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TITLE EMPHASIZING THE SENSE OF NUMBER IN CARTOONS: THE EXAMPLE OF THE CARTOON NAMED "YADE YADE"

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Abstract:
In this research, the cartoon "Yade Yade" broadcasted on TRT Çocuk, Turkey's national channel where programs for children's education are broadcast, was examined in terms of number sense components. In this context, 52 episodes of the cartoon "Yade Yade", which has been broadcast on TRT Çocuk since 2020, were used as data sources. Document analysis method was used in data analysis. The 52 episodes of the cartoon "Yade Yade" were examined in terms of number sense components (counting aloud, measuring concepts, nonverbal calculation, number identification, and quantity discrimination) used by Lago and DiPerna (2010). When the number components were analyzed for each section, it was seen that the measuring concepts component was mostly emphasized. This number sense component was followed by number determination, recognizing quantity, counting aloud and nonverbal calculation components. Various suggestions were developed in line with the results of the study. "Yade Yade" cartoon can be used for educational purposes in mathematics lessons in schools to emphasize the number sense, especially the component of measuring concepts. This and similar cartoons can be analyzed in terms of content and concept teaching can be realized in lessons.

Keywords: number sense, cartoons, document analysis

1. Introduction

Mathematics is defined as a language used to express relationships between objects, events, and times (Clarke & Shinn, 2004). The primary purpose of teaching for schools is the development of students with mathematical skills. Mathematical proficiency, which

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includes the ability of individuals to understand, solve and apply mathematical issues, is becoming more and more essential for all individuals today. Especially 21st century technology jobs and many other daily activities require a mathematical ability (Mazzocco & Thompson, 2005). Curriculum and assessment standards for school mathematics in the United States [NCTM, 1989] and the National paper on mathematics for Australian schools [AEC, 1991] identify the development of "number sense" as an important core output of school mathematics.

Researchers have introduced various definitions and classifications of number sense (McIntosh et al., 1992; Reys et al., 1999; Yang, 1995). Number sense refers to the general understanding of numbers and operations, along with the ability and tendency to use this understanding in flexible ways to make mathematical judgments and develop useful and efficient strategies for managing numerical situations (Reys et al., 1999). Number sense is defined as the ability of people to understand and use numbers and mathematical concepts. In particular, the development of children's sense of number is important in mathematics education in terms of associating numbers by creating concrete concepts rather than abstract concepts, associating numbers with symbols, understanding the relationship between numbers, and making sense of operations in numbers.

Number sense is defined differently by different researchers and divided into different components. Five components related to number sense were created by Reys et al. (1999). These components appear as understanding the meaning and magnitude of numbers, using equivalent representations of numbers, the effects, and meanings of operations, using a benchmark (reference) point in measurement, and counting strategies for mental and written calculations, and flexibility in calculation. Number sense, asserted by Yang (1995), consists of six components: understanding the meanings of numbers, decomposing and recombining numbers, number sizes, the use of benchmarks, the effect of operations on numbers, flexibility in applying number and operation knowledge to computational situations. Number sense components were discussed under three headings by McIntosh et al. (1992). These components include number concepts, operations with numbers, and applications of numbers and operations. This proposed framework is an attempt to articulate a structure that clarifies, organizes, and relates some of the generally agreed upon components of the basic number sense, many of which have been estimated by different people over many years (McIntosh et al., 1992). There are also interconnections (number, operations, and settings) between these components. These interconnections suggest a monitoring process that associates number sense with metacognition. A person with a good number sense thinks and reflects on numbers, operations, and the results produced (McIntosh et al., 1992).

While there are minor differences between operational definitions of the number sense, several tasks are consistently cited across these definitions (Lago & DiPerna, 2010). The most frequently measured tasks related to numbers include quantity discrimination (size comparison), counting objects, counting aloud, number identification, basic

computation, estimation, understanding measurement concepts, number generation, and identifying a missing number (Lago & DiPerna, 2010).

The components of the number sense are the basic skills that constitute people's ability to understand and use numbers and mathematical concepts. The components of number sense include number recognition, number ordering, number classification, measurement, and basic concepts of numbers, reading and writing numbers, and using numbers. These components relate to each other, and many support each other. For example, the ability to read numbers supports number recognition and sequencing skills. All of these components are important, and it is important to develop all of them in order to develop an individual's sense of number.

Number sense manifests itself in a variety of ways as the student engages in mathematical thinking. In particular, it is an important core theme as the student selects, develops, and uses computational methods, including written computation, mental computation, calculators, and estimation. Number sense plays a role in using each of these methods to varying degrees (McIntosh et al., 1992). Number sense helps children learn literacy skills. After children learn literacy skills, they can be more successful in math lessons because they can write numbers and understand the use of numbers. Various games and activities can be used to develop number sense. For example, games to help children recognize numbers, activities to help them learn measures, and problems to use numbers can be presented.

2. Literature Review

When examining the studies conducted on number sense, it can be observed that the effect of parents on their children's number development was examined (Önkol, 2012), the relationship between children's interactive play and verbal language achievements and number sense was investigated (Kilimlioğlu, 2018), the impact of drama method on teaching number and operation concepts to children was examined (Sezer, 2008), the relationship between mathematics learning difficulties and number sense was examined (Tunalı & Demirtaş, 2022), the number sense skills of gifted students were analyzed in terms of number sense components (Er & Dinç Artut, 2022), a measurement tool was developed to determine students' number sense performance (Birgin & Peker, 2021a), and studies related to number sense were reviewed (Birgin & Peker, 2021b). In a study by Çetin and Öztürk (2020), the achievements in the 2018 Mathematics Curriculum were examined according to the basic components of number sense. It is stated that this sense of number is started to be acquired as a basic mathematical skill and intuition during critical periods, namely primary school periods (van de Walle, et al., 2014, p.129). In addition, national studies examining students' mathematics achievement reveal that students' use of number sense is not sufficient (Clarke & Shinn, 2004; Harç, 2010; Kayhan Altay & Umay, 2011; Kayhan Altay, 2010; Markovits & Sowder, 1994; Menon, 2004; Mohamed & Johnny, 2010; Reys & Yang, 1998; Reys et al., 1999; Singh, 2009; Yang, 2005).

