

Examination of the Contents of Popular Science Magazines within the Framework of Design Thinking Method

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ABSTRACT

Theoretical Article

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In the century we live in, it is important to raise individuals who can recognize the problems they encounter in daily life and offer solutions. In this context, various approaches are used in educational processes. One of these approaches, Design Thinking, emerges as a new way of thinking and a new approach to problem-solving. In this study, processes that encourage creativity and aim to impart problem-solving skills, which differ from traditional design approaches, were examined by trying to understand the nature of design thinking. In this context, the activities used to develop design thinking in TÜBİTAK Popular Science Magazines were examined. The use of concepts such as innovation, empathy, design, production, problem-solving, and problem identification in the examined activities was evaluated. Adopting a qualitative research design, the data were analyzed through document analysis. Descriptive content analysis was used in the analysis.

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INTRODUCTION

The digital age has sped up technological advancements, accompanied by industrialization and urbanization. This has led society to face an inevitable challenge unprecedented in the history of humankind; dealing with the consequences of human impacts on the environment. Confronting these issues is indisputable as the population has exponentially surged to amounts more than Mother Earth is able to handle. Global warming caused by greenhouse gases results in disastrous climate change (Intergovernmental Panel on Climate Change (IPCC) 2014; Kerr 2007), deforestation eradicates animal habitats (Symes et al., 2018; Werth & Avissar 2002), and millions of people are still left without basic needs such as food and clean water (Gerten et al. 2011; Kang, Khan & Ma 2009). Until recently, both scientists and the general public alike have realized the necessity to respond and counteract the destruction of our planet. This has been reflected by research and political initiatives as well as by popular scientific books and documentaries (Attenborough, 2020; Rich, 2019; Wallace-Wells, 2019). Although it seems that the majority of people agree on the need to change our behavior, some remain skeptical and/or even apathetic. In our study, we aim to explore if environmental attitude is a facet of the human psyche, if it can be discovered early on in life and if it reflects internal opinions and actions regarding world-wide ecological problems.

The use of design methods that support educational processes for different purposes in education is increasing. It is believed that integrating design thinking structures into educational methods will contribute to interdisciplinary education and be effective in enabling students to propose creative solutions to problems as independent individuals (Lipman, 2003). In our world, which faces many global problems, unique solutions are needed (Owen, 2007). Fundamentally, popular science publishing aims to promote inquiry, creativity-based learning approaches, and awareness. It also aims to contribute to the development of individuals' knowledge and skills in their school or daily lives, helping them succeed scientifically and technologically. Various methods and approaches are used together today to enhance creativity alongside cognitive skills. The concept of design thinking, which has gained significant importance, can be defined as an innovation-oriented approach (Carlgren, 2013) and a problem-solving method based on skills, processes, and thinking activities to address problems. Design thinking is also a problem-solving methodology that helps define, understand, and solve a problem or need. It typically includes a five-step process: empathy, definition, ideation, prototyping, and testing. This process is used to understand users' needs, define the problem area, generate various solution ideas, transform these ideas into prototypes, and then test the prototypes. This approach encourages continuous improvement through rapid trial and error and feedback.

Tim Brown, CEO of a company that is one of the architects of the design thinking approach, has explained this approach most comprehensively. According to Brown (2019), "design thinking is a human-centered approach used to create innovation by utilizing designers' methods to combine the needs of business success, the possibilities of technology, and the needs of people." Design thinking turns needs into demands. It is a human-centered approach to problem-solving that helps people and organizations be more innovative and creative. As can be understood from the definitions, some keywords stand out: innovation, human-centeredness, creativity. These words have started to be used in many different fields in our era and frequently

appear in our daily lives. According to Kelley & Kelley (2013), being human-centered forms the heart of innovation. It involves making observations about people, thinking about why they do what they do today, and what they might do in the future with empathy. It is not forgetting that the design is human-oriented. It is thinking human-centeredly for creative solutions. As the interaction between science, technology, and design becomes increasingly complex, design thinking seeks to find solutions to our existing problems by promoting innovations in these areas. According to Zhou (2018), design thinking integrates scientific theory and human-centered understanding to encourage innovation. Different learning environments outside of school are effective learning environments for developing problem-solving, creative thinking, and design thinking (Zou, P. X., Marsh, D., Evans, M., Sherrard, A., & Howard, J., 2014; Shanta & Wells, 2022). Popular science publications are one of the fields where comprehensive learning activities that can be carried out outside of school are conducted. This research will examine popular science publications planned according to the steps of design thinking (empathy, problem definition, ideation, prototyping, testing) to impart or enhance problem-solving skills.

Popular Science Publishing

Popular science publishing is a scientific publishing activity that facilitates access to information for people who are interested in science and technology but are not experts in the subject. It conveys scientific topics to a broad audience. By presenting complex scientific topics in an understandable and engaging way, it aims to attract the public's interest by avoiding technical terms and using a more comprehensible language. While popular science publications avoid technical terms and presentation styles, they also explain the results of scientific research, discoveries, findings, studies, and reviews, and occasionally apply the principles of all branches of science practically. These types of publications include websites, books, magazines, television programs, podcasts, social media platforms, documentaries, and science-related news.

