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Mathematics Textbook Use in Primary Schools: Patterns, Preferences, and Perceptions

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Textbooks are key curriculum materials and play a central role in shaping classroom instruction, particularly in systems where their use is mandated by educational policy. This study, therefore, investigates how primary school teachers engage with such mandated textbooks in mathematics instruction. A survey of 294 teachers explored (i) the frequency and manner of textbook use, (ii) the criteria teachers prioritise when selecting among approved textbooks, and (iii) their perceptions of textbook quality. Findings show that while textbooks remain the dominant instructional resource, many teachers supplement them with additional materials. The most influential selection criteria are the textbook's didactical intent, its alignment with the curriculum, and the clarity and variety of worked examples and tasks. While respondents were generally satisfied with current textbooks, they also highlighted some shortcomings: tasks that are too difficult for some age groups, limited diversity of problem types, and technical constraints in digital editions. The findings contribute to research on curriculum enactment by showing how teacher agency mediates the use of mandated mathematics textbooks and offering insights relevant to the development of textbooks and educational policies in centrally regulated systems.

Keywords: curriculum enactment, mathematics textbooks, primary school teachers

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Uporaba učbenikov za matematiko v osnovnih šolah: vzorci, preference in zaznave

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Učbeniki so ključno učno gradivo in imajo osrednjo vlogo pri oblikovanju pouka v razredu, zlasti v sistemih, v katerih njihovo uporabo predpisuje izobraževalna politika. Ta študija zato preučuje, kako osnovnošolski učitelji uporabljajo takšne predpisane učbenike pri pouku matematike. V anketi, v kateri je sodelovalo 294 učiteljev, smo raziskovali: i) pogostost in način uporabe učbenikov; ii) merila, ki jih učitelji upoštevajo pri izbiri med odobrenimi učbeniki; iii) njihove zaznave kakovosti učbenikov. Izsledki kažejo, da učbeniki sicer ostajajo prevladujoče učno gradivo, vendar jih veliko učiteljev dopolnjuje z dodatnim gradivom. Najvplivnejša merila pri izbiri so: didaktični namen učbenika, njegova usklajenost z učnim načrtom ter jasnost in raznolikost rešenih primerov in nalog. Čeprav so bili anketiranci na splošno zadovoljni z zdajšnjimi učbeniki, so poudarili tudi nekatere pomanjkljivosti: naloge, ki so za nekatere starostne skupine prezahtevne, omejena raznolikost vrst nalog in tehnične omejitve v digitalnih izdajah. Ugotovitve prispevajo k raziskavam o izvajanju kurikuluma, saj kažejo, kako učiteljeva izbira in odločitve posredujejo pri uporabi predpisanih učbenikov za matematiko, ter ponujajo vpoglede, pomembne za razvoj učbenikov in izobraževalnih politik v centralno reguliranih sistemih.

Ključne besede: izvajanje kurikuluma, učbeniki za matematiko, osnovnošolski učitelji

Introduction

Textbooks have long played a central role in mathematics instruction (Fan et al., 2021; Gustafsson et al., 2024), serving not only as a source of instructional content but also as a key link between curriculum policy and classroom practice (Valverde et al., 2002). They guide both teachers and students through structured content and tasks, shaping what is taught and how it is approached during lessons (Pepin et al., 2013). In primary education, textbooks are particularly important for introducing mathematical vocabulary and symbolic representations in developmentally appropriate ways, with visual supports helping young learners to grasp abstract concepts (Norberg, 2023). Despite the increasing availability of digital tools and online resources, textbooks – in either printed or digital form – remain the most commonly used teaching materials in mathematics classrooms (Engledowl et al., 2021; Marks et al., 2023; Raymond, 2021). This is especially true during periods of curriculum reform, when they provide a familiar and reliable foundation for adapting to new instructional demands (Fan et al., 2021; Glasnović Gracin & Jukić Matić, 2021; Polly, 2017). Understanding how teachers use textbooks is important for gaining insight into how the intended curriculum is actually implemented in classrooms. Research shows that teachers engage with textbooks in diverse ways: some follow them closely, others modify the materials to better suit their classroom context, and some create their own lessons inspired by textbook content (e.g., Glasnović Gracin & Jukić Matić, 2021; Jukić Matić, 2019). From this point of view, teachers are active agents in shaping the enacted curriculum by selecting, modifying, or supplementing textbook content in response to their students' needs and the instructional context (Remillard & Heck, 2014). At the same time, research on digital textbooks shows that while they can enhance student engagement, their use in classrooms is often constrained by technical and design-related limitations (Glasnović Gracin & Krišto, 2022; Raymond, 2021; Wijaya et al., 2024). Building on this work, the present study examines how primary school teachers engage with both printed and digital mathematics textbooks, focusing on the extent of textbook use, the criteria guiding textbook selection, and teachers' perceptions of textbook quality in everyday teaching practice.