Number sense is a complex process involving many different components of numbers, operations, and their relationships, and has been the focus of research and debate among mathematics educators, educational psychologists, researchers, and curriculum developers (Yang et al., 2009). Students' understanding of number operations and the development of number sense play an important role in mathematics achievement (NCTM, 2000). While number sense is a subject of great interest in school mathematics, it is also a vague and difficult subject to describe. Number sense is said to develop gradually through discovering numbers, visualizing them in various contexts, associating them in ways that are not limited by traditional algorithms (Howden, 1989, p. 11). For this reason, there is a need for studies on gaining the sense of number at lower levels, because not understanding what numbers mean creates obstacles to learning mathematics (Ekenstam, 1977, p.317). Since the development of number sense starts from an early age (Atasoy & Karakoc, 2022), studies that examine the number sense in depth are required. For this reason, in this study, it was desired to examine the emphasis on number sense in cartoons.

It is a known fact that audio-visual tools are effective in teaching and attract students' attention (Demirel 2012, p.30). Mass media, which is one of the audio-visual tools, is effective on all individuals, and features can be even more effective in the learning of young children. Young children are constantly encountering television, one of the mass media, in their home environment, and they watch many programs. One of the programs that children watch is cartoons.

A cartoon is a type of animation created by moving drawings. These animations are usually broadcast as entertainment television programs or movies. There are many genres of cartoons, and these genres include comedy, adventure, fantasy, science fiction, and musical. These are just some types of cartoons. Cartoons have many different genres that appeal to different age groups and interests. One of these genres is educational cartoons. Educational cartoons are animated films designed to provide viewers with information and learning on a particular subject. Most educational cartoons are designed for children or teenagers, but some are for adults. Educational cartoons, because they are fun and interesting, usually make learning more enjoyable and attract the attention of children or viewers. Educational cartoons usually provide information on historical, scientific, mathematical, or geographical topics. Educational cartoons are cartoons that are used as educational material, especially for children. Such cartoons are usually designed to support children's academic, social, or emotional development. These movies are presented in a colorful and animated way to make children's learning process fun. Educational cartoons can cover topics that children need to learn, such as animals, plants, numbers, letters, or mathematical concepts. For example, television programs such as "Sesame Street" pioneered many educational cartoons that taught numbers, letters, and other basic concepts.

When reviewing the literature on educational cartoons, various effects of educational cartoons on children have been examined (Darga et al., 2021; Hacıbektaşoğlu, 2014), cartoons have been analyzed in terms of various variables (Albayrak & Kartal,

2020; Çakmak & Koç, 2015; Erişti, 2017; Hamarat et al., 2015; Kılınç, 2013; Seckin Kapucu & Ozcan, 2022), cartoons have been examined conceptually and scientifically (Bayır & Gunsen, 2017; Demiral et al., 2016; Koçak, 2016), and their use as educational materials has been explored (Köprülü, 2016).When these studies were examined, it was mentioned that the importance of cartoons in the education process of preschool children was emphasized, and that the cartoons broadcast on TRT Children's channel contributed positively to the education of children. Considering that educational cartoons are a tool that supports the learning process, there is a need for studies that examine movies in-depth in terms of content. In addition, the development of number sense will make an important contribution to the development of mathematics achievement. For this reason, in this study, it was deemed appropriate to examine the "Yade Yade" cartoon in terms of number sense, considering the mathematical concepts involved. This study, designed in a qualitative design, contains originality in terms of in-depth examination of the number sense components, which have an important place in mathematics teaching and in daily life, in the episodes of the cartoon Yade Yade, which has been broadcast since 2020 on TRT Cocuk, the national channel of Turkey.

In this research, it is aimed to examine the cartoon "Yade Yade" broadcast on TRT Child, the national channel of Turkey, where programs for children's education are broadcast, in terms of number sense components. For this purpose, answers to the following questions were sought:

1) What is the level of the content of the 'counting aloud' component, one of the number sense components, in the cartoon titled 'Yade Yade'?
2) What is the level of the content of the "measuring concepts" component, one of the number sense components, in the content of the cartoon named 'Yade Yade'?
3) What is the level of the content of the "non-verbal calculation" component of the number sense components in the cartoon titled "Yade Yade"?

3. Material and Methods

3.1. Research Model

Document analysis was used as a data collection method in this research, which was designed in accordance with qualitative research. Document analysis is defined as the systematic process of reviewing and evaluating printed and electronic (computer-based and internet-enabled) documents (Bowen, 2009). Document analysis describes it as the primary research data source used in collecting, examining, querying, and analyzing various forms of written text (O'Leary, 2017). In this study, document analysis was preferred in order to examine the contents of cartoons, which are among the visual documents.

3.2. Examined Documents

Documents are classified in different ways by different researchers (Merriam, 2009). These classifications include popular culture documents such as social media, radio,

newspapers, cartoons, and visual documents such as movies, videos, and photographs (Bogdan & Biklen, 2007). The visual document examined in this study is the 52 episodes of the cartoon named "Yade Yade", which was broadcast on TRT Children's channel from April 23, 2020 until today. Since it is a national channel that can be accessed by everyone, the cartoon "Yade Yade" is important for the accessibility of preschool and school-age children. The content of this cartoon, which is prepared for pre-school and school-age children, has an emphasis on number sense, which is an important subject in mathematics. For this reason, the cartoon named Yade Yade was chosen in this study. Information about the examined cartoon named "Yade Yade" is given in Table 1.

