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| Research Article / Araştırma Makalesi |

Investigating the contextual realism levels of the mathematics contents in curriculum resources in Türkiye

Türkiye müfredat kaynaklarındaki matematik içeriklerinin bağlamsal gerçeklik seviyelerinin araştırılması

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Keywords

1.Realistic mathematics education
2.Mathematics textbooks
3. Centralized exams
4. Curriculum resources
5. Contextual reality

Anahtar Kelimeler

1.Gerçekçi matematik eğitimi
2.Matematik ders kitapları
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Abstract

Purpose: The current study aims to investigate the realistic level of curriculum resources (textbooks and national examinations) in Turkey.

Design/Methodology/Approach: Being qualitative in nature, the current study utilized the document analysis method to examine contextual reality aspects of curriculum resources. The source for this study comprises the centralized assessments for secondary education institutions (CASEI) implemented since 2018 and a middle school mathematics textbook. 749 content items (609 from textbooks and 140 from examinations) were investigated in order to determine the realistic structure of the curriculum resources. In order to reveal the contextual reality level of mathematical problems, I have utilized a rubric including event, question, language use, existence of information/data, realism of information/data, specificity of information/data, and affective purpose aspects.

Findings: The results indicated that a significant portion (more than 90%) of the questions in textbooks and in exams remain at the poor-fit level. In contrast, the number of questions reaching the good-fit level in terms of contextual realism is quite limited, with only 3 items in textbooks and 4 items in CASEI. The results of the current study also reveal that some items from both sources fall into the stereotyped score level in terms of total score but are categorized as poor-fit contextual reality due to inadequacies in one or more core components of contextual realism. When evaluating the competency statuses of the contextual reality components in the CASEI and textbook questions, it is observed that the majority of questions are largely inadequate in components other than language use. In particular, the rate of inadequate problems is notably higher in the question, specificity of information, and affective purpose components. On the other hand, in addition to the language use component, it can be said that the number of questions with acceptable competency in the realism of information and event components, although at low rates, is higher than the other components. Furthermore, compared to textbooks, the number of questions in CASEI with partial sufficient and sufficient competency for each component is higher.

Highlights: The results of the study indicated curriculum resources' in adequacy regarding contextual reality framework. The results discussed in detail, and suggestions were provided accordingly. Further research is required to gain a comprehensive understanding of the reflections of the inadequacies identified in this study on teachers and students. Additionally, intervention studies to enhance the contextual relevance levels of the problems will contribute to the existing literature on this topic. It is also recommended that research be conducted to examine the reflections of the competencies related to contextual realism in different curriculum resources.

Öz

Çalışmanın amacı: Bu çalışma, Türkiye'deki müfredat kaynaklarının (ders kitapları ve ulusal sınavlar) gerçeklik düzeyini araştırmayı amaçlamaktadır.

Materyal ve Yöntem: Nitel bir doğaya sahip olan mevcut araştırma, müfredat kaynaklarının bağlamsal gerçeklik durumlarını incelemek için doküman analizi yöntemini kullanmıştır. Bu çalışmanın kaynağını, 2018 yılından itibaren uygulanan ortaöğretim kurumları için merkezi sınavlar (CASEI) ve bir ortaokul matematik ders kitabı oluşturmaktadır. Müfredat kaynaklarının gerçeklik yapısını belirlemek amacıyla 749 içerik (609 ders kitabından ve 140 sınavdan) incelenmiştir. Matematiksel problemlerin bağlamsal gerçeklik düzeyini ortaya koymak amacıyla, olay, soru, dil kullanımı, bilgi/veri varlığı, bilgi/veri gerçekçiliği, bilgi/veri özgüllüğü ve duyuşsal amaç unsurlarını içeren bir rubrik kullanılmıştır.