Science might be considered a difficult or distant field for many people to learn. This perceived difficulty or distance can be said to indicate that society does not have much curiosity about science and that we are a consumer society rather than a producer. A society that quickly consumes ever-changing science and technology must first become scientifically literate to be productive. Individuals should not merely memorize or superficially learn scientific information but should internalize, understand, know, and be able to use scientific and technological knowledge. There can be various challenges in encouraging the public to engage with science, research, and innovation. Some of these challenges include people's perceptions that understanding science is very complex or that the places where science is discussed are formal or inaccessible (Dilli and Gözcelioğlu, 2019). Different tools and methods are used to overcome these challenges or prejudices. One of the most important of these methods is publishing. Popular science publishing aims not only to convey scientific knowledge to a broad audience but also to correct misunderstandings about science, reduce anti-scientific thoughts, and increase understanding of science. Therefore, popular science publishing plays both an educational and entertaining role, helping science have a positive impact on society. In this

context, creating activities within popular science magazines based on the design thinking approach can contribute to the learning process by enabling individuals to directly face problems and turn the phenomena encountered in daily life into meaningful and lasting learning experiences.

Design Thinking Approach

Design thinking essentially transforms the theoretical structure of thinking into practice. In this context, the design thinking approach emerges as a tool for fostering individuals who generate solutions, question, and produce products. Design thinking is a learning and teaching method that goes beyond traditional knowledge acquisition by applying acquired knowledge to real-life situations, offering a different pedagogical potential (Karakaya, 2024). At this point, methods used in popular science publishing for transferring and applying cognitive domains can be considered to enable the effective use of design thinking from early ages onwards. The concept of design thinking first emerged in 1987 (Ambrose and Harris, 2009; Brown, 2008; Owen, 2007). Design thinking has been introduced in connection with creative thinking, critical thinking, and problem-solving thinking (Dorst and Cross, 2001; Razzouk and Shute, 2012; Vanada, 2014). Design thinking is focused on practical, creative problem-solving and is based on experiential learning. Razzouk and Shute (2012) define design thinking as an analytical and creative process that provides opportunities for individuals to experiment, model, prototype, receive feedback, and redesign. Unlike learning by watching or listening to others, the design-focused approach signifies learning from experiences directly resulting from one's own actions. Therefore, design thinking incorporates individual traits such as personality, patience, and creativity (Razzouk and Shute, 2012). From another perspective, Rauth et al. (2010) define design thinking as a model that supports creativity, creating process-based learning through active problem-solving that interacts with and transforms the world. Rauth et al. (2010) emphasize that design thinking repeatedly emphasizes "process" by allowing students to trust their creative skills because they can solve the problems they encounter.

The design thinking process is commonly defined in five stages, and this definition has been examined through the model proposed by the Hasso Plattner Design Institute at Stanford University, consisting of empathy, definition, ideation, prototyping, and testing stages. Empathy, the first stage of the design thinking approach, represents the human-centered part of the design process. Empathy begins with curiosity. As curiosity about how a problem can be solved increases, it opens the way for new communication channels and ensures the involvement of different individuals in the relevant topic. Empathy provides insights into how individuals observe a subject, communicate about it, and immerse themselves in it (Gallagher and Thordarson, 2020). Empathy can be summarized as processes of observation, engagement, monitoring, and listening.

During the definition stage, individuals develop insights and focus on understanding people's needs. It involves accessing and refining accurate information, and accurately identifying the problem. Once the main problem is identified, the roadmap is created to solve this foundational problem with the right design (Kozan, 2022). This stage helps clarify and focus the entire design

process. It is a stage where perspectives are developed in individuals. The ideation stage is the phase of creating creative processes through brainstorming (White et al., 2012). The primary goal in this stage is to generate as many ideas as possible. Some of these ideas may contain potential solutions, while others may not be accepted. The more ideas and perspectives generated, the richer the solution process can be. Ideas that need to move to the prototyping stage should be selected and tested during the prototyping stage.

The prototype stage is where it is ensured that the solution or product functions as intended before it is presented. Creating a prototype is fundamental to design thinking. A prototype is a stage where the user can interact with a post-it note, paper, or tangible product (Hasso Plattner School of Design, 2003). It can be described as a simulation that allows testing before actually starting to develop the product, avoiding time and production costs (Kozan, 2022). If there is a flaw in the design, it can be identified during the prototyping stage.

The final stage is the testing stage. Throughout the process, after accurately defining the problem to evoke the same feeling among all parties involved, developing solutions and ideas for the problem, and transitioning from abstract ideas to the concrete stage after prototyping, the last phase will move on to testing the product with real users. The testing stage ensures that our application is tested to be the most error-free and user-friendly product possible. This stage allows us to focus on the user and their needs. The main goal of the testing stage is to establish more empathy with the user and enhance the solution through reflection (Painter, 2018). Thinking like a designer, materializing ideas, prototyping, and subjecting them to testing will ensure the production of an effective and efficient solution at the end of the process.