Table 1: Information on the Cartoon Named Yade Yade

Episode	Episode Name	The topic of the episode	Duration	Keywords
1	Lost Pages	Yade helps find Mati's missing pages.	14.32	Counting from 1 to 10
2	Materials in the Bag	Yade asks Mati, who missed the school bus, why he missed it? She helps Mati by sorting out the materials requested from the school.	14.08	Counting from 1 to 10
3	Golf Time	Mati and Yade will play golf. Yade starts the game with Mati, but Yade helps when Mati messes up the color sequence.	14.17	Colors
4	Mixed Fruit Festival	Ustaçi has separated the fruits to make juice. The colors mix when Mati presses the wrong button. With the help of Yade and her friends, the problem is solved.	14.15	Red, purple, orange
5	Little Painters	While Yade is painting, her friends also want to paint, but they mix colors. They learn colors with Yade's help.	14.19	Green, blue, brown, yellow
6	Three Rickshaws	Mati and his friends are trying to move items, but they have difficulties when they put them on top of each other. With Yade's help, the problem is solved.	15.40	Summation, increment
7	Crowded Picnic	Yade will go on a picnic with Mati. They share their food. A surprise is waiting the couple at the picnic.	13.29	Short, long, equal division
8	Confused Wanderers	Mati and his friends confuse the road on their way to the village. Yade helps them to solve the problem with maps and signs.	14.51	Bottom, top, up, down
9	Mosaic Road	Ustaçi and his friends are trying to make stones for the newly built road. Yade helps in road construction.	15.35	Triangle, square, circle, corner
10	Motif Exhibition	Mati and her friends mix motif materials. Yade helps them find the pattern.	15.36	Pattern
11	Roller Coaster	Together with Yade, Mati and Mat Mats, they had so much fun while waiting in line for the roller coaster.	13.53	Length measuring, weight
12	Ustaçi's Garden	Yade and Mati go to Ustachi's garden. They help the Ustaçi to water his flowers.	14.01	Small, big, little, a lot
13	Market Place	Yade helps Mati and his friends to set up and organize their stalls in the marketplace.	15.02	Addition, plus, minus, symbol
14	Postman	Because Mati did not know the numbers 11 to 20, he mishandled the mails.	13.50	Counting

15	The Birthday Surprise	Yade and her friends are preparing a birthday surprise for Ustaçi.	11.35	Counting from 1 to 10
16	Spring Mess	Spring cleaning has been done in Mat Mat village, but there are some problems.	13.17	Short, medium, long, shorter, longer
17	Tree House	Ustaçi will build a tree house, and his friends will help him; but the boards get mixed up.	12.32	Short, medium, long
18	Wrong Feet	Mati takes off the legs of the chairs because he misunderstood Ustaçi .	11.47	Lengths, short, medium, long
19	Vehicle of Help	Yade and her friends plan to take the unused items to the neighboring village.	12.06	Addition, equal
20	Volleyball Court	The team wants to play volleyball, but there is confusion due to the wind.	11.19	Space, division, circle, square, equal parts
21	Hide and Seek	Yade became a midwife in the game of hide and seek, but her friends did not understand the game well.	10.52	Front, back, height order
22	Garden Plan	Bahçeçi has started planting the vegetables, but everyone is stepping where they planted seeds.	13.00	Area, line point, perimeter,
23	Treasure Hunt	Şefi who prepares the treasure race distributes the puzzles to the teams.	11.45	Sequence, pattern, addition,
24	Challenging Race	Mati is preparing for the village olympics, but somehow the robot can't pass the bug.	12.54	Long, short, medium
25	Corrupted Clock Tower	Since the clock tower doesn't work, morning, noon and evening times are confused.	12.46	Morning, noon, day night, evening,
26	Jam? Marmalade?	The traditional product of the village will be chosen, but it is not easy to decide.	11.50	Long, short, sequence
27	Theatre	Theatre will be performed in the village, but the script pages are mixed.	11.12	Streaming, symbol,
28	Dinner Table	Ustaçi's guests are coming from far away there is confusion in the ingredients while preparing the meals and Yade and her friends help him to solve this mess.	12.53	Zero, numbers
29	Picnic Trip	Yade and her friends are going to the picnic, but they do not think about how to carry the materials they prepared. Yade tries to solve this problem.	12.05	Light, heavy, less, more
30	Balloon Trip	Mati wants to go on a balloon trip, but the balloon never takes off. Yade helps its fly by grouping the weights of the materials puts into it.	11.23	Heavy, light
31	The day of Syrup	Yade helps her other friends for the day of syrup. First she saves Ustaçi from the bucket on this head. Then for the syrup they carry water.	10.06	Heavy, light
32	Summer Festival	The neighboring villages are invited to the summer festival in Mat Mat village. Mishaps occur during the preparations for the celebration. It's up to Yade to fix things.	11.03	Addition, plus, more, equal
33	Adventure for the Flag	Mati will have a difficult journey to put the flag. Yade will help him with his problems on this journey and they will reach the top.	11.01	Dividing equal to two, middle
34	Mat Mat Wagon	Bilgeçi makes a "Mat Matt Wagon" that will cut the travel time between village and farm in half. Yade gives a detailed explanation to Mati about back and forth. They start their test drive. It describes what happened while driving.	10.16	Back and forth

35	Kite	Yade sees her friends trying to fly a kite and goes towards them. Meanwhile, the rope breaks and the kite flies. Yade helps her friends to build a new kite.	11.12	Line, point, line segment, top
36	Mysterious Sculptures	Yade and her friends find very valuable sculptures at the excavation site. They need to take them to the car to take them to the museum because some sculptures are heavy so it is a problem to carry them.	11.34	Pattern, heavy, light, sequence
38	Camping Time	Yade and friends will camp. While doing chores at the camp, Mati has problems about the time. Yade teaches time to Mati.	12.14	Minute, hour, noon evening, yesterday, tomorrow,
39	Elevator Clutter	Elevator engine breaks down, Yade helps to determine how much items Şefi and Mati can carry.	12.29	Chart, light, heavy
40	100 Tree Forest	Şefi decided to plant trees in the barren field so that Sporçi and her friends could do sports in a clean air	13.42	counting to 100
41	Precious Stone	Yade ve Mati, start looking for the matalite stone. Yade helps Mat Mats in solving the problem.	11.28	Large, medium, small,
42	Model of Bilgeçi	One fine day in Mat Mat Land, the robot bug holds a mock-up of Mat Mat hills. It falls when lose its balance. Yade and her friends find a solution to this problem by fixing it together.	12.24	Counting numbers up to 10
43	Sports Field	A sports field was established in Mat Mat Land, but the sports field is scattered. Yade groups objects according to their size, making everything more orderly.	12.26	Large, medium, small
44	Great İnvention	Mati and Bilgeçi go on a journey of discovery, Yade helps her friends find out what items to get Mat Matlar.	12.31	Big, small, heavy, light, same size
45	Snow Time	There is a terrible cold in the Land of Mat. Mati and Ustaçi had to carry all the wood because they forgot the number of wood needed. Yade helps them with this problem.	13.15	The effect of zero on the addition
46	Racetrack	There will be a race in the Mat Mat Land but some problems arise. Yade will help with the preparations.	11.12	Equal, whole, half
47	Puzzle Garden	Mati loses the sketch of the puzzle garden, while searching in a hurry, he meets Yade. They find the sketch. In order to participate in the opening, they must pass the whole maze. Yade will help Mati, who is confusing the concepts of right and left.	12.27	Right-left
48	Circle Show	Mat Mat Village has a traditional Circle Show. Şefi will draw the greatest Circle ever drawn with his Mat Mat plane. Yade tells him how to draw the best Circle.	12.04	Circle
49	The Secret of Confusion	The fences in the Bahçeçi 's garden are scattered. Mati and Bahçeçi tried to attach the fence but could not do it because they messed up their rows. Yade and her friends solve problems in the mess.	11.24	Pattern, big, small, medium
50	Natural Measures	All rulers, measuring tapes, meters, kilos and scales in the village have disappeared. It was a mess, and nobody knew what to measure and how to weigh. Yade tells them about natural	12.48	Fathom, step, foot, span natural units of measure