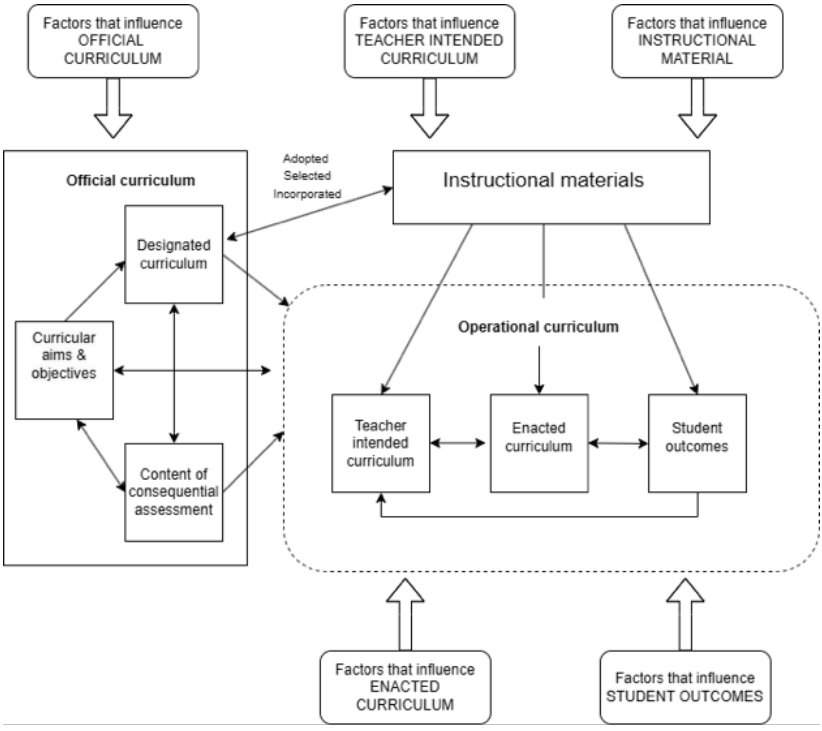
Textbooks, Curriculum Enactment, and Teacher Agency: Theoretical Frameworks

Mathematics textbooks serve as intermediaries, translating curriculum guidelines and educational policies into classroom practice (Pepin et al.,

2013). Remillard and Heck (2014) proposed a curriculum enactment model that shows the dynamic interaction between curriculum policy and classroom implementation. This framework distinguishes between the *official curriculum* and the *operational curriculum* (Figure 1). The official curriculum consists of stated goals and objectives, the content of consequential assessments, and the designated curriculum. Goals and objectives define expectations for student learning and, in some cases, instructional approaches. Although consequential assessments do not explicitly define scope and sequence, they often influence content teachers' priorities due to their evaluative weight. Designated curriculum refers to a set of instructional guidelines established by an authorised body and may include textbooks or other resources when these are formally selected or approved at the policy level. In systems where curriculum governance is centrally controlled or where alignment between standards and resources is required, textbooks commonly constitute a key component of the designated curriculum. The operational curriculum includes both the teacher-intended curriculum, meaning the lessons planned using available materials such as textbooks and teacher guides, and the enacted curriculum, which reflects what actually unfolds in classroom instruction and student outcomes. The shift from planning to enactment involves various adaptations shaped by teachers' backgrounds, beliefs, available resources, and student characteristics. The enacted curriculum emerges from the ongoing interaction between teachers and students as they engage with curricular content and tasks. Student outcomes encompass not only achievement but also participation, dispositions, and meanings attributed to the subject.

Figure 1

Curriculum enactment model according to Remillard and Heck (2014, p. 709)



To deepen understanding of how mathematics teachers work with curriculum materials, Remillard et al. (2024) introduced a model of teacher agency. Their approach builds on the ecological model described by Priestley et al. (2015) and conceptualises agency as something enacted through teachers' situated decisions, shaped by the materials they use and the conditions under which they work. The model emphasises two key dimensions of agency. The practical-evaluative dimension involves teachers' real-time judgements in response to institutional structures, cultural norms, and material resources. The projective dimension reflects their instructional goals and aspirations for student learning. This model views curriculum materials, both printed and digital, as central elements of the material environment that guide, constrain, or support teachers' choices.

In this paper, we will use both models to examine how Croatian primary teachers interact with mathematics textbooks in practice. While the curriculum enactment model situates textbooks within the broader educational system as

part of the designated curriculum, the agency model draws attention to how teachers interpret and negotiate these materials in light of their goals, values, and classroom contexts.