Bulgular: Sonuçlar, ders kitaplarındaki ve sınavlardaki soruların önemli bir bölümünün (%90'dan fazla) düşük uyum seviyesinde kaldığını göstermektedir. Buna karşılık, bağlamsal gerçekçilik açısından iyi uyum seviyesine ulaşan soru sayısı oldukça sınırlıdır; ders kitaplarında yalnızca 3 ve CASEI'de 4 soru bulunmaktadır. Mevcut çalışmanın sonuçları ayrıca her iki kaynaktan bazı maddelerin toplam puan açısından kalıplaşmış puan seviyesine ulaştığını, ancak bağlamsal gerçekliğin bir veya daha fazla temel bileşenindeki yetersizlikler nedeniyle düşük uyum seviyesinde kategorize edildiğini ortaya koymaktadır. CASEI ve ders kitabı sorularındaki bağlamsal gerçeklik bileşenlerinin yeterlilik durumları değerlendirildiğinde, dil kullanımı dışındaki bileşenlerde soruların büyük ölçüde yetersiz olduğu gözlemlenmiştir. Özellikle soru, bilgi özgüllüğü ve duyuşsal amaç bileşenlerinde yetersiz problem oranı dikkat çekici şekilde daha yüksektir. Öte yandan, dil kullanımı bileşenine ek olarak, düşük oranlarda da olsa bilgi gerçekçiliği ve olay bileşenlerinde kabul edilebilir yeterlilik düzeyine sahip soru sayısının diğer bileşenlere göre daha yüksek olduğu söylenebilir. Ayrıca, ders kitaplarına kıyasla CASEI'de her bileşen için kısmen yeterli ve yeterli yeterliliğe sahip soru sayısı daha fazladır.

Önemli Vurgular: Çalışmanın sonuçları, müfredat kaynaklarının bağlamsal gerçeklik çerçevesi açısından yetersiz olduğunu göstermiştir. Sonuçlar detaylı bir şekilde tartışılmış ve ilgili önerilerde bulunulmuştur. Bu çalışmada tespit edilen yetersizliklerin öğretmen ve öğrenciler üzerindeki yansımalarının kapsamlı bir şekilde anlaşılabilmesi için daha fazla araştırmaya ihtiyaç duyulmaktadır. Ayrıca, problemlerin bağlamsal uygunluk düzeylerini artırmaya yönelik müdahale çalışmaları bu konudaki mevcut alan yazınına katkı sağlayacaktır. Bağlamsal gerçekçilikle ilgili yeterliklerin farklı müfredat kaynaklarındaki yansımalarını inceleyen araştırmaların yapılması önerilmektedir.

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INTRODUCTION

Among the goals of mathematics education is to teach students to identify and understand the connection between mathematics and the real world (Niss, Blum & Galbraith, 2007). Realistic problem-solving is now recognized as central to the educational standards of many countries around the world, and they are seen as crucial elements in the current understanding of mathematical competence (Hankeln, 2020). Curriculum documents in many countries clearly support the benefits of relating school mathematics to real life (e.g. Brenner & Moschkovich 2002; Verschaffel, Greer & De Corte, 2000). As one of the process standards and guiding principles for curriculum and assessment, the National Council of Mathematics Teachers (2000, 2009) has consistently emphasized the importance of linking subjects with students' daily lives. Moreover, the reformed mathematics teaching program of Turkey also highlights the use of realistic problems in the mathematics teaching process by requiring applying math content to real-life situations and explaining their connection to reality (MNE, 2024).

Commercial curriculum materials have a significant impact on school practices, which is clearly highlighted by researchers such as Jitendra, Deatline-Bunchman, and Sczesniak (2005). It is essential to note that textbooks are thoughtfully developed in alignment with the national objectives that are outlined in the intended curriculum. These resources play a critical role in shaping the nature of classroom instruction that is based on the implemented curriculum. As a result, textbooks serve as a vital linkage between the curriculum and educators, a relationship pointed out by Viholainen et al. (2015). Furthermore, they symbolize the potentially implemented curriculum, as discussed in works by scholars like Fukkink (2010), Lepik (2015), and Pepin & Haggarty (2001). In investigating research related to the enacted curriculum, it becomes evident that textbooks exert a considerable influence on teaching methodologies. This influence stems from the fact that teachers tend to closely adhere to the topics, problems, tasks, and instructional strategies that are presented in textbooks while planning their lessons (Ulusoy & Incikabi, 2023). This adherence continues through various classroom activities, the assignment of homework, and the introduction of new subjects to students (Gracin, 2011; Gracin & Matić, 2016; Haggarty & Pepin, 2002; Pepin & Haggarty, 2001). In this intricate context, it is crucial to conduct a thorough examination of how the expectations outlined in mathematics curricula regarding realistic mathematics education are reflected within the contents of textbooks. This investigation could reveal important insights into the alignment between curriculum expectations and teacher practices in mathematics education.