		measurement units by this way, they solve the problems		
51	Night and Day	Mat Mats don't sleep at nights. They found the source of the problem with Yade. They understood the importance of the day and night.	11.18	Night and day
52	Aşçıçi's Patisserie	Yade is trying to teach half and whole to Mat Mat here.	11.36	Half, whole

3.3. Data Collection Tools and Process

Document analysis, which is among the qualitative data collection tools, includes the analysis of written materials containing information about the case or cases that are aimed to be investigated (Yıldırım and Şimşek, 2021). In this study, a document review form developed by the researchers was used as a data collection tool. Sections, number sense components and frequencies are included in the document review form. 52 episodes of the cartoon named "Yade Yade" were examined in terms of counting aloud, measuring concepts, non-verbal calculation, number determination and noticing quantity, which are the components of number sense determined for preschool children. In these reviews, the relevant sections were also examined in terms of time and film content.

3.4. Data Analysis

The document analysis process proposed by Corbin and Strauss (2008) was used in data analysis. In this process, review (superficial review), reading (detailed review) and interpretation steps were followed (Corbin & Strauss, 2008) and content analysis was used. Although there are different components proposed by the researchers, the components used by Lago and DiPerna (2010) to measure the number sense of preschool children were preferred when choosing the number sense components in this study. For this study, firstly, 52 episodes of the cartoon named "Yade Yade" were watched and analyzed in terms of number sense components (counting aloud, measuring concepts, non-verbal calculation, number identification, recognizing quantity) used by Lago and DiPerna (2010).

In this qualitative research, some precautions were taken to ensure validity and reliability. Regarding internal reliability, in this process, the departments were examined separately by two researchers in terms of number components and codes were created. These codes were then compared (Creswell, 2013). At the end of the analysis process, the two researchers analyzed the analyzes they had made separately and agreed on the codes. The research process is presented in detail in relation to external reliability and confirmability. However, the documents related to the research were kept by the researcher (Yıldırım & Şimşek, 2011). In this research, the content in the cartoons was first directly defined and then interpreted in order to ensure internal validity. The research process was tried to be explained in detail in relation to external validity and transferability, and purposive sampling was used (Miles & Huberman, 1994).

4. Results and Discussion

52 episodes of the cartoon Yade Yade were analyzed in terms of number sense components (counting aloud, measuring concepts, non-verbal calculation, number identification, recognizing quantity) used by Lago and DiPerne (2010); the 4th, 25th, 38th, 48th and 51st sections of the published sections were not found significant in terms of number sense components.

When the number components for each section were examined, it was seen that the component of measuring the concepts was mostly emphasized. This number sense component was followed by number identification, recognizing quantity, counting aloud and non-verbal calculation components. However, when the components were examined according to the number of sections, it was seen that the number identification component was included in more sections, followed by the components of counting aloud, measuring concepts, recognizing quantity and non-verbal calculation (Table 2).

Table 2: Frequencies Related to the Highlighted Components in the Parts of the Cartoon Named Yade Yade

Component	Number of Sections	Frequency (f)
Counting aloud	27	214
Measuring concepts	25	873
Non-verbal calculation	15	170
Number identification	28	535
Recognizing quantity	24	433

4.1. The Counting Aloud Component of the Number Sense

When the "counting aloud" component is examined in terms of the contents, while the audio counting component takes place more in the "Lost pages" and "Postman" sections (f=21), it is followed by " Vehicle of help", "Summer festival", "Theatre " (16) and “Birthday surprise” (15). In the sections where counting aloud was performed, counting was performed with a certain tempo or accompanied by music, so that it was more effective in terms of memorability.

Table 3: The Counting aloud Component of the Number Sense

Chapters	Frequency (f)	Chapters	Frequency (f)
1) Lost Pages	21	27) Theatre	16
2) Materials in the Bag	12	28) Dinner Table	-
3) Golf Time	11	29) Picnic Trip	-
4) Mixed Fruit Festival	-	30) Balloon trip	4
5) Little Painters	2	31) The Day of Syrup	-
6) Three Rickshaws	1	32) Summer Festival	16
7) Crowded Picnic	2	33) Adventure for the Flag	5
8) Confused Wanderers	-	34) Mat Mat Wagon	6
9) Mosaic Road	7	35) Kite	2
10) Motif Exhibition	-	36) Mysterious Sculptures	8
11) Roller Coaster	4	37) Missing Weights	-

12) Ustaçi's Garden	1	38) Camping Time	-
13) Market Place	8	39) Elevator Clutter	-
14) Postman	21	40) 100 Tree Forest	10
15) The Birthday Surprise	15	41) Precious Stone	1
16) Spring Mess	-	42) Model of Bilgeçi	12
17) Tree House	-	43) Sports Field	-
18) Wrong Feet	-	44) Great İnvention	-
19) Vehicle of Help	16	45) Snow Time	7
20) Volleyball Court	3	46) Racetrack	-
21) Hide and Seek	2	47) Puzzle Garden	-
22) Garden Plan	1	48) Circle Show	-
23) Treasure Hunt	-	49) The Secret of Confusion	-
24) Challenging Race	-	50) Natural Measures	-
25) Corrupted Clock Tower	-	51) Night and Day	-
26) Jam? Marmalade?	-	52) Aşçıçi's Patisserie	-

4.2. The Measuring Concepts of Number Sense Concepts

When examined in terms of the contents of the "Measuring concepts" component, the component measuring concepts takes place more in the "Puzzle Garden" section (111), this section is " Ustaçi's Garden " (71), " Spring Mess " (58) and " Mysterious Sculptures" (54) followed.