Context of the Study

Within the Croatian educational context, textbooks hold a particularly important role, as their use is mandatory across all school levels. Textbooks must align with the national curriculum and adhere to defined standards (*Act on textbooks and other educational materials for primary and secondary school*, 2018). These standards state that textbook content and organisation should help students learn on their own, encourage the development of different skills, and make it easier to evaluate both subject-specific and general learning criteria. In addition, textbooks must meet pedagogical, ethical, technical, and linguistic criteria. With the increasing emphasis on digital resources, the official guidelines also define expectations for digital textbooks. These must include at least one interactive or multimedia feature, such as audio recordings, animations, videos, simulations, or interactive elements that enable communication and engagement. Such features are expected to serve both instructional (e.g., educational games, interactive maps) and evaluative purposes (e.g., quizzes with feedback). While the Ministry of Science and Education [MSE] is responsible for textbook approval, schools and teachers are granted autonomy to select resources from the approved list. Once selected, textbooks are typically used for at least four years or until a new edition is adopted. A major curricular reform implemented in 2019 further shaped this context. The reform introduced a revised mathematics curriculum (MSE, 2019) aimed at strengthening students' problem-solving skills through active learning and modern teaching resources. It also sought to enhance student engagement and increase teacher motivation (Divjak & Pažur Aničić, 2019). A central goal of the reform was to expand teachers' professional autonomy, enabling them to choose instructional methods, adapt materials, and implement flexible assessment strategies within the boundaries of clearly defined learning outcomes. In support of the reform, new mathematics textbooks were introduced between 2019 and 2021, alongside significant investments in digital infrastructure and access in schools (Divjak & Pažur Aničić, 2019).

Rationale for the Study

Although textbooks have long been recognised as key mediators between curriculum policy and classroom practice, the ways in which teachers

actually engage with these materials remain highly variable and context-dependent. Most research in Croatia has focused either on textbook content or on mathematics teachers in lower secondary school grades (e.g., Glasnović Gracin, 2018; Glasnović Gracin & Krišto, 2022; Jukić Matić, 2019), while the practices of primary mathematics teachers remain largely unexplored. This is a concerning oversight, especially given that Croatian primary teachers are generalists who teach six different subjects, often have limited subject-specific training and work in diverse, mixed-ability classrooms. Their textbook choices and usage patterns significantly influence how mathematics curriculum goals are realised in practice. This study addresses this gap by examining how Croatian primary teachers select, use, and perceive mathematics textbooks, both printed and digital. Understanding their practices provides valuable insights into the implementation of curriculum policy in real classrooms, particularly in the post-reform context characterised by increased digitalisation and autonomy. The findings aim to inform future textbook policy, support the development of pedagogically appropriate resources, and contribute to a better understanding of curriculum enactment processes in early mathematics education. In line with this, the study is guided by the following research questions: (1) To what extent do Croatian primary school teachers use mathematics textbooks in their instructional practice? (2) What criteria do primary school teachers prioritise when selecting mathematics textbooks? (3) How do teachers perceive the mathematics textbooks they currently use?

Method

Participants

The study sample consisted of 294 primary school teachers from Croatia, who participated in the research during the winter of 2025. The teachers were sampled using the convenience sampling technique, as defined by Creswell (2014): participants were selected based on their availability, accessibility, and willingness to participate. This approach was necessary due to the absence of a comprehensive registry of primary school teachers in Croatia. Sociodemographic characteristics of participants, including gender, age, teaching experience, and geographic region, were collected and are detailed in Table 1. Participation was anonymous and voluntary; teachers chose whether or not to disclose demographic information.

Table 1

Sociodemographic characteristics of participants

Category	Characteristics	Percent
Gender	Female	96.3
	Male	3.4
Years of teaching experience	0-5	5.4
	6-15	21.1
	16-30	42.5
	> 31	30.6
Academic background	Graduate Primary Teacher (4 years of study, finished before 2005, Cro. *diplomirani učitelj razredne nastave*)	44.9
	Master of Primary Education (5 years, finished after 2005, Cro. *magistar primarnog obrazovanja*)	33.6
	Primary School Teacher (2 years post-secondary qualification, finished before 1992, Cro. *nastavnik razredne nastave*)	21.1
	Specialist in Primary Education (Cro. *stručni specijalist primarnog obrazovanja*)	0.3

Instrument

The study utilised the *Teachers' Opinion Questionnaire on the Use of Textbooks in Mathematics Instruction* developed by Domović et al. (2012). The original questionnaire included 24 statements related to the use of mathematics textbooks, rated on a modified 4-point Likert scale (1 = never, 4 = almost always). Using exploratory factor analysis, Domović et al. (2012) identified four factors: *Following the textbook* (12 items), *Use of textbook tasks* (4 items), *Using other teaching resources* (4 items), and *Individualised approach in teaching* (4 items). Due to the low reported reliability of the last factor, items related to *Individualised approach in teaching* were excluded from the present study. In addition to the retained items, new statements were added to capture teachers' use of digital interactive textbooks or digital platforms associated with printed textbooks, resulting in a modified version of the instrument. The questionnaire also included several closed-ended questions and one open-ended question:

1. Which criteria do you find most important when choosing a textbook? (see Appendix A)
2. Overall, are you satisfied with the current selection of primary school textbooks? (Yes; Mostly yes; Neutral; Mostly no; No)
3. Has the quality of today's textbooks improved compared to those used

before 2019? (Yes; Mostly yes; Neutral; Mostly no; No)

4. Could you briefly describe the aspects of textbooks you are most satisfied or dissatisfied with?

Research Design

This study employed a cross-sectional survey design. Data collection took place over a two-month period in the winter of 2025. The online survey was administered via Google Forms for ease of access and data management. The questionnaire was first distributed via email to the heads of County Professional Councils (contact information obtained from the Education and Teacher Training Agency's publicly available records). The council heads then forwarded the survey link and an information letter describing the research aims to primary school teachers in their respective networks. Based on piloting, the survey took approximately 10–12 minutes to complete. All responses were collected anonymously; no identifying information (such as teacher names, school names, or IP addresses) was recorded.

Data Analysis

To explore the latent structure of the questionnaire, Principal Component Analysis (PCA) with Varimax rotation and Kaiser normalization was conducted. Prior to conducting PCA, the suitability of the dataset was evaluated. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.788, indicating that the sample was adequate for factor analysis. Furthermore, Bartlett's test of sphericity was statistically significant ($\chi^2 = 1662.645$, $p < 0.001$), confirming that the correlations among variables were sufficiently strong to justify the use of factor analysis. The initial PCA included 27 variables and yielded four components with eigenvalues greater than 1, explaining 45.52% of the variance. Variables with low communalities (< 0.30) were excluded, resulting in a refined model with 21 variables that explained 52.34% of the variance, representing an improvement in model quality. The four components remained conceptually coherent and were labelled as *Following the textbook* (7 items), *Use of textbook tasks* (4 items), *Use of other teaching resources* (3 items), and *Digital support in teaching* (7 items). Cronbach's alpha coefficients ranged from 0.640 to 0.820, indicating acceptable to good internal consistency. Pearson correlation coefficients were calculated to examine relationships among the extracted factors, and descriptive statistics (means and standard deviations) were used to summarise responses. Frequencies and percentages were calculated for categorical items related to textbook selection criteria and satisfaction ratings.

An inductive thematic analysis was conducted for the open-ended

question. The analysis included only those textual responses that contained relevant information regarding satisfaction or dissatisfaction with the textbooks. An inductive coding approach was applied in several phases (Saldaña, 2015). The goal was to identify patterns of meaning (themes) in teachers' responses without relying on predetermined categories. In the first phase, all responses were reviewed and segmented into smaller units, like sentences or phrases expressing a particular opinion, experience, or observation. Each unit was labelled with a descriptive code that summarised its content. For instance:

- "The exercises are diverse and encourage logical thinking": task variety, logical reasoning
- "The tasks are too difficult for students"; excessive difficulty, age inappropriateness
- "The digital version of the textbook makes teaching easier": digital support, facilitated preparation

After the initial coding, the codes were grouped into broader thematic categories based on their similarity and conceptual relatedness. This process resulted in 8 thematic categories: Task variety, Age appropriateness, Didactical approach, Quality and accuracy, Digital content, Visual design, Teacher autonomy and Obligation, which are described in detail in the *Results* section. Additionally, expressions of satisfaction and dissatisfaction within each category were examined. Different formulations of evaluative language were considered e.g., "I'm satisfied," "I'm dissatisfied," "There are too many errors," "The tasks are too difficult".

Results

Use of Mathematics Textbooks in Primary School

The factor *Following the textbook* reflects a structured, textbook-centred approach to mathematics instruction, commonly observed among primary school teachers. It encompasses practices such as following the sequence and methods recommended in the textbook, adhering closely to its structure for lesson planning, and using textbook content to introduce new topics and motivate students. It also refers to emphasising the details highlighted in the textbook, using its specific mathematical language and symbols during instruction, and drawing students' attention to illustrations, photographs, and comics. In addition, some teachers indicated that they present rules and procedures exactly as written in the selected textbook. The results show that primary teachers strongly rely on the textbook as the primary instructional resource (Table 2). The factor

Use of textbook tasks captures the extent to which teachers utilise textbook exercises and assignments to support practice and assessment. This includes assigning tasks from the textbook for homework, reviewing content through textbook problems before exams, and selecting test and practice questions based on textbook examples. The obtained results suggest that while textbook tasks are a substantial component of teaching practice, their use is slightly less pronounced compared to overall reliance on the textbook structure (Table 2). The factor *Using other teaching resources* reflects the use of instructional materials beyond the official textbook, including additional math textbooks, supplementary resources, and external collections of practice problems. The results indicate that teachers utilise these alternative resources, but they do so to a lesser extent compared to textbook-based materials (Table 2). The factor *Digital support in teaching* measures the integration of digital tools into teaching practice, particularly interactive digital textbooks or associated digital platforms. These resources are used for various instructional purposes, such as motivating students during lessons, introducing new content, promoting individual learning, practicing during lessons, and facilitating differentiated instruction. The results point to a moderate level of digital integration in the classroom (Table 2).