Many countries employ national exit examinations to certify and signal the achievements of secondary school students to universities and employers. Bishop (1998) defined curriculum-based exit examinations as producing “signals of student accomplishment that have real consequences for the student, define achievement relative to an external standard, not relative to the other students in the classroom or the school …, are organized by discipline and keyed to the content of specific course sequences …, signal multiple levels of achievement in the subject …, cover almost all secondary school students …, and assess a major portion of what students studying a subject are expected to know or able to do (Bishop 1998, pp. 171, 172). ” Standardized tests may also influence a teacher’s choice of content for classroom instruction. In fact, an earlier study of teachers’ responses to hypothetical schools indicated that, when a school district reports test results by grade level in the local newspaper, standardized tests may function as one of the strongest sources of curriculum influence (Floden et al. 1981). In a study of the high school curriculum in Korea, Kim (2005) claimed that the college entrance examinations have significantly influenced high school classroom teaching-learning activities, yielding a curriculum different from the formal curriculum. Besides the textbooks’ adaptation of real-life situations, analyzing real-life skills addressed in standardized exams, which have the potential to guide classroom practices, is important in terms of meeting curriculum expectations regarding the application of mathematics to real-life situations. Hence, the current study aims to investigate the contextual reality level of curriculum resources (textbooks and national examinations) in Turkey. For this purpose, I addressed the following research question in this study: When evaluated within the framework of contextual problems, what are the levels of contextual realism in the problems presented in textbooks and in the high school entrance examinations?

Contextual problems in mathematics education

The extensive literature on the various contextual properties of mathematics problems highlights the crucial significance of incorporating real-world applications and cognitive processes in the context of problem-solving. This emphasizes how these elements profoundly influence student engagement and understanding throughout the learning process. Research consistently indicates that integrating contextual elements into mathematics instruction not only significantly aids in the development of essential problem-solving skills but also fosters a much deeper and more comprehensive understanding of various mathematical concepts (e.g., Bonotto, 2007; Marco & Palatnik, 2023). Numerous studies have compellingly shown that when students encounter mathematics problems that are framed within relatable real-life scenarios, they are far more likely to engage meaningfully with the material and apply their accumulated knowledge effectively in various situations (Reinke & Casto, 2020; Verschaffel et al., 2020). Consequently, real-world problems have notably emerged as a pivotal and critical element in mathematics curricula worldwide, as evidenced by numerous educational frameworks (e.g., MNE, 2018; NCTM, 2000). The mathematics education literature robustly reflects this growing focus, featuring a variety of terms used to describe such problems, including but not limited to, realistic problems, modeling problems, word problems, contextualized problems, context problems, real-world problems, and authentic problems, as noted by Jurdak in two of his significant works (2006, 2016) and Verschaffel and colleagues (2020). In the context of this research, the term "contextually realistic mathematics problems" is adopted intentionally to underscore the

importance of engaging with substantial mathematical ideas and the inclusion of meaningful, relevant real-life contexts that facilitate learning.