In the puzzle garden section, the concepts of "right" and "left" are emphasized, in the sections of Ustaçi's garden and the Spring confusion, the concepts of "littleness and abundance" are emphasized, and in the mysterious sculptures section, the concepts of "pattern, sequence" are emphasized.

Table 4: The Measuring Concepts of Number Sense Concepts

Chapters	**Frequency (f)**	**Chapters**	**Frequency (f)**
1) Lost Pages	2	27) Theatre	2
2) Materials in the Bag	-	28) Dinner Table	-
3) Golf Time	-	29) Picnic Trip	39
4) Mixed Fruit Festival	-	30) Balloon Trip	37
5) Little Painters	-	31) The Day of Syrup	21
6) Three Rickshaws	-	32) Summer Festival	-
7) Crowded Picnic	9	33) Adventure For the Flag	4
8) Confused Wanderers	40	34) Mat Mat Wagon	-
9) Mosaic Road	-	35) Kite	-
10) Motif Exhibition	-	36) Mysterious Sculptures	54
11) Roller Coaster	45	37) Missing Weights	28
12) Ustaçi's Garden	71	38) Camping Time	-
13) Market Place	-	39) Elevator Clutter	-
14) Postman	-	40) 100 Tree Forest	-
15) The Birthday Surprise	-	41) Precious Stone	2
16) Spring Mess	58	42) Model of Bilgeçi	-
17) Tree House	24	43) Sports Field	-
18) Wrong Feet	19	44) Great İnvention	-
19) Vehicle of Help	2	45) Snow Time	-

20) Volleyball Court	10	46) Racetrack	30
21) Hide and Seek	46	47) Puzzle Garden	111
22) Garden Plan	-	48) Circle Show	-
23) Treasure Hunt	-	49) The Secret of Confusion	-
24) Challenging Race	30	50) Natural Measures	26
25) Corrupted Clock Tower	-	51) Night and Day	-
26) Jam? Marmalade?	11	52) Aşçıçi's Patisserie	48

4.3. Non-Verbal Computing Components of the Number Sense

When examined in terms of the contents of the 'non-verbal calculation' component the non-verbal calculating component is mostly emphasized in the "Treasure hunt" (32) section, while this section is " Three rickshaws " (28), "Snow time" (20) and " Vehicle of help "(18) followed. While non-verbal calculations were made, visuals contributed to the abstraction of children, and it was seen that addition and subtraction were given with symbols.

Table 5: Non-Verbal Computing Components of the Number Sense

Chapters	**Frequency (f)**	**Chapters**	**Frequency (f) (f) (f)**
1) Lost Pages	-	27) Theatre	1
2) Materials in the Bag	9	28) Dinner Table	4
3) Golf Time	-	29) Picnic Trip	-
4) Mixed Fruit Festival	-	30) Balloon Trip	-
5) Little Painters	-	31) The Day of Syrup	-
6) Three Rickshaws	28	32) Summer Festival	12
7) Crowded Picnic	6	33) Adventure For the Flag	11
8) Confused Wanderers	-	34) Mat Mat Wagon	-
9) Mosaic Road	-	35) Kite	-
10) Motif Exhibition	-	36) Mysterious Sculptures	-
11) Roller Coaster	4	37) Missing Weights	-
12) Ustaçi's Garden	-	38) Camping Time	-
13) Market Place	16	39) Elevator Clutter	-
14) Postman	-	40) 100 Tree Forest	1
15) The Birthday Surprise	-	41) Precious Stone	-
16) Spring Mess	-	42) Model of Bilgeçi	-
17) Tree House	-	43) Sports Field	-
18) Wrong Feet	-	44) Great İnvention	-
19) Vehicle of Help	18	45) Snow Time	20
20) Volleyball Court	11	46) Racetrack	5
21) Hide and Seek	-	47) Puzzle Garden	-
22) Garden Plan	-	48) Circle Show	-
23) Treasure Hunt	32	49) The Secret of Confusion	-
24) Challenging Race	-	50) Natural Measures	-
25) Corrupted Clock Tower	-	51) Night and Day	-
26)Jam? Marmalade?	-	52) Aşçıçi's Patisserie	5

4.4. Number Identification Component of Number Sense

When examined in terms of the contents of the "Number identification" component, the Number identification component is mostly located in the "Lost pages" (93) section, while this section is located in the "Dinner table" (48), “Materials in the bag (48)”, "Treasure hunt" (36) and "Postman" (30) section followed the episodes. Showing numbers together with their visuals enabled children to establish the relationship between numbers and symbols. The determination of the number was concrete. therefore, it contributed to the development of the student's sense of number.

Table 6: Number Identification Component of Number Sense

Chapters	Frequency (f)	Chapters	Frequency (f)
1) Lost Pages	93	27) Theatre	-
2) Materials in the Bag	48	28) Dinner Table	48
3) Golf Time	11	29) Picnic Trip	3
4) Mixed Fruit Festival	-	30) Balloon Trip	-
5) Little Painters	-	31) The Day of Syrup	1
6) Three Rickshaws	19	32) Summer Festival	18
7) Crowded Picnic	12	33) Adventure For the Flag	-
8) Confused Wanderers	-	34) Mat Mat Wagon	-
9) Mosaic Road	8	35) Kite	1
10) Motif Exhibition	18	36) Mysterious Sculptures	-
11) Roller Coaster	6	37) Missing Weights	-
12) Ustaçi's Garden	-	38) Camping Time	-
13) Market Place	22	39) Elevator Clutter	23
14) Postman	30	40) 100 Tree Forest	12
15) The Birthday surprise	17	41) Precious Stone	-
16) Spring Mess	-	42) Model of Bilgeçi	22
17) Tree House	3	43) Sports Field	-
18) Wrong Feet	5	44) Great İnvention	-
19) Vehicle of Help	23	45) Snow Time	21
20) Volleyball Court	11	46) Racetrack	-
21) Hide and Seek	-	47) Puzzle Garden	-
22) Garden Plan	1	48) Circle Show	-
23) Treasure Hunt	36	49) The Secret of Confusion	-
24) Challenging Race	-	50) Natural Measures	-
25) Corrupted Clock Tower	-	51) Night and Day	-
26) Jam? Marmalade?	16	52) Aşçıçi's Patisserie	-