Correlation analyses revealed moderately positive but statistically significant relationships between the *Following the textbook* factor and each of the other three dimensions: *Use of textbook tasks, Using other teaching resources*, and *Digital support in teaching* (Table 2). These results suggest that teachers who heavily rely on the textbook are also somewhat more likely to use textbook-based tasks, additional materials, and digital textbooks. A particularly notable finding was the very strong correlation between using other teaching resources and digital support, indicating that teachers who frequently incorporate additional materials tend to integrate digital textbooks to a similar extent. No other statistically significant correlations were observed.

Table 2

Descriptive statistics and correlations for scales

Scale	*N*	*M*	*SD*	1	2	3	4
Following the textbook	294	3.21	0.42	—	.32**	.22**	.23**
Use of textbook tasks	294	2.96	0.52		—	.10	.11
Using other teaching resources	294	2.55	0.53			—	.99**
Digital support in teaching	294	2.58	0.52				—

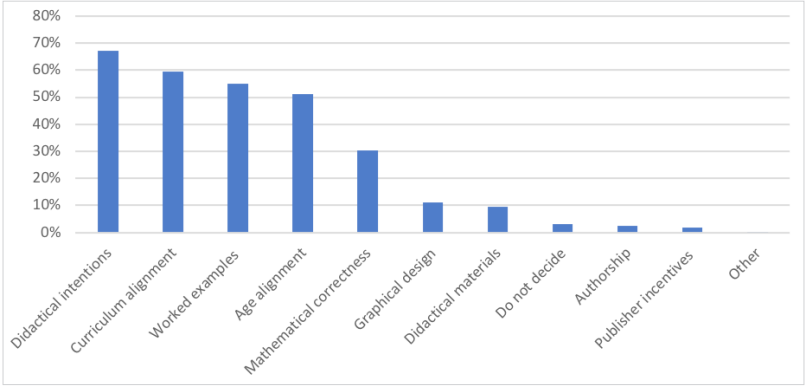
Note. ** $p < 0.01$

Criteria for Textbook Selection and Textbook Quality

The survey investigated the key criteria guiding primary school teachers in their textbook selection process, with respondents selecting up to three preferred criteria. The participants' preferences can be seen in Figure 2. The most frequently selected criterion was *Didactical intentions of the textbook* (67%, n = 197), reflecting the emphasis teachers place on lesson structure and the pedagogical suitability of the textbook for supporting effective teaching strategies. This was closely followed by *Curriculum alignment* (59.5%, n = 175), indicating that coherence with the national curriculum and prescribed learning outcomes is considered highly important. *Work examples and tasks* was selected by 55.1% (n = 162) of respondents, emphasising the value teachers assign to concrete, well-designed examples and exercises that facilitate students' understanding and application of content. Teachers also highly valued *Age alignment* (51.0%, n = 150), which refers to the appropriateness of content in relation to students' cognitive and emotional development. *Mathematical correctness* was chosen by 30.3% of teachers, highlighting the importance of subject-specific precision and reliability in textbook content. In contrast, *Graphical design* (11.2%, n = 33) and *Didactical materials as gifts from publishers* (9.5%, n = 28) were considered less critical, although still relevant for a portion of respondents. Some respondents indicated that they do not decide on textbook selection themselves (3.1%, n = 9), suggesting that the decision is made by a school team or administration. Authorship (2.4%, n = 7) had a limited impact on selection, and minimal importance was placed on *Publisher incentives* (1.7%, n = 5) and other unspecified criteria (0.3%, n = 1).

Figure 2

Mathematics textbook selection criteria



Around 79% of participants reported being satisfied with the standard of mathematics textbooks offered for use in primary schools. Teachers were also asked to compare their current textbooks to those used before the curriculum reform. Approximately 60% of teachers indicated their belief that the quality of textbooks had improved in comparison to mathematics textbooks published before reform, while 40% indicated their belief that their quality did not improve. These results warrant further investigation into the underlying causes, which is explored in the next subsection.