The essential components of a realistic problem are a topic of significant and ongoing discussion among task developers in the field of education and problem-solving methodologies (Palm, 2006). In this regard, Palm's comprehensive framework (2008, 2009) stands out for its thoroughness and detailed analysis of what constitutes a realistic problem. According to Palm (2008), five fundamental elements serve to characterize a realistic problem: event, question, purpose, language, and information/data. The term "event" is understood to refer to scenarios that either occur in reality or have a plausible chance of occurring in real-life situations. Within this context, the "question" emphasizes the essential relationship between tasks assigned in educational settings and their analogous situations that may exist outside the classroom. Moreover, the "purpose" denotes that the objective of the task should be clear, straightforward, and uncomplicated for the learner to grasp. Additionally, research on realistic problems has underscored the importance of affective elements in problem-solving and problem-posing, alongside the cognitive factors that learners engage with (Jonassen, 2000; Jonassen & Tessmer, 1996). Consequently, the affective aspect related to the overall purpose has been integrated into the criteria for real-world problems of this nature. The dimension of language encompasses the terminology, sentence structure, and overall length of text utilized to express the task in a manner that is comprehensible and beneficial to students. Lastly, the information/data category is further categorized into three critical aspects: the availability of information/data, the realism of that information/data, and the specificity of the information/data presented. The availability aspect ensures that the information provided is appropriately aligned with the knowledge and context relevant to the modeled situation being addressed. The realism aspect emphasizes that figures and values used are credible, either matching or closely resembling those found in the theoretical scenario proposed. Finally, the specificity aspect signifies that the scenario described in the task represents a distinct and clearly defined situation, complete with identifiable entities, objects, and locations.

METHODOLOGY

Being qualitative in nature, the current study utilized the document analysis method to examine realistic aspects of curriculum resources. Document analysis includes recording the existing records and documents related to the subject to be investigated and then coding these documents according to a certain norm or system (Cohen, Manion, & Morrison, 1994).

Data Collection Sources

In Turkey, centralized secondary school transition examinations have been conducted since 1998 to assess primary school student's achievements and improve the quality of education, undergoing five changes in terms of content and implementation processes. Particularly, the fact that Turkish students lag behind in international competition (as seen in the results of assessments like TIMSS and PISA) has led to a reevaluation of the education, teaching, and assessment systems (Gündoğdu, Kızıltaş, & Çimen 2010). In this context, the transition system to high schools was reorganized starting in 2018. In this system, centralized assessments were conducted only at the 8th grade for secondary education institutions that will admit students through examination, with a shift in exam question contexts (MEB, 2018b), moving to a format known as 'new generation' questions, which emphasize mathematical literacy and real-life skills (Atasoy, 2019; Dolapçıoğlu, 2020; 25. Incikabi, Sadak, & Incikabi, 2023; Korkmaz, Tutak, & İlhan, 2020; Ünal, 2019). This exam, administered centrally by the Ministry of National Education across Turkey, allows students in the 8th grade of public and private high schools, Imam Hatip high schools, and temporary education centers to gain admission to Science High Schools, Social Science High Schools, Special Program and Project Implementing Educational Institutions, and the Anatolian Technical Programs of Vocational and Technical Anatolian High Schools (MNE, 2018). In this context, the examination source for this study comprises the centralized assessments for secondary education institutions (CASEI) implemented since 2018.

In this study, the textbooks were selected based on a purposive sampling strategy. This study aims to examine the levels of realism in curriculum resources within the context of textbooks and national examinations. Since 2018, Turkey has revised the transition system to secondary education, introducing a national examination based on mathematical literacy targeting 8th-grade topics and administered to 8th-grade students. Therefore, it was deemed appropriate to analyze 8th-grade textbooks to ensure alignment between exam and textbook content. In this regard, a textbook approved for use in public schools by the Ministry of National Education (MNE) and currently in use has been included in the scope of this review.". Turkey utilizes standardized textbooks in their classrooms, and textbooks are compulsory in primary and secondary education. The adoption of a textbook for instruction depends on the approval of the Ministry of National Education. Turkish textbooks are evaluated on the basis of four basic dimensions: (1) conformity to the instructions of the Ministry of National Education, (2) scientific competence, (3) the level of achievement of instructional objectives, and (4) the quality of visual and content design. .