4.5. The Recognizing Quantity Component of the Number Sense

When examined in terms of the contents of the " Recognizing quantity " component, the component of recognizing quantity is mostly included in the "The Secret of Confusion" section (119), while this section is "Sports field" (60), "Great invention" (56) and "Precious stone" (54) chapters followed. Comparisons of quantities such as large, larger, smaller, medium were made from the quantities.

Table 7: The Recognizing Quantity Component of the Number Sense

Chapters	Frequency (f)	Chapters	Frequency (f)
1) Lost Pages	-	27) Theatre	16
2) Materials in the Bag	-	28) Dinner Table	-
3) Golf Time	-	29) Picnic Trip	2
4) Mixed Fruit Festival	-	30) Balloon Trip	4
5) Little Painters	25	31) The Day of Syrup	11
6) Three Rickshaws	-	32) Summer Festival	3
7) Crowded Picnic	16	33) Adventure For the Flag	8
8) Confused Wanderers	-	34) Mat Mat Wagon	-
9) Mosaic Road	2	35) Kite	1
10) Motif Exhibition	-	36) Mysterious Sculptures	-
11) Roller Coaster	5	37) Missing Weights	8
12) Ustaçi's Garden	-	38) Camping Time	-
13) Market Place	-	39) Elevator Clutter	15
14) Postman	-	40) 100 Tree Forest	-
15) The Birthday Surprise	-	41) Precious Stone	54
16) Spring Mess	1	42) Model of Bilgeçi	1
17) Tree House	9	43) Sports Field	60
18) Wrong Feet	10	44) Great İnvention	56
19) Vehicle of Help	-	45) Snow Time	1
20) Volleyball Court	10	46) Racetrack	-
21) Hide and Seek	-	47) Puzzle Garden	-
22) Garden Plan	3	48) Circle Show	-
23) Treasure Hunt	-	49) The Secret of Confusion	119
24) Challenging Race	-	50) Natural Measures	9
25) Corrupted Clock Tower	-	51) Night and Day	-
26) Jam? Marmalade?	-	52) Aşçıçi's Patisserie	-

From the first part to the last part of the cartoon, it has been tried to give the sense of number to the students by focusing on concepts that can be confused from simple to complex, thus laying the foundation for further education levels. Mathematics education consists of a spiral structure, so it will help children who will shape our future and take us forward scientifically, help them better understand mathematics and solve daily life problems and be effective.

In this research, it is aimed to examine the content of the cartoon "Yade Yade" broadcast on TRT Children's channel in terms of number sense components (counting aloud, measuring concepts, non-verbal calculation, number identification and recognizing quantity). The results obtained are presented in this section.

The general analysis of the 52-part cartoon “Yade Yade” showed that the content mostly consisted of components related to "measurement concepts", followed by the "number identification" component. These components were followed by “recognizing quantity”, “counting aloud” and “non-verbal calculation”. In mathematics, it is necessary to learn the concepts correctly. Developing the sense of number is important in this respect. In the cartoon named “Yade Yade”, children were given number sense components, sometimes with visuals, sometimes with lyrics, and sometimes with

contradictory concepts. In the study by Lago and Di Perna (2010), it was stated that the components of number identification and recognizing quantity may not contain difficulties for kindergarten students at the end of the school year. The results of the study by Logo and Di Perna (2010) are matches with the results of the current study. On the other hand, in other studies with students, it is stated that students tend to use the number sense less (Markovits & Sowder, 1994, s.4; Yang & Reys, 2002, s. 6). Markovits and Sowder (1994, s.4), reported ın the United States, "*few students produce a sense of number when solving arithmetic problems in schools*" and Yang & Reys (2002, s. 6), reported "*Taiwanese students tend to use standard written algorithms while explaining their answers.*"

A scientific analysis of the cartoons most watched by preschool children was made in a study conducted by Bayır and Günşen (2017). As a result of the research, it was determined that the cartoons that preschool children (3-5 years old) watched the most, and it was determined that the number of scientific expressions and scientific concept types in the examined cartoons were very low. In the research conducted by Koçak (2016), it was aimed to examine the effect of cartoons on the concept development of preschool children. As a result of the research, it was found that cartoons have a statistically significant effect on the concept development of preschool children. In the research conducted by Demiral et al, (2016) in which the educational messages given in the cartoons were examined in terms of the TRT children's channel, it was concluded that children should use the cartoons as a tool that will make an important contribution to education, since they watch them with all their attention. The findings of these studies (Bayır & Günşen, 2017; Demiral et al., 2016; Koçak, 2016) in which cartoons were analyzed from a conceptual perspective, support the results of this research. The results of this study have potential implications for the assessment of number sense skills emphasized in cartoons for young children.

5. Recommendations

Within the scope of this study, the following recommendations have been developed: In the research, the component of measuring concepts is mostly included. This component is necessary for children to identify basic measurement concepts (longer, shorter, higher) using basic shapes. For this reason, the cartoon "Yade Yade" can be used for educational purposes in schools in order to emphasize the component of number sense, especially measuring concepts, in mathematics lessons. In addition, different cartoons prepared for children can be used in teaching concepts by examining them in terms of content. In the research, a cartoon prepared for preschool was used. Experimental research can be conducted to examine the effect of cartoons on the development of the number sense of students at various grade levels. In the research, pre-school number sense components (counting aloud, measuring concepts, non-verbal calculation, number identification, recognizing quantity) used by Lago and Di Perne (2010) were used. Different components recommended by different researchers for different levels of students can be used in different studies.

