TEACHING MATHEMATICALLY PROMISING STUDENTS: INSIGHTS FROM CLASSROOM PRACTICE

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This chapter explores how future primary school teachers engage with mathematically promising students. The study analysed 40 records from student teachers' practical training, focusing on their experiences working with at least one mathematically promising pupil. The findings highlight key characteristics of mathematically promising students, including their proficiency in mathematical operations, ability to handle complex tasks, and intrinsic motivation. Future teachers employed a range of approaches, such as personalized teaching, supplementary activities, and problem-solving tasks. While many future teachers recognized the need for adaptive strategies, only half engaged students in problem-based or divergent thinking tasks. This limited use of advanced pedagogical methods indicates a need for further training to enhance instructional practices for mathematically promising students. These findings contribute to understanding the challenges and opportunities in educating mathematically gifted learners.

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1 Introduction

The TIMSS 2023 report for fourth-grade students, finalized in December 2024, presents significant new insights into higher cognitive milestones achieved in mathematics and science. The TIMSS 2023 international assessment, conducted across 59 countries and 6 educational systems, focused on three cognitive domains: knowledge of facts and procedures, application, and reasoning. Particularly notable are findings related to reasoning, a key higher-order cognitive skill, which requires students to integrate knowledge, analyse complex scenarios, and draw conclusions. The study revealed that Slovenian fourth graders performed moderately well in mathematics, with a mean score of 514, slightly above the TIMSS international average of 500 but trailing behind many European peers. Tasks emphasizing reasoning—such as interpreting patterns, solving novel problems, and engaging in multi-step logical processes—highlighted disparities in higher-level thinking skills. Only a small proportion of students consistently achieved success in tasks requiring abstract reasoning and the application of relational concepts. These findings underscore the need for targeted educational strategies to enhance reasoning skills at higher taxonomic levels. The TIMSS 2023 advocates for incorporating complex problem-solving tasks, fostering mathematical investigations, and using adaptive learning tools to challenge and support students, especially those with higher mathematical promise. This new evidence provides a strong basis for refining teaching practices and curricular frameworks to better cultivate advanced cognitive abilities in young learners.

Identifying and supporting mathematically promising students at an early age is essential to foster their development and address their unique needs. These students often demonstrate advanced problem-solving, creativity, and enthusiasm for mathematics, even before formal identification processes begin. This highlights the importance of teachers' ability to recognize and nurture their potential early on.

While much is known about the characteristics of mathematical giftedness and effective teaching strategies, little research has explored how future primary teachers engage with mathematically promising students. Understanding how preservice teachers perceive and support these learners during their practicum is crucial for bridging the gap between theory and practice in mathematics education.

2 Theoretical Framework

Traditionally, mathematical giftedness was framed through attributes like high reasoning skills, problem-solving ability, and creativity. Renzulli's triadic model of giftedness—above-average ability, creativity, and task commitment—remains influential (Sternberg et al., 2024), while Gagné's differentiated model emphasizes the role of environmental factors in converting gifts into talent (Gagné, 2023). Mathematically gifted primary students often exhibit creativity through problem-solving and problem-posing activities. These students can vary given problems and create new mathematical objects, demonstrating their ability to engage in theory-building processes even with limited mathematical knowledge (Assmus & Fritzlar, 2018). Creativity in mathematics is closely linked to divergent thinking and originality, which significantly impact the problem-solving process (Kim et al., 2016).

Identifying and nurturing mathematically promising students—those who show potential for mathematical giftedness or exceptional aptitude in mathematics Sheffield et al. (1995)—is essential in primary education to foster their development and address their unique needs. Identifying mathematically gifted students aged 6–11 involves recognizing characteristics such as thinking in concepts and relationships, high motivation, perseverance, and a systematic and reflective mind. Traditional methods often rely on high achievement in standardized tests, and specially devised problem sets (Wagner & Zimmermann, 1986). This concept encompasses not only those identified through traditional assessments but also students who show a strong interest and enthusiasm for mathematics, reflecting diverse expressions of mathematical ability. Therefore, it is crucial to consider a broader range of indicators, including dynamic and informal assessments, historical data, and input from parents and teachers, to capture the full spectrum of giftedness, especially in students with learning difficulties (Al-Hroub, 2011).