Contents of the Curriculum Sources

I used problems and examples as the content of the analysis. Textbooks covered these contents under the headings of "problems," "exercises," and "examples". In this regard, Table 1 shows the distribution (f) of the contents to be analyzed in textbooks and centralized assessments for secondary education institutions (CASEI). According to Table 1, a total of 749 content items (609 from textbooks and 140 from examinations) were investigated in order to determine the realistic structure of the curriculum resources.

Table 1. Content distribution across the curriculum sources (f)

Source of the Content	Problem	Exercises	Examples
Textbook	39	274	296
CASEI	140		

Coding procedures

The system developed by Vicente and Manchado (2016) was utilized to ascertain the contextual reality level of the mathematics problems. The system was augmented with components of affective purpose, drawing from the seminal study of Tran et al. (2020). The final version of the analytical system, designed to determine the contextual reality level of mathematical problems, considers the following aspects: The event, the question, the language use, the existence of information/data, the realism of information/data, the specificity of information/data, and the affective purpose (see Table 2).

Table 1. A framework for analyzing of the level of contextual reality of mathematics problems

Core components	Insufficient	Partially sufficient	Sufficient
Event	Imaginary or fictitious	Possible but unlikely outside of school	Probable that the student will have the opportunity to engage outside of the school environment.
Question	Could not be asked in the real life setting.	Possible, but of limited interest to students.	Reasonable; its answer has practical value in real life
Language use	Complex terminology and unconventional sentence structure impede students' engagement with the problem.	The issue may be challenging terminology and/or inappropriate sentences. However, this did not impede effective problem-solving.	The issue is not complex terminology or unconventional grammar, as long as these are not used in real-world situations.
Existence of information/data	The information is not consistent with reality.	The information may exist in reality but is seldom found	The information is consistent with data that can be verified in the physical world.
Realism of information/data	The problem situation lacked the inclusion of realistic values and numbers.	Some data is consistent with the values and variables observed in the scenario, exhibiting a high degree of correlation.	The numbers and values given are realistic in the sense of identical or very close to the corresponding numbers and values in the problem situation.
Specificity of information/data	Neither the subjects nor the objects involved are specified.	The situation is not specific, but the objects, roles, or names of the people are	People with names, defined objects and specific places
Affective purpose	The problem does not contain any expressions of purpose; there is no social, cultural, moral or intellectual need to solve the problem.	There is a purpose statement in the problem, but there is no social, cultural, moral, or intellectual need for solving the problem.	The purpose of the problem is clearly stated, and the context provides a social, cultural, moral, or intellectual need for solving the problem.

To assess the contextual realism of the problems analyzed, a three-level scoring system was developed. Each problem was evaluated across seven aspects, with scores of 1, 0.5, or 0 assigned to each. A score of 1 indicated that the aspect was presented in a way closely aligned with students' real-life experiences. A score of 0.5 was given when the aspect, while theoretically possible, was unlikely to occur in students' everyday lives. A score of 0 was used when the aspect was deemed implausible or disconnected from students' typical experiences. The sum of these scores determined the overall realism score for each problem. Problems were then categorized into three levels based on the total score, as defined in Table 3.

Good-Fit Problems were those scoring between 6 and 7 points. These problems accurately reflected everyday contexts familiar to students and demonstrated clear purpose, accessible language, realistic data, and affective relevance. For example, a problem involving the preparation of a dessert for a dinner gathering, which required careful time planning based on real-life recipe instructions, received full marks across all evaluated aspects. Stereotyped Problems, with total scores ranging from 4 to 5.5, included contexts that were technically feasible but less commonly experienced by students or presented with vague or generalized information. These problems often included flexible or nonspecific details that could apply to a broad range of contexts. Although some linguistic or structural issues were present, these did not significantly hinder problem comprehension or resolution. Poor-Fit Problems received scores of 3.5 or lower and were characterized by missing or underdeveloped contextual elements. These problems often presented unrealistic or unclear scenarios and prioritized procedural computation over meaningful problem-solving. An example includes a travel-based problem that asks students to compute arrival time without providing a practical or affective rationale for doing so.