This research is limited to 52 episodes of the cartoon named 'Yade Yade', which was broadcast on TRT Children's channel from April 23, 2020 until today. In addition, this film is limited in terms of examining the components of number sense. Components of number sense are composed of different components by many researchers. However, there are number sense components in the cartoon, which are necessary not only for pre-school students but also for primary school students. However, in this research, number sense components (counting aloud, measuring concepts, non-verbal calculation, number identification, recognizing quantity) for preschoolers used by Lago and Di Perne (2010) were used. This study is limited in terms of number sense and its component used by Lago and Di Perne (2010).

6. Conclusion

In this research, it is aimed to examine the content of the cartoon "Yade Yade" broadcast on TRT Children's channel in terms of number sense components (counting aloud, measuring concepts, non-verbal calculation, number identification and recognizing quantity). When the number components were analyzed for each section, it was seen that the measuring concepts component was mostly emphasized. This number sense component was followed by number determination, recognizing quantity, counting aloud and nonverbal calculation components.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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References

Albayrak, B. M. & Kartal, A. (2020). Değerler eğitimi bağlamında animasyonlar: Kung Fu Panda 3 filmi incelemesi. *Türkiye Eğitim Dergisi*, *5*(2), 268-284. https://dergipark.org.tr/en/pub/turkegitimdergisi/issue/55125/716458

Atasoy, E., & Karakoç, S. (2022). Türkiye'deki sayı duyusu çalışmalarının eğilimi: İçerik analizi. *Turkish Journal of Mathematics Education*, *3*(2), 25-38. https://tujme.org/index.php/tujme/article/view/60

Bayır, E. & Günşen, G. (2017). Okul öncesi dönem çocuklarının en çok izledikleri çizgi filmlerin bilimsel açılardan analizi . *Trakya Üniversitesi Eğitim Fakültesi Dergisi, 7(2),* 746-761. https://doi.org/10.24315/trkefd.303686

Birgin, O., & Peker, E. S. (2021a). Sekizinci sınıf öğrencilerine yönelik sayı duyusu testinin geliştirilmesi: Geçerlik ve güvenirlik çalışması. *Çukurova Üniversitesi Eğitim Fakültesi Dergisi*, *51*(1), 187-219. DOI: 10.14812/cuefd.871367

Birgin, O., & Peker, E. S. (2021b). Türkiye'de sayı duyusu konusunda yapılan çalışmalara ilişkin tematik içerik analizi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *36*(3), 593-609.

Bogdan, R. C., & Biklen, S. K. (2007). Qualitative research for education: An introduction to theories and methods. Pearson.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journa*l, *9*(2), 27-40.

Çakmak, A. & Koç, K. (2015). Anaokulu çocuklarının televizyon, kitap, bilgisayar ve oyuncaklarla geçirdikleri zamanın niteliğinin incelenmesi . Gaziantep University Journal of Social Sciences, *14*(2), 513-534. DOI: 10.21547/jss.256764

Clarke, B., & Shinn, M. R. (2004). A preliminary investigation into the identification and development of early mathematics curriculum-based measurement. *School Psychology Review*, *33*, 234 –248. https://doi.org/10.1080/02796015.2004.12086245

Corbin, J. & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.). Thousand Oaks, CA: Sage.

Creswell, J. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd edition). USA: Sage.

Çetin, H. & Öztürk, Ş. (2020). İlkokul matematik öğretim programının sayı duyusu temel bileşenlerine göre incelenmesi. *Ulusal Eğitim Akademisi Dergisi (UEAD)*, *4*(2), 163-180. DOI: 10.32960/uead.778027

Darga, H., Öztürk, F. Z., & Öztürk, T. (2021). Çizgi filmlerin çocukların dil ve sosyal gelişim alanlarına etkisine yönelik ebeveyn görüşlerinin incelenmesi. *International Primary Education Research Journal*, *5*(1), 59-77. https://dergipark.org.tr/en/pub/iperj/issue/61098/878666

Demiral, U., Yamaner, E., & Süklüm, N. (2016). Çizgi filmlerde verilen eğitimsel mesajlar; TRT çocuk kanalı örneği. *Journal of International Social Research*, *9*(45), 536-544. Doi: 10.17719/jisr.20164520632

Er, Z., & Dinç Artut, P. (2022). Gifted students' number sense skills in terms of number sense components. *Journal of Education and Learning* (EduLearn), 16, 92-102. 10.11591/edulearn.v16i1.20424.

Erişti, S. D. (2017). Çocuklarda teknoloji odaklı görsel iletişim ve dinamik bir görsel iletişim yolu olarak dijital öyküleme. *İstanbul Üniversitesi İletişim Fakültesi Dergisi*, (52), 25-38. DOI: 10.17064/iuifd.333102

Hacıbektaşoğlu, E. S. (2014). Kültürel çalışmalar ve çizgi filmlerin çocuk izleyici üzerindeki etkileri araştırmaları. Yayımlanmamış yüksek lisans tezi, İstanbul Arel Üniversitesi, İstanbul.

Hamarat, D., Işıtan, S., Özcan, A. & Karaşahin, H. (2015). Okul öncesi dönem çocuklarının izledikleri çizgi filmler üzerine bir inceleme: Caıllou ve Sünger Bob Örneği. *Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *18*(33), 75-91. DOI: 10.31795/baunsobed.645462

Harç, S. (2010). 6. Sınıf öğrencilerinin sayı duygusu kavramı açısından mevcut durumlarının analizi. Yayımlanmamış yüksek lisans tezi, Marmara Üniversitesi, İstanbul

Howden, H. (1989). Teaching number sense. *The Arithmetic Teacher*, *36*(6), 6-11. DOI: https://doi.org/10.5951/AT.36.6.0006

Kayhan Altay, M. (2010). İlköğretim ikinci kademe öğrencilerinin sayı duyularının; sınıf düzeyine, cinsiyete ve sayı duyusu bileşenlerine göre incelenmesi. Yayımlanmamış doktora tezi, Hacettepe üniversitesi, Ankara.