In Slovenia, formal identification of gifted students typically occurs in the fourth grade. However, many students with significant mathematical promise may emerge at younger ages. This creates a critical need for teachers to recognize and support such potential early on, even before formal identification processes begin.

Effective teaching approaches for mathematically gifted students include the use of complex, non-routine problems designed to foster critical thinking and advanced problem-solving skills (Wagner & Zimmermann, 1986; García-Moya et al., 2024). Instructional strategies aimed at nurturing mathematical talent emphasize advanced content, conceptual depth, and higher-order thinking. These methods encourage students to approach mathematics with creativity and innovation, engaging with tasks that reflect the intellectual challenges faced by professional mathematicians (Gavin, 2024). Incorporating hands-on, activity-based learning further enhances students' creative thinking abilities, particularly in primary education, where student-centered methods can be especially effective (Nwoke, 2021). Collaborative tasks on challenging problems further promote shared cognition and mutual support, helping students to enhance their critical thinking and problem-solving capabilities through teamwork (Diezmann & Watters, 2001).

Enrichment programs, such as extended Saturday classes (Wagner & Zimmermann, 1986) or introducing dedicated math clubs or long-term programs (Gavin, 2024)., play a pivotal role in supporting mathematically gifted students. These opportunities complement advanced curricula and foster sustained engagement with mathematics.

Creativity-based mathematics instruction (CBMI) further highlights the importance of fostering divergent thinking and a creative learning environment for gifted students (Kozlowski & Chamberlin, 2019). Programs emphasizing problem-posing as a tool for cognitive variety encourage students to reframe problems and explore abstract concepts, aligning with strategies shown to enhance mathematical creativity and understanding (Singer, 2018). Additionally, digital tools have been found to deepen engagement, as dynamic representations facilitate the exploration of complex mathematical ideas (Pitta-Pantazi et al., 2022). Together, these strategies underscore the critical role of tailored interventions in nurturing mathematical giftedness.

The Didactic Pentagon program in Slovenia exemplifies how field-based teacher education can simultaneously support mathematically promising students and develop preservice teachers' pedagogical skills. This program brought together students aged 7 to 12, preservice teachers, classroom teachers, parents, and teacher educators in a collaborative framework (Lipovec & Bezgovšek Vodušek, 2006). Weekly math club activities allowed preservice teachers to design and implement cognitively challenging tasks, fostering their confidence and competence in mathematical communication and teaching. For students, the program provided exposure to creative mathematical tasks, such as open-ended problems and data generalization, which supported higher-order cognitive skills like abstraction and relational thinking (Lipovec & Pangrčič, 2008; Lipovec, 2009)

The purpose of the presented study is to address a notable gap in the literature concerning the engagement of mathematically promising students in primary education classrooms. While extensive research has focused on identifying mathematically gifted students and proposing theoretical guidelines for their teaching, far less is known about the concrete practices and strategies teachers employ in real-world settings. The originality of this study lies in its focus on future primary teachers, a group that has been largely overlooked in existing research regarding their interactions with gifted students. Specifically, the study investigates how future primary teachers perceive and engage with mathematically promising students during their practicum. By examining the alignment between theoretical recommendations and practical implementation, the study seeks to shed light on the challenges and opportunities involved in nurturing mathematical potential among young learners, thereby offering new insights into this relatively underexplored area.

3 Methods

3.1 Research Question

Two research questions were formulated.

1. How do prospective primary teachers perceive the characteristics of mathematically promising students?
2. How do prospective primary teachers describe their teaching approaches, materials, and strategies when working with mathematically promising students?

The study employed a non-experimental qualitative methodology within pedagogical research, using a narrative approach to analyse reflections written by preservice teachers during their practical training. This design allowed for an in-depth exploration of experiences and insights related to teaching mathematically promising students.