Design thinking involves using various tools to develop and support the design process, creativity, and self-expression. One of these tools is popular science magazines. Design thinking can be valuable in education because it naturally bridges topics, integrates thinking and making approaches, and enhances critical and creative thinking skills. Therefore, evaluating the content of popular science magazines can play an important role in education.

METHOD

Research Design

This qualitative study aims to examine the steps of design thinking in activities developed within the framework of popular science publishing. Document analysis technique has been used because the current research aims to present an existing situation. Document analysis is a systematic method used to examine and evaluate all documents, including printed and electronic materials. Like other methods used in qualitative research, document analysis requires examining and interpreting data to derive meaning, develop an understanding of the relevant subject, and generate empirical knowledge (Corbin & Strauss, 2008).

Examined Documents

In this context, the examined documents consist of popular science magazines published by TÜBİTAK (The Scientific and Technological Research Council of Turkey). The scope of this study is limited to examining the concepts related to the steps of design thinking used within the magazines between the years 2018 and 2023, along with examples of activities provided within the magazines.

Data Collection

A total of 180 issues published under the scope of popular science magazines by TÜBİTAK (The Scientific and Technological Research Council of Turkey), including Bilim ve Teknik (Science and Technology), Bilim Çocuk (Science for Kids), and Meraklı Minik (Curious Tiny), have been examined. During the review process, notes were taken, and contents supporting the research question were identified. The method of document analysis, a qualitative research technique, was employed to analyze written and visually-based contents according to their characteristics.

Data Analysis

To examine the selected data more closely and uncover relevant themes, coding was developed based on the characteristics of the data, enriching the method qualitatively (Şekerci, 2020). Classification was conducted according to themes identified through content analysis, and findings related to classified data were summarized and interpreted using descriptive content analysis. To ensure validity and reliability in the research, a broad sample was attempted by analyzing 180 issues of Bilim Çocuk (Science for Kids) magazine published between 2018 and 2023.

FINDINGS

The first sub-problem of the research investigated the usage of the word "Design" within popular science magazines.

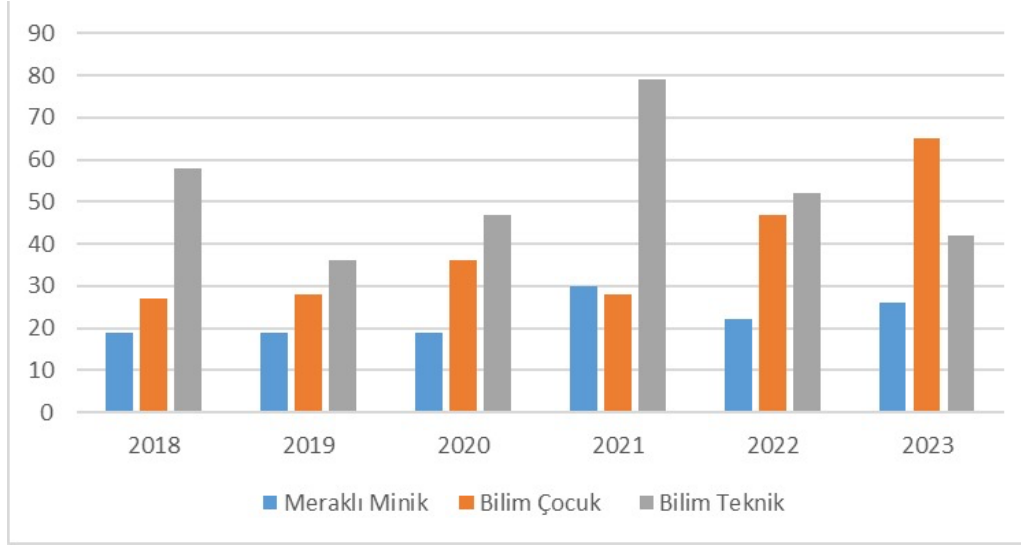


Table 1. Design

As seen in Table 1, the word "design" has been predominantly used in articles and columns aimed at adults in the Bilim ve Teknik magazine during the year 2021 among the years 2018 and 2023. Throughout these years, design-related content has been observed in 27 different contexts. In Bilim ve Çocuk magazine, there has been a continued increase over the years, reaching its peak in 2023. Referring to Examples 1 and 2 in Figures 1 and 2, it is evident that the concept of design is specifically introduced in children's magazines, reinforced with examples from our daily lives. Moreover, within the framework of design-focused thinking, the development of designs appropriate to the given problem has been encouraged. In Meraklı Minik magazine, an increase in the preparation and publication of design-related content over the years is also evident in Table 1. Embedding concepts such as aesthetics, functionality, usability, manufacturability, and environmental impacts in the prepared content can be beneficial in enhancing critical thinking skills among readers.



Figure 1. Science Kid Magazine,

Figure 2. May, 2019