To ensure the validity and reliability of the scoring, two independent experts with doctoral degrees in mathematics education and research backgrounds in contextual problems were recruited. Each expert independently coded the problems using the

defined criteria. Inter-rater reliability was calculated using Miles and Huberman's (1984) formula, yielding an initial agreement rate of 81.5%. Disagreements were discussed and resolved through consensus, resulting in a finalized and agreed-upon dataset for analysis.

Table 3. Levels of contextual reality according to the score of each problem on each aspect

Type	Event	Question	Language use	Existence of Info.	Realism of Info.	Specificity of Info.	Affective Purpose	Problem Score
Good-fit	1	1	1	1	1/0.5	1	1/0.5	6-7
	1	1	1	1	1	1/0.5	1/0.5	
Stereotyped	1	1	1/0.5	1	0.5	0.5	0.5	5/5.5
	1	0.5	1/0.5	0.5	0.5	0.5	0.5	4/4.5
	0.5	1	1/0.5	0.5	0.5	0.5	0.5	
Poor-fit	0.5	0.5	0.5	0.5	0.5	0.5	0.5	3.5
	1/0.5	1/0.5	0.5	0.5	0.5	0		
	1/0.5	0.5	1	0.5	0			
	1/0.5	1/0.5	1	0				
	1/0.5	0.5	0					
	0.5	0						
	0							

Note: Following Palm and Burman (2004), when a main aspect scored 0, the analysis was halted, and a total score of 0 was assigned.

Ethical Issues

This study does not involve any living subjects, so there is no situation involving an ethical violation. Care has been taken to ensure that the selected samples for analysis do not contain any elements that could disadvantage any individual, gender, group, or race.

FINDINGS

Figure 1 illustrates the levels of contextual realism of the questions included in the examined resources. Upon reviewing the figure, it is evident that a significant portion of the questions remains at the poor-fit level, with 98% (f=595) in textbooks and 93% (f=130) in exams. The number of questions reaching the good-fit level in terms of contextual realism is quite limited, with only 3 items in textbooks and 4 items in CASEI.

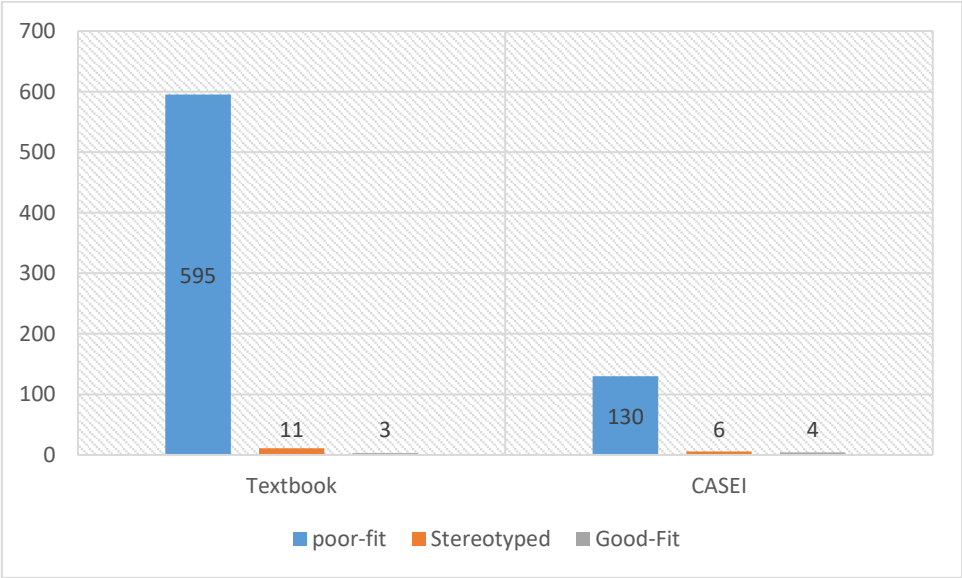

Figure 1. Contextual reality levels of the curriculum resources

Table 4 presents the total realism score distributions of problems included in curriculum resources. A general review shows that a significant portion of the problems (409 out of 609 in textbooks and 54 out of 140 in exam questions) have a total score of 1. Only 36 questions in textbooks (about 5%) and 29 questions in LGS exams (20%) surpassed the threshold score of 3.5, which is one of the criteria to qualify above the poor-fit level. Additionally, the table displays the total scores of problems within the poor-fit category. Accordingly, 22 textbook items and 19 exam items (colored in grey) fall into the stereotyped score level in terms of