3.2 Participants

The sample consisted of 40 reflections written by 40 future primary teachers during their teaching practicum in 2024. Although 62 students participated in the practicum, some reflections were excluded due to insufficient detail or irrelevance to the study's focus. Future primary teachers in the primary education program (4+1 model) undertake an intensive practicum during the spring semester of their fourth year. Prior to this, they complete a substantial number of mandatory courses in general pedagogy and psychology, a mathematics course designed for primary school teachers, and two courses in mathematics didactics. Additionally, they deliver two teaching sessions in each subject taught at the primary level, including two sessions where they teach mathematics in pairs.

3.3 Data Collection Procedure

Data were collected over three weeks in March and April 2024, during a concentrated practicum period for fourth-year students enrolled in the 4th year of Elementary Teaching study program at the Faculty of Education, University of Maribor. Students chose schools for their practicum independently, ensuring diverse educational settings.

3.4 Measurement Instruments

Reflections on working with a mathematically promising student were part of the journal from the intensive practicum, which included multiple elements (reflections on the student teacher’s own lessons and observations of the mentor teacher's teaching, reflections on working with a student with special needs, descriptions of the didactic tools and resources used, etc.). The instructions were intentionally broad: *Write a reflection on your work with a mathematically promising student in approximately 200 words. You may use the following questions to guide you: What stood out to you the most? What were the strengths? Did you notice anything unusual about the students/teacher? Was there anything about the mathematical content that confused you? What did the students learn during the lesson? What would you change, and how?*

3.5 Data Analysis

Data were analysed using qualitative content analysis with the assistance of the ATLAS.ti software. Following a data-driven approach, initial AI-assisted coding was manually reviewed, refined, and organized into subcategories and broader categories. The approach was primarily inductive, except for two predefined themes. Analysis was done using thematic analysis in six phases suggested by Braun and Clarke's (2006): (1) familiarizing with the data (reading and re-reading the data while simultaneously noting initial ideas), (2) generating initial codes (systematic coding of interesting features of the data and collating data according to the codes, partially AI assisted), (3) searching for themes (collating of the codes into potential subcategories and then categories), (4) reviewing (sub)categories (checking of themes against the coded statements and the data as a whole), (5) defining and naming categories (refining each theme and generating clear definitions for each theme), (6) producing the report (providing extracts for each subcategory theme to illustrate the participants' accounts).

3.6 Limitations

This study has several limitations that should be acknowledged. First, the sample size was relatively small, consisting of 40 reflections from future primary teachers, which limits the generalizability of the findings. Although the data provide valuable insights, a larger sample would have allowed for a broader understanding of the practices and perceptions related to teaching mathematically promising students.

The second limitation pertains to the content of the reflections, which were highly diverse in terms of length and the inclusion of (sub)categories, as reflected in the number of cases. Also, the quality and clarity of some reflections were inconsistent. In several cases, it was challenging to extract detailed or meaningful information due to vague or incomplete descriptions. This variability may have influenced the depth of the data analysis. Since this is a qualitative study, the overall aim is not quantification, but still, the number of cases is provided as additional information for the reader.

Third, not all future primary teachers had the opportunity to work with the same mathematically promising student over an extended period. This lack of continuity may have limited their ability to observe and reflect deeply on the student's learning process and needs.

Lastly, as with all qualitative research, this study is inherently subject to certain subjective interpretation, which, despite rigorous methods, may introduce biases. To mitigate this, established protocols for trustworthiness and peer validation of coding were followed, and participant citations were used to ensure authenticity.

Despite these limitations, the study offers valuable contributions to understanding the teaching practices and challenges associated with mathematically promising students, highlighting areas for further research and teacher education. The study adhered to four primary criteria to ensure trustworthiness: credibility, transferability, dependability, and confirmability. Although coding was performed by the lead author, two additional researchers reviewed the process to validate the findings. Excerpts from participants' reflections were included to provide transparent evidence supporting the findings (Braun & Clarke, 2021). This systematic approach ensured a rigorous and trustworthy analysis of the data.