Teachers' Perception of the Textbooks

The thematic analysis of teachers' perceptions of textbooks offers information about the sources of their satisfaction and dissatisfaction. Among 294 participants, 162 responded to this question. Eight themes emerged from the data, with negative and positive comments (Table 3), which are described below:

- *Task variety*. This category encompasses comments related to the number, types, and level of complexity of textbook tasks. Teachers expressed satisfaction when tasks were varied, problem-oriented, logically challenging, and gradually structured, i.e., progressing from simpler to more complex ("The tasks are of different types and levels of difficulty"). Conversely, dissatisfaction was noted when tasks were monotonous, too difficult, or too easy; when instructions were unclear; or when there was insufficient space provided for solving the tasks ("Dissatisfied because there are no tasks structured by difficulty (from easier to more difficult), and in the textbook it's always the same type of task", "I'm dissatisfied because all materials from the publisher I use have the same type of tasks (textbook, workbook, and exercise book)").
- *Age appropriateness*. Comments in this category relate to the alignment of textbook content and tasks with students' age and developmental capabilities. Positive remarks emphasised the appropriateness of the language, illustrations, and task design for the target age group ("The textbook is appropriate for the students' age"). In contrast, negative feedback focused on tasks that were too demanding for younger students, particularly word problems that required reading skills many students had not yet developed ("Word problems are too difficult for primary school students because they still lack sufficiently developed reading skills").
- *Didactical approach*. This category includes teachers' comments on the didactical conception of textbooks, encompassing not only their structural organisation but also the sequencing and progression of content,

the presentation of mathematical ideas and the inclusion of intermediate learning steps. Teachers gave positive evaluations for textbooks that followed a didactically cohesive sequence, allowed for differentiation, and were clearly organised. Criticism was directed at overly templated structures, the omission of intermediate learning steps, and a general lack of methodological clarity in certain units ("I sometimes feel that textbooks do not respect the principle of gradual progression…").

- *Accuracy*. This category comprises teachers' comments on both linguistic/technical accuracy (e.g., typographical and grammatical errors, unclear formulations) and mathematical correctness. The majority of comments referred to issues of copyediting and clarity of wording, while explicit references to mathematical errors were less frequent. ("The textbook is not well copyedited, so we discover many mistakes"). This theme was also frequently implied in other comments. Comments related to mathematical errors were less frequent but also present ("At how many points does this straight line bend? This is not correct. If it bends, then it is not straight but broken.")
- *Digital content*. Comments within this category refer to digital versions of textbooks and accompanying online materials. Teachers appreciated the availability of interactive exercises, quizzes, and digital tools that supported lesson planning and delivery ("[..] the interactive tasks, which make teaching dynamic and engaging."). Criticism focused on technical issues, limited functionality, and the absence of features that would allow students to complete tasks directly within the digital textbook ("It would be good if the digital textbook offered an option for students to complete assignments digitally").
- *Visual design*. This category captures comments related to the visual and graphic design of textbooks. Positive comments emphasised clarity, visual organisation, and the appropriateness of illustrations ("I am satisfied with the balance between images and text"). Negative comments pointed to excessive colourfulness, visual distractions for students, and insufficient space for writing and solving tasks ("Too little space is provided for solving tasks – students often don't have enough room to write calculations and answers").
- *Teacher autonomy*. This category contains teachers' views on professional autonomy in using textbooks. Satisfaction was expressed when textbooks allowed for flexibility and instructional adaptation ("I am satisfied because they meet the criteria I follow in my teaching"). Dissatisfaction emerged when textbooks constrained teachers' creativity and limited

their ability to tailor instruction to individual student needs ("Textbooks personally constrain me in teaching… my creativity and freedom are limited").

- *Obligation*. Seven teachers stated that they use the textbook because they are required to.

Table 3
Number of comments per category

Nr. of comments:	Task variety	Age appropriate	Didactics	Accuracy	Digital content	Visual design	Autonomy
Positive	49	20	28	12	11	8	4
Negative	32	18	24	13	4	8	3

Discussion

The findings of the study show that while printed textbooks remain the primary instructional resource, teachers also incorporate digital interactive textbooks and other existing resources into their practice. The most valued textbook selection criteria were didactical intentions, curriculum alignment, and the quality of worked examples. Qualitative responses revealed both satisfaction and dissatisfaction with textbook features, particularly regarding task variety, age appropriateness, and digital functionality.

Textbooks as Part of the Designated Curriculum

Within the curriculum enactment model (Remillard & Heck, 2014), the high score on the factor *Following the textbook* indicates that the mathematics textbook, as the designated curriculum, has a strong influence on the teacher-intended and enacted curriculum in Croatian primary education. Moreover, rather than merely supporting the teaching process, mathematics textbooks appear to structure the ways in which curricular learning outcomes are interpreted and enacted in teaching. As reflected in teachers' reported instructional practices, the high score on the factor *Following the textbook* and the relatively high score on the factor *Use of textbook tasks* suggest that there is a considerable degree of alignment between the designated and the enacted curriculum. This points to a mode of curriculum enactment characterized by limited transformation of officially approved materials, where the intentions embedded in the designated curriculum are enacted with relatively little modification. This kind of enactment can be particularly important in primary education, where

teachers are responsible for a wide range of subjects and often rely on structured materials to support planning and instruction.