total score but are categorized as poor-fit contextual reality due to inadequacies in one or more core components of contextual realism (receiving a score of 0).

Table 2. Contextual reality scores of curriculum resources (%)

	Contextual Reality Total Scores												
	1	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6	6.5	7
Textbook	409	41	27	32	34	30	13	13	3	4	3		
Poor-fit	409	41	27	32	34	30	12	7	2	1			
CASEI	54	13	11	14	15	4	9	8	4	4	2		2
Poor-fit	54	13	11	14	15	4	8	5	3	3			
	Poor-fit score zone						Stereotyped score zone				Good-fit score zone		

Table 5 presents the distribution of questions found in the textbook and CASEI exams according to the components of contextual reality. The last column shows the percentages of questions that provide acceptable competency (partial sufficient or sufficient) based on the framework employed during the analysis process. According to the table, the language use component is addressed with adequate competency in both the textbooks and CASEI in relation to contextual reality. When evaluating the competency statuses of the textbooks across other components, it is noteworthy that the majority of questions (ranging from 70% to 90%) are inadequate, particularly in the components of question, specificity of information, and affective purpose, where the rate of inadequate problems is notably higher. On the other hand, in addition to the language use component, it can be said that the number of questions with acceptable competency in the realism of information and event components, although at low rates, is higher compared to the other components. When evaluating the competency statuses of the contextual reality components in the CASEI questions, it is observed that the majority of questions are largely inadequate in components other than language use. In particular, the rate of inadequate problems is notably higher in the question, specificity of information, and affective purpose components. Furthermore, compared to textbooks, the number of questions in CASEI with partial sufficient and sufficient competency for each component is higher. Additionally, it can be stated that there is a greater presence of questions with acceptable competency in the realism of information and event components.

Table 5. Distribution of competencies for the contextual realistic core components (%)

		Competency Level			
Source	Core Component	Insufficient	Partially Sufficient	Sufficient	(PS+S)
Textbook					
	Language Use	0.0	0.3	99.7	100.0
	Event	80.3	15.4	4.3	19.7
	Question	89.3	9.9	0.8	10.7
	Existence of Information	83.1	14.3	2.6	16.9
	Realism of Information	73.7	19.0	7.2	26.2
	Specificity of Information	87.5	6.4	6.1	12.5
	Affective Purpose	86.9	12.2	1.0	13.2
CASEI					0
	Language Use	0.0	0.7	99.3	100
	Event	52.1	34.3	13.6	47.9
	Question	72.9	16.4	10.7	27.1
	Existence of Information	64.3	22.1	13.6	35.7
	Realism of Information	55.7	30.7	13.6	44.3
	Specificity of Information	76.4	15.0	8.6	23.6
	Affective Purpose	71.4	24.3	4.3	28.6

DISCUSSION

The current study aimed to investigate the contextual reality level of the questions placed in the mathematics textbooks and CASEI centralized exams in Turkey. The results indicated that a significant portion (more than 90%) of the questions in textbooks and in exams remain at the poor-fit level. In contrast, the number of questions reaching the good-fit level in terms of contextual realism is quite limited, with only 3 items in textbooks and 4 items in CASEI. Bridging school mathematics and real-life situations has been one of the goals of mathematics education reforms, and in several studies, the mathematics education community