4 Results

The findings are organized into two themes that emerged from the content analysis: *Characteristics of gifted students* and *Teaching gifted students*. These themes capture the essential aspects of the experiences, observations, and strategies described by participants in their work with mathematically gifted students. Below, each theme and its corresponding categories, subcategories and codes from which the categories were derived, are presented in more detail.

4.1 Characteristics of Gifted Students

The following section describes the characteristics of gifted students as identified by prospective teachers, organized into two main categories: *Cognitive skills and behavioural attributes* and *Affective-motivational strengths*. Each category encompasses unique attributes, which are detailed further in respective tables.

The category *Cognitive skills and behavioural attributes* includes four subcategories (explained in more detail in Table 1).

Table 1: Category Cognitive skills and behavioural attributes

Subcategory	Codes	Excerpts
Mathematical strengths (30 cases)	Strong in mathematics, proficient in math operations, excel in basic math skills, fast calculation, good at math, precise.	*I found that mathematics, with its logic, spatial and numerical representations, as well as reading comprehension, is a very strong area for the girl.*
Logical thinking (18 cases)	Logical thinking, logical tasks, Logical monster, critical thinking.	*We did more logical exercises, one of which was Sudoku.*
Quick learning and understanding (16 cases)	Quick learners, quick understanding, quick task solving, fast problem solving, quick problem solving, fluent in reading, encyclopaedic knowledge, knowledgeable.	*He solved all the tasks first, very quickly and correctly, and immediately moved on to more challenging tasks.*
Exceptional problem-solving skills (10 cases)	Advanced problem-solving, exceptional problem-solving abilities, efficient problem solving, standing out, handle advanced tasks, drawing as a tool for solving problems.	*For the problem-based task, he quickly found a successful solution method.*

The category *Affective-motivational strengths* (details in Table 2) captures the emotional and motivational traits of mathematically gifted students, including *independence and persistence* (9 cases), *creativity* (7 cases), and *curiosity and motivation* (7 cases).

Table 2: Category Affective-motivational strengths

Subcategory	Codes	Excerpts
Independent and persistent (9 cases)	Independent, focused, systematic, persistent, minimal explanations, focused.	*What surprised me about the students was that they were very persistent and eager to get to the solution, so surrendering was not an option for them.*
Creative thinker (7 cases)	Creative, original, making correlations, multiple solution paths, pattern recognition.	*He was able to solve more challenging tasks and approach problems in a creative way.*
Curious and motivated (7 cases)	Curious, motivated, enthusiastic, positive attitude, interesting tasks, enjoying challenging tasks, encouraging knowledge.	*He greatly enjoys solving complex and logical tasks, assembling puzzles, tangrams, and Rubik's cubes, as well as completing Sudoku puzzles. He is highly motivated to solve mathematical problems and engage in logical thinking.*

4.2 Teaching Gifted Students

This section explores approaches and resources for teaching gifted students, categorized into three main categories. The first, *Approaches to working with gifted students* (Table 3), highlights strategies such as personalized and adaptive teaching, supplementary activities and support, collaborative learning, encouraging critical and creative thinking, and encouraging problem-solving and logical thinking. The second, *Tools and materials* (Table 4), focuses on resources such as supplementary and advanced materials, interactive and visual tools, competitions, traditional materials, and games and mathematical puzzles.

In the continuation, a detailed description of all three mentioned categories is provided.

The category A*pproaches to working with gifted students* (Table 3) outlines strategies and methods used to support gifted students in their learning.