Kayhan Altay, M., & Umay, A. (2011). Sınıf öğretmeni adaylarının hesaplama becerileri ve sayı duyuları arasındaki ilişkinin incelenmesi. *e-Journal of New World Sciences Academy*, *6*(1), 1277-1283. https://dergipark.org.tr/en/pub/nwsaedu/issue/19821/212210

Kilimlioğlu, M. Ç. (2018). 5-6 yaş çocuklarının etkileşimli oyunları ile sözel dil başarımları ve sayı hissi arasındaki ilişkinin incelenmesi, *Yayımlanmamış yüksek lisans tezi, Pamukkale Üniversitesi, Denizli.*

Kılınç, F. (2013). *Çizgi filmlerdeki temel sosyal değerler: Pepee ve Pocoyo örneği. Yayımlanmamış* doktora tezi, Marmara Universitesi, Turkey.

Koçak, Ö. (2016). Üç boyutlu çizgi filmlerin okul öncesi çocuklarin mekânda konumla ilgili kavram gelişimine etkisi (The effects of three dimension cartoons on preschool children's concept development of position on the space). Yayımlanmamış doktora tezi, Atatürk Üniversitesi, Erzurum.

Köprülü, S. G. (2016). Erken yaşta yabancı dil öğreniminde çizgi filmlerin yeri. *Diyalog Interkulturelle Zeitschrift Für Germanistik*, *4*(1), 88-98.

Lago, R. M., & Diperna, J. C. (2010). Number sense in kindergarten: A factor-analytic study of the construct. *School Psychology Review*, *39*(2), 164-181. https://doi.org/10.1080/02796015.2010.12087771

Markovits, Z., & Sowder, J. (1994). Developing number sense: An intervention study in grade 7. *Journal for Research in Mathematics Education*, 25, 4-29. DOI: https://doi.org/10.5951/jresematheduc.25.1.0004

Mazzocco, M. M. M., & Thompson, R. E. (2005). Kindergarten predictors of math learning disability. *Learning Disabilities Research & Practice*, 20, 142–155. https://doi.org/10.1111/j.1540-5826.2005.00129.x

McIntosh, A., Reys, B. J., & Reys, R. E. (1992). A proposed framework for examining basic number sense. *For the Learning of Mathematics*, *12*(3), 2-44. https://www.jstor.org/stable/40248053

Menon, R. (2004). Elementary school children's number sense. *International Journal for Mathematics Teaching and Learning*, *57*(1), 1-16.

Merriam, S. B. (2009). Qualitative research: A guide to design and implementation. Jossey-Bass.

Miles, M. B., & Huberman, M. A. (1994). *An expanded sourcebook qualitative data analysis*. London: Sage.

Milli Eğitim Bakanlığı [MEB] (2013). Ortaokul matematik dersi (5-8. sınıflar) öğretim programı. Ankara: MEB Yayınları

Mohamed, M., & Johnny, J. (2010). Investigating number sense among students. *Procedia Social and Behavioral Sciences*, *8*, 317-324. https://doi.org/10.1016/j.sbspro.2010.12.044

National Council of Teachers of Mathematics (NCTM) (2000). The principles and standards for school mathematics. Reston: NCTM Publications.

National Council of Teachers of Mathematics. [NCTM]. (1989). Curriculum and evaluation standards for school mathematics. Reston: NCTM Publications.

O'Leary, Z. (2017). Araştırma projenizi yapmak için temel rehber. Londra: Adaçayı.

Önkol, F. L. (2012). *Erken sayı testi'nin uyarlanması ve erken sayı gelişim programı'nın altı yaş çocukların sayı gelişimlerine etkisinin incelenmesi. Yayımlanmamış* doktora tezi, Marmara Üniversitesi, Turkey.

Reys, R. E., & Yang, D. C. (1998). Relationship between computational performance and number sense among sixth-and eighth-grade students in Taiwan. *Journal for Research in Mathematics Education*, *29*(2), 225-237. DOI: https://doi.org/10.5951/jresematheduc.29.2.0225

Reys, R., Reys, B., Emanuelsson, G., Johansson, B., McIntosh, A., & Yang, D. C. (1999). Assessing number sense of students in Australia, Sweden, Taiwan, and the United States. *School Science and Mathematics*, *99*(2), 61-70. https://doi.org/10.1111/j.1949-8594.1999.tb17449.x

Seckin Kapucu, M., & Özcan, H. (2022). Digital literacy in cartoons: "Digital Crew" as an example. *European Journal of Education Studies*, *9*(2), 268-286. DOI: http://dx.doi.org/10.46827/ejes.v9i2.4183

Sezer, T. (2008). Okulöncesi eğitim alan beş yaş grubu çocuklara sayı ve işlem kavramlarını kazandırmada drama yönteminin etkisinin incelenmesi. Yayımlanmamış yüksek lisans tezi, Abant Izzet Baysal Üniversitesi, Bolu.

Singh, P. (2009). An assessment of number sense among secondary school students. *International Journal for Mathematics Teaching and Learning*, 1-27. https://eric.ed.gov/?id=EJ904871

Sowder, J, & Schappelle, B. (1994). Number sense making. *Arithmetic Teacher*, *41*(6), 342–345.

Tunalı, S. D., & Demirtaş, V. Y. (2022). Matematik öğrenme güçlüğü ve sayı hissi. *Akdeniz Üniversitesi Eğitim Fakültesi Dergisi*, *1*(1), 105-127. https://dergipark.org.tr/en/pub/akuned/issue/71400/1076977

van De Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2014). İlkokul ve ortaokul matematiği: gelişimsel yaklaşımla öğretim. Nobel Akademik Yayıncılık.

Yang, D. C. (1995). Number sense performance and strategies possessed by sixth and eighth grade students in Taiwan (unpublished doctoral dissertation). University of Missouri, Columbia.

Yang, D. C. (2005). Number sense strategies used by 6th-grade students in Taiwan. *Educational Studies*, *31*, 317-333. https://doi.org/10.1080/03055690500236845

Yang, D. C., Reys, R. E., & Reys, B. J. (2009). Number sense strategies used by pre-service teachers in Taiwan. *International Journal of Science and Mathematics Education*, *7*, 383-403. https://doi.org/10.1007/s10763-007-9124-5

Yıldırım, A., & Şimşek, H. (2021). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara: Seçkin yayıncılık