At the same time, the findings indicate that reliance on textbooks does not prevent teachers from using their professional judgement or making adaptations. Teachers reported that they frequently combine textbook use with additional teaching materials, as reflected in the factor *Using other teaching resources*. Together with the positive correlation between the factor *Following the textbook* and this practice, and qualitative themes related to teacher autonomy, task variety, and age appropriateness, these findings suggest that many teachers actively construct a teacher-intended curriculum by selectively extending and supplementing the designated curriculum in response to students' needs. Overall, primary teachers in the study appear to balance fidelity to officially approved resources with flexibility in everyday classroom practice.

International studies reveal a similar pattern. In the UK, for example, primary teachers continue to rely on textbooks to structure lessons, even as they adapt materials for diverse learners (Marks et al., 2023). Similarly, in the United States, textbooks in primary education remain influential despite increasing access to digital content (Engledowl et al., 2021). Furthermore, across diverse European contexts (Slovakia, the Czech Republic, Italy, Norway, and Turkey), mathematics teachers report using supplementary or self-created materials, yet still regard textbooks as essential (Çakıroğlu et al., 2023). Across these settings, a common theme can be observed: mathematics textbooks provide instructional stability and coherence while simultaneously allowing space for teacher adaptation.

Digital Interactive Textbooks

While the curriculum enactment model situates digital textbooks within the curriculum system, the teacher agency model explains how teachers utilize them in practice. Recent studies suggest that digital textbooks can shape classroom instruction by encouraging greater student interaction and engagement (Wijaya et al., 2024). The findings related to the factor *Digital support in teaching* largely reflect these trends. Teachers described using digital interactive textbooks to engage students, adjust task difficulty, assign homework, and support lesson planning. The strong correlation between the use of additional teaching resources and digital support suggests that, for many teachers, digital textbooks are integrated as part of broader, resource-rich teaching practices rather than replacing printed textbooks. From the perspective of teacher agency (Remillard et al., 2024), such practices reflect the practical-evaluative dimension of agency, as teachers make context-sensitive decisions about when and how digital resources can meaningfully support instruction. These practices are also

consistent with recent curricular reforms in Croatia, which promote digitalization along with greater instructional flexibility.

At the same time, the results for the factor *Digital support in teaching* indicate that digital textbooks are not yet fully embedded in everyday teaching. Although participants in the study recognize their potential, many pointed to technical problems, limited interactivity, and infrastructural constraints, echoing earlier research on the conditions under which digital materials are used (Raymond, 2021). Analyses of Croatian digital mathematics textbooks show that many digital tasks largely replicate printed formats and offer few opportunities for personalization or dynamic interaction (Glasnović Gracin, & Krišto, 2022). In the teacher agency model, these limitations can be seen as material constraints that affect, and sometimes limit, teachers' ability to use digital resources to carry out their teaching plans. As a result, teachers in this study often preferred printed textbooks, a pattern consistent with previous findings showing that digital materials are most readily adopted when they enhance the quality of mathematics instruction (Wijaya et al., 2022).

Selection Criteria and Perceived Textbook Quality

Teachers in this study prioritised textbooks with a clear structure, strong alignment with the curriculum, quality of worked examples and tasks and age-appropriate content. These preferences reflect teachers' efforts to achieve instructional clarity, coherent progression, and meaningful understanding for their students. In line with Remillard et al. (2024), such choices can be interpreted as expressions of practical-evaluative agency, as teachers draw on professional experience and classroom context when judging the suitability of curriculum materials. At the same time, their focus on pedagogical usefulness rather than publisher incentives or visual appeal reflects the projective dimension of agency, oriented toward teachers' longer-term aspirations for student learning.

Teachers' perceptions of textbook quality further reflect this enactment of agency. While many expressed overall satisfaction, dissatisfaction appeared when textbooks were perceived as overly rigid, insufficiently differentiated, or lacking clear task progression. In contrast, textbooks that allowed flexibility and adaptation to diverse student needs were evaluated more positively. These evaluations show that teachers are not passive implementers of mandated materials but active professionals who assess, adapt, and supplement textbooks in relation to both immediate instructional demands and broader educational goals (Remillard et al., 2024).

These findings position textbook selection as a form of professional judgement rather than a purely procedural decision, which can significantly

impact student learning outcomes (van den Ham & Heinze, 2018). It reflects teachers' beliefs about what constitutes effective instruction and their efforts to meet the diverse needs of learners. Consistent with our findings, which show that teachers prioritise didactical intentions, curriculum alignment, and task quality, similar patterns have been reported by Han and Lim (2022), who observed that primary school teachers tend to prioritise curricular relevance and pedagogical utility. In contrast, secondary mathematics teachers often emphasise clarity and precision in mathematical reasoning (Andrade et al., 2023), indicating that textbook design needs to be responsive to both developmental and instructional contexts.

Although Croatian education policies formally grant teachers autonomy in their teaching practices, textbooks remain a required element of their pedagogical suite. Yet, even within these constraints, teachers in this study exercised agency. They supplemented and selectively used textbook content based on what they believed would best support student learning. As Adams et al. (2021) argue, agency does not necessarily emerge through overt resistance but through reflective and context-sensitive navigation of systemic structures. From this perspective, teachers' interaction with textbooks represents not mere compliance but a deliberate expression of pedagogical values, contextual understanding, and commitment to meaningful teaching.

Conclusion

This study examined how Croatian primary school teachers use mathematics textbooks, the criteria guiding their selection, and teachers' perceptions of textbook quality. By integrating the curriculum enactment model (Remillard & Heck, 2014) with the teacher agency model (Remillard et al., 2024), the study makes a theoretical contribution to mathematics education research by conceptualizing textbooks simultaneously as elements of the designated curriculum and as resources that teachers actively interpret, adapt, and supplement. The combined use of these frameworks enables us to explain both the strong influence of textbooks in a mandated system and the professional agency teachers enact in selecting, evaluating, and adapting curriculum resources. In this way, the study moves beyond descriptive accounts of textbook use and provides a theoretically grounded account of how curriculum policy is enacted in everyday classroom practice.

The findings have clear implications for practice and educational policy. For teachers, they reveal the central role of professional judgement when working with curriculum materials, even within structurally regulated contexts. For

textbook authors and publishers, the results show the importance of pedagogical flexibility, coherent task progression, differentiation, and meaningful digital integration. At the policy level, the study indicates that in centrally regulated systems such as the Croatian education system, teacher feedback on textbook use should be incorporated into textbook approval criteria and curriculum reform processes to a certain extent, particularly with regard to differentiation, digital functionality, and didactical coherence. In this sense, the study provides evidence that can inform both the design of future textbooks and the refinement of policies governing their selection and use.

A limitation of the study is its reliance on primary teachers' self-reported data, which may not fully reflect actual classroom practice and should be complemented by classroom observations in future studies. Future research should also investigate how textbook use relates to teachers' selection criteria and perceptions of textbook quality, with the aim of identifying user profiles that can inform the design of textbooks which are better aligned with teachers' needs.

Ethical Statement

The study was conducted in accordance with the ethical principles and guidelines for educational research. The participants were fully informed of the purpose and procedures of the research. Participation was voluntary and data were anonymised to ensure confidentiality and privacy. The research was approved by School of Applied Mathematics and Informatics, University of Osijek.

Data Availability Statement

Teachers' textbook use data were deposited at the Repository Dabar (https://repozitorij.mathos.hr/object/mathos:1079).

Disclosure Statement

The authors report there are no competing interests to declare.

When preparing this article, the authors used QuillBot on January 7th, 2026 with the prompt *"Grammar check"* for the purpose of checking grammar. The authors subsequently reviewed and edited the output as necessary and accept full responsibility for the content and integrity of the publication.

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Appendix A

1. Which criteria do you consider most important when selecting a textbook? (Select the three most relevant options.)
   a) Quality and relevance of examples and exercises
   b) Appropriateness of content for students' age and developmental level
   c) Mathematical correctness and precision
   d) Alignment with the official curriculum
   e) Visual and graphic design
   f) Didactical intentions in the textbook
   g) Reputation or expertise of the author
   h) Didactical materials as gift from publisher
   i) Publisher-provided benefits or incentives
   j) I am not responsible for textbook selection
   k) Other

Appendix B

Factor 1: Following the textbook

1. In lessons, I follow the methods recommended in the textbook.
2. I strictly adhere to the structure of the textbook for each lesson.
3. I use textbook content to motivate students when introducing new topics.
4. In the lesson, I emphasize the key points highlighted in the textbook.
5. I use the mathematical language and symbols specific to the textbook during instruction.
6. I draw students' attention to textbook illustrations, photos, and comics.
7. In the lesson, I use rules and procedures in the same form as they are written in the chosen textbook.

Factor 2: Use of textbook tasks

1. I rely on tasks from the textbook when reviewing for an exam.
2. My students receive homework assignments from the textbook.
3. I select exam tasks based on those found in the textbook.
4. I select practice tasks from the textbook.

Factor 3: Using other teaching resources

1. When preparing for lessons, I rely on additional mathematics textbooks.

2. When preparing for lessons, I rely on supplementary materials.
3. I select practice tasks from other sources.

Factor 4: Digital support in teaching

1. I use the digital interactive textbook/platform to motivate students during lessons.
2. I use the digital interactive textbook/platform to introduce new content.
3. I use the digital interactive textbook/platform to support in-class practice.
4. I use the digital interactive textbook/platform to encourage students to independently learn new material.
5. I use the digital interactive textbook/platform to facilitate differentiated instruction.
6. I use the digital interactive textbook/platform to assign homework.
7. I use the digital interactive textbook/platform to design written assessments.

Biographical note

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