Table 3: Category Approaches to working with gifted students

Subcategory	Codes	Excerpts
Supplementary support (25 cases)	Additional activities, additional lessons, additional support, extra math classes.	*During each lesson, I prepared additional worksheets for him because he always completed everything much faster than the others.*
Encouraging problem-solving and logical thinking (18 cases)	Problem-solving, logical reasoning, logical thinking, pattern recognition training, multiple solution paths.	*I tried to find tasks that offered multiple solution paths. For such tasks, the student needed only a few minor hints before independently finding the solutions.*
Personalized and adaptive teaching (13 cases)	Adapting to individual student, adapt lessons, adapt teaching, personalized approach, individualized learning, individual observation, no extra guidance.	*Working with gifted students during math lessons and preparing them for the Logical Monster math competition can be a particular challenge for teachers, as it requires adapting to the specific needs and abilities of these students.*
Encouraging critical and creative thinking (10 cases)	Critical thinking, independent thinking, encourage independence, independent work, independent problem-solving.	*It is also important for the teacher to encourage gifted students to think outside the box and adopt a creative approach to problem-solving.*
Encouraging collaborative learning (4 cases)	Collaboration, collaborative problem solving, group work, engaging in discussions.	*They solved three logical tasks, including one where they had to decipher a calculation involving vegetable values. Starting with the initial clue (tomato = 2), they deduced the values of the other vegetables (1–6) and worked on solving the tasks in groups.*

The category *Tools and materials* highlights the various tools and materials used to engage and challenge gifted students in mathematics. The subcategories are described in Table 4.

Table 4: Category Tools and materials

Subcategory	Codes	Excerpts
Traditional materials (18 cases)	Math worksheets, written math problems, textbook, workbooks, notebooks, tasks with three stars.	*I took the tasks from old notebooks, most of which were marked with three stars.*
Games and mathematical puzzles (16 cases)	Math games, domino games, crosswords, memory games, Rubik's cubes, interactive games, didactic games, online puzzles, math-related games, logic puzzles, sudoku, Wolf, goat, and cabbage, Frogs.	*The student was not familiar with the game Minesweeper, so I first explained the rules and played one game myself, explaining along the way where the mines were most likely located and how we could determine that.*
Interactive and visual tools (15 cases)	Interactive tasks, interactive math tasks, visual aids, Powerpoint presentation, geoboards, computers, tablets, online platforms.	*The tasks required the student to engage in problem-solving, recognize that different calculations could yield the same result, and maintain precision. I worked on these tasks with the student using a tablet, with the tasks increasing in difficulty.*
Competitions (14 cases)	Competition preparation, competition problems, math competition tasks, previous competition tasks, past competition problems, Logical monster, Kangaroo.	*When preparing for the mathematical competition Logical Monster, it is crucial for gifted students to become familiar with various types of mathematical problems they might encounter in the competition.*
Supplementary and advanced resources (12 cases)	Additional materials, advanced math problems, additional workbooks, extended tasks, advanced math workbooks, additional tasks.	*I offered extended assignments and gave him access to additional materials in the classroom.*

4.3 Procedurally Based Computational Tasks Versus Problem-Based/Divergent Thinking Activities

A specific focus was given to the distinction between procedurally based computational tasks and problem-based/divergent thinking activities, emphasizing the diversity of tasks utilized in teaching. These categories collectively underscore the varied strategies and tools that support gifted students in developing their potential.

Among the 40 participants, 17 explicitly referenced procedurally based computational tasks in their reflections. These activities were curriculum-aligned and typically involved structured, guided methods emphasizing accuracy and the reinforcement of standard mathematical procedures. Examples included solving textbook exercises, completing worksheets, and engaging in tasks that prioritized the correct application of algorithms. Conversely, 17 participants described problem-based or divergent thinking activities. These tasks fostered independent exploration, logical reasoning, and creativity, requiring students to devise their own strategies or consider multiple approaches. Examples included open-ended problems such as the wolf, goat, and cabbage, logical puzzles, and activities focused on pattern recognition or generalization. Notably, only one participant reported using both types of activities. Additionally, in the records of seven participants, the type of activities employed could not be clearly identified from the considered perspective.

5 Discussion

The discussion section is organized into two themes that emerged from the content analysis: *Characteristics of gifted students* and *Teaching gifted students*.