emphasized the potential benefits of integrating mathematics into real-life contexts on students' understanding of and motivation toward mathematics (Chapman, 2006; Gainsburg, 2008; Lee, 2012; Savard & Polotskaia, 2017). In this context, aligning the content of textbooks and standardized exams with real-world applications is critical, as these resources serve as direct reflections of educational philosophies within the classroom. When textbooks and exams lack relevant real-life connections, there is an increased risk that these skills may be neglected during classroom applications (Darling-Hammond, Ancess, & Falk, 1995; Kim, 2005; Rasmussen, 1997). Studies show that students in a such classroom setting persistently approach word problems with a calculational orientation (Thompson, Philipp, Thompson, & Boyd, 1994) and typically do not take into account realistic considerations about the problem situation (Cooper & Harries, 2003; Dewolf, Van Dooren, Hermens, & Verschaffel, 2015). This behavior leads to underachievement; the students do not make sense of the problem situation, and hence cannot show their full potential in solving problems from daily life (İncikabı, Ayanoğlu, & Uysal, 2020). There are indications from several studies that this effect might be counteracted or avoided by making the problem situations or the representation of the problem situations more authentic for the students (Palm, 2002, 2006, 2008, 2009; Verschaffel, Greer, Van Dooren, & Mukhopadhyay, 2009). Additionally, the limited emphasis on contextual reality in curriculum resources may negatively impact student learning and motivation. (Marco & Palatnik, 2023; Reinke & Casto, 2020). Rich contextual tasks have the potential to support students' mathematical learning, problem-solving, and motivation to learn (Cordova & Lepper, 1996; Walkington, Sherman, & Petrosino, 2012). The real-life context might help students to make sense of the mathematical relations involved in the problem and, on the other hand, might encourage students to check whether the solutions mathematically and contextually make sense, understanding of and motivation toward mathematics (Savard & Polotskaia, 2017). Moreover, the lack of real-life connections in textbooks particularly affects teachers' expectations of these resources. Prior studies indicate that teachers and students pay little attention to contexts described in traditional textbook tasks, and do not consider them a source for meaningful connections to "real-world" mathematics (Gainsburg, 2008; Wernet, 2009).

The results of the current study also reveal that some items from both sources fall into the stereotyped score level in terms of total score but are categorized as poor-fit contextual reality due to inadequacies in one or more core components of contextual realism. This situation indicates that, with small touches to the weak components, the realism of the questions in the examined resources can be elevated to the desired good-fit level. In this regard, it is posited that activities and application studies designed to enhance the awareness of content developers and evaluators regarding the fundamental components of contextual reality would be advantageous. Such initiatives are likely to foster a more relevant and effective educational experience, thereby aligning assessment practices with real-world applications. When evaluating the competency statuses of the contextual reality components in the CASEI and textbook questions, it is observed that the majority of questions are largely inadequate in components other than language use. In particular, the rate of inadequate problems is notably higher in the question, specificity of information, and affective purpose components. On the other hand, in addition to the language use component, it can be said that the number of questions with acceptable competency in the realism of information and event components, although at low rates, is higher than the other components. Furthermore, compared to textbooks, the number of questions in CASEI with partial sufficient and sufficient competency for each component is higher. This situation shows that, although not at the desired levels, the questions included in exams are closer to reality. The transition to certain prestigious high schools was based on student scores at CASEI, measured reasoning ability and logic within the framework of the PISA and TIMSS assessments. Studies exist in which the core components of contextual realism are demonstrated at varying levels of competency. Palm and Burman (2004) examined the content of Finnish and Swedish upper secondary school national assessments and revealed that these assessments were significantly inadequate in simulating real-life contexts, particularly regarding their purpose and data/information characteristics.

This study elucidates the contextual reality competencies inherent in mathematical problems as presented in mathematics textbooks and high school transition exams. Further research is required to gain a comprehensive understanding of the reflections of the inadequacies identified in this study on teachers and students. Additionally, intervention studies to enhance the contextual relevance levels of the problems will contribute to the existing literature on this topic. It is also recommended that research be conducted to examine the reflections of the competencies related to contextual realism in different curriculum resources.

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Statements of publication ethics

I/We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

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