlas et al., 2022). Effective education of gifted pupils fundamentally depends on the teacher's pedagogical approach and their ability to recognise and purposefully nurture talent in a timely manner. A key tool in working with gifted pupils is a metacognitive approach, which fosters awareness of one's own thinking processes. This approach contributes to deeper understanding of the subject matter and supports the development of independent thinking. Equally important is the systematic use of differentiated instructional materials, particularly in mathematics, where gifted pupils can benefit from enrichment content that extends beyond the standard curriculum (VanTassel-Baska et al., 2020).

7. Conclusion

Research indicates that the quality of education for gifted pupils is closely linked to teacher qualifications, their preparedness to employ differentiation strategies, and their ability to create an environment that fosters cognitive growth (Basister & Kawai, 2018; Brulles et al., 2010; Omerović et al., 2020). Achieving these goals requires that teachers have access to specialised training and professional development, which familiarises them with the characteristics of gifted pupils, their specific educational needs, and appropriate instructional methods (Özdemir & Bostan, 2021a; VanTassel-Baska et al., 2020). Effective professional development should help teachers enhance their differentiation skills, particularly when teaching in heterogeneous classrooms (Shayshon et al., 2014), where it is often necessary to respond simultaneously to a wide range of abilities and learning styles. At the same time, teachers must be able to enrich the curriculum, recognise the emotional and social needs of gifted pupils, and respond sensitively to behaviours that may be misinterpreted (Brulles et al., 2011). According to Mossberg and Lundqvist (2025), enhancing teacher knowledge and professional development may contribute to more effective inclusive gifted education. Similarly, Jarrah and Almarashdi (2019) conclude that while teachers often report a high level of competence in teaching gifted pupils, they simultaneously acknowledge a lack of practical preparation and targeted training. The authors therefore recommend integrating elements into professional development that become part of the teacher's cognitive belief system, thereby influencing both their attitudes and their qualifications for teaching gifted pupils.

8. Recommendations

8.1. Implications for Practice

The findings discussed above highlight the need to strengthen the practical and reflective dimensions of teacher education concerning gifted learners. Integrating the topic of gifted education systematically into both pre-service and in-service teacher training could help bridge the gap between teachers' reported competence and their actual preparedness. This integration should not remain on the level of theoretical knowledge but should include opportunities for practical application, such as case studies, classroom observations, and collaboration with experienced mentors.

Furthermore, professional development should be designed to influence not only teachers' skills but also their cognitive belief systems. Training programs that encourage reflection on personal beliefs, biases, and expectations about giftedness can therefore promote a deeper transformation of teachers' approaches to gifted pupils.

In addition, long-term and reflective forms of professional development are likely to be more effective than one-off workshops. Continuous support, mentoring, and opportunities for peer collaboration can help teachers gradually integrate new insights into their classroom practice. Schools and educational authorities should thus create environments that facilitate such ongoing

learning and provide access to relevant materials, examples of good practice, and expert consultation.

Finally, developing supportive institutional frameworks is essential. Schools should aim to establish collaborative cultures in which teachers can exchange experiences and strategies related to the education of gifted pupils. Such systemic support can enhance teachers' confidence and competence, ultimately leading to more responsive and inclusive learning environments for gifted learners.

8.2. Recommendations for Further Research

For further research, it is recommended to focus on how teachers in primary schools and multi-year grammar schools are trained in the area of gifted education in mathematics and the extent to which they are competent to teach these pupils effectively. It would also be valuable to investigate how well-prepared future teachers—those studying at faculties of education—are in the domain of gifted education. Additionally, it is important to investigate whether teachers, when teaching mathematically gifted pupils, use constructivist methods, in which pupils actively explore new concepts, develop their own problem-solving strategies, and share their findings, or whether they rely on traditional methods, such as frontal teaching, explanation of algorithms, and practice of predetermined exercises. Comparing these approaches can reveal how teachers support the independence, creativity, and deeper understanding of mathematical concepts among gifted pupils.

9. Limitations of the Research

The research study presents the experiences of primary school mathematics teachers (N=5) working with gifted pupils. The findings reflect individual cases rather than a broader population, and therefore are not intended for generalisation. Nevertheless, the results offer a valuable insight into how primary school mathematics teachers perceive the education of gifted pupils and the contexts they encounter.

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Data availability: The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declaration of interest: The authors declared that there were no potential conflicts of interest.

Ethical statement: This study did not require approval from an ethics committee because the research involved only adult participants (mathematics teachers) and no children or vulnerable populations were included. All participants were informed about the purpose and procedures of the study, and their voluntary participation was based on informed consent.

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