5.1 Characteristics of Gifted Students

This study reports the key characteristics of mathematically gifted younger students, as identified by future primary teachers. The findings revealed that future primary teachers recognize these students based on distinct cognitive and behavioural traits (e.g., advanced mathematical abilities, logical reasoning, quick learning, and deep understanding) as well as affective and motivational characteristics (e.g., independence, persistence, creativity, curiosity, and intrinsic motivation). Several studies align to our results by emphasizing superior cognitive abilities in mathematically gifted students, such as quick problem-solving, abstract thinking, and creativity (Arabacı & Danişman, 2023; Lubinski & Humphreys, 1990). Similarly, a comparison between Golle et al. (2022) and the findings of this study, highlights shared cognitive strengths in gifted students, such as problem-solving and quick learning, while Golle et al. also emphasize demographic influences like gender and parental education, which are absent in our skill-focused approach. Both studies align on affective traits, such as curiosity and motivation, but this research uniquely highlights mathematical strengths, like proficiency and independence. By identifying cognitive traits such as critical thinking, and affective qualities such as creativity, the results of this study are, similarly to that of Jawabreh et al. (2022), shaped by cultural contexts. This study adds depth by categorizing traits into structured domains, such as mathematical proficiency and persistence. Similarly to the work of Reis-Jorge et al. (2021), this study focused on advanced cognitive abilities and the challenges of limited teacher training. However, while this study emphasizes mathematical and motivational traits, Reis-Jorge et al. (2021) focus on intellectual and socio-emotional dimensions, reflecting differing educational contexts.

On the other hand, the findings of this study do not correspond with those of Assmus (2018) and Assmus & Fritzlar (2018), who identified specific mathematical strengths such as the ability to recognize and construct mathematical structures, switch between different modes of representation, reverse lines of thought, and applying relational concepts.

The results showed that future primary teachers, despite their limited classroom experience, are able to identify some key characteristics of mathematically gifted students, particularly cognitive traits such as quick learning and logical reasoning, as well as affective traits like creativity and persistence. However, their ability to recognize more specific mathematical strengths—such as the capacity to construct mathematical structures, switch between modes of representation, reverse lines of thought, and apply relational concepts—appears to be less developed. This suggests that while pre-service teachers demonstrate a basic understanding of giftedness, there is a clear need for more targeted training to help them identify and support the full range of abilities in mathematically gifted students.

5.2 Teaching Gifted Students

Future primary teachers, according to the findings of this study, employ effective teaching strategies similar to those highlighted in other studies, such as personalized and adaptive teaching models (Trpin, 2024), active and collaborative learning (Diezmann, & Watters, 2001), and problem-solving tasks with visual and computer assisted tools (Stambaugh, & Pierce, 2019). In this study, future primary teachers emphasized the use of personalized and adaptive teaching approaches, tailoring lessons to the unique needs and abilities of mathematically gifted students. For example, additional tasks and challenges were frequently prepared to accommodate their advanced skills and quicker learning pace. Collaborative learning was less prominent but was observed in activities that encouraged group discussions and teamwork to solve logical problems. Problem-solving tasks, particularly those utilizing visual and interactive tools, also featured in our findings. Teachers used resources like puzzles, dynamic representations, and digital platforms to foster creative and independent exploration. While the findings echo established effective practices, they also underscore areas for improvement, particularly in the broader adoption of collaborative and problem-based methods in primary education.

The findings of this study also align with Diezmann's (2005) emphasis on the need for cognitively challenging strategies to support mathematically gifted students. Diezmann identifies several effective approaches, including problematising tasks, conducting mathematical investigations, extending the use of manipulatives, and modifying educational games. Similarly, this research observed how prospective primary teachers implemented strategies to address the unique needs of mathematically promising students but also revealed areas for growth in their application. Diezmann (2005) underscores the role of manipulatives in supporting visual-spatial and higher-level thinking. Similarly, teachers in this study utilized tools like geoboards, interactive puzzles, and dynamic representations to deepen conceptual understanding. Visual and interactive tools were used in 15 cases, enhancing engagement and helping students explore complex mathematical ideas. Diezmann's focus on adapting games for rich learning opportunities aligns with our findings, where 16 participants incorporated educational games such as Sudoku, Minesweeper, and logic puzzles. These activities were particularly effective in fostering pattern recognition, persistence, and creativity among mathematically promising students. Our findings suggest that while some teachers adopt cognitively demanding strategies like those outlined by Diezmann (2005), many still default to less challenging, procedurally based tasks.

A comparison of the results of this study with the findings of the study by Pitta-Pantazi et al. (2022), reveals interesting parallels and distinctions in the use of interactive and visual tools for fostering mathematical creativity. Both studies emphasize the role of dynamic representations and manipulatives in supporting higher-order thinking and conceptual understanding. In this research, interactive and visual tools were employed by approximately 37% of participants to enhance engagement and facilitate problem-solving among mathematically promising students. These tools included geoboards, puzzles, and interactive digital platforms, which were effective in helping students visualize patterns, relationships, and spatial configurations. Notably, Slovenia has a national open-access platform which hosts numerous applets akin to those described by Pitta-Pantazi et al. (2022), such as dynamic balance models and visual tools. Despite its potential, the platform is underutilized, and none of the future primary teachers in this study referenced it in their reflections, suggesting a lack of awareness or integration into their teaching practices. Pitta-Pantazi et al. (2022) describe the use of a technologically enhanced learning environment based on the PMMI (Personalized Mathematics and Mathematics Inquiry) framework. Their study, focusing on teaching the arithmetic mean, utilized a dynamic digital applet that enabled students to manipulate visual representations, such as balance models and number lines, to deepen their understanding of the concept. This approach was particularly successful in fostering "mini-c" creativity, defined as the process of personal knowledge construction. Students exhibited abilities to create, manipulate, and connect representations, as well as to generalize and apply the concept in novel contexts. A key distinction lies in the targeted outcomes.

The findings of this study complement those of Gabrijelčič Kukonja and Konrad Čotar (2019), who highlight key challenges in educating gifted students in Slovenia. Their research emphasizes that teachers often lack knowledge and confidence in identifying and teaching gifted students, leading to the use of inappropriate strategies. They stress the importance of teacher training to address these gaps and advocate for tailored instructional approaches and well-trained personnel to support gifted learners. This study focused specifically on mathematically gifted younger students, identifying their strengths, such as quick learning, problem-solving, and creativity. The value of personalized teaching, problem-posing tasks, and interactive tools, was emphasized. However, just like in the findings of Gabrijelčič Kukonja and Konrad Čotar (2019), it was also observed in this study that teacher preparation often limits effective approaches. Specifically, only half of the participants in this study engaged mathematically gifted students in problem-based or divergent thinking activities, which are crucial for fostering creativity and independent exploration. The other half relied on procedurally based tasks that focused on reinforcing standard algorithms and accuracy, reflecting the need for stronger emphasis on creative teaching strategies in teacher training.

6 Conclusions

This study provides valuable insights into how prospective teachers perceive and engage with mathematically promising students during their practical training. By analysing their reflections, key cognitive, affective-motivational, and pedagogical strategies were identified that are effective for supporting such students. The findings highlight some of the strengths of mathematically promising students, as perceived by future primary teachers, including advanced problem-solving abilities, quick learning, and logical thinking, alongside their persistence and intrinsic motivation. These traits underline the need for teaching approaches that challenge students cognitively and nurture their mathematical potential.

The analysis also uncovered several areas for improvement. The study findings indicated that certain characteristics of mathematically gifted students, such as creativity, originality, and making unique correlations, were recognized in a smaller proportion of cases compared to traits like logical thinking or quick learning. Regarding instructional approaches, collaborative learning was notably underutilized, with only four instances of group problem-solving or discussions, as opposed to more frequently observed individualized or procedurally guided methods. The most worrying is that only half of the teachers employed problem-based or divergent thinking activities, emphasizing the need for greater emphasis on fostering creativity and independent exploration in teacher education programs.

This study reinforces the importance of providing future primary teachers with comprehensive training that equips them with the ability to recognize and support mathematically promising students. By integrating theoretical knowledge with practical tools, educators can better meet the unique needs of these students. Despite its limitations, including the small sample size and inconsistent quality of reflections, this research offers a foundation for improving instructional practices and shaping future studies on mathematical giftedness in primary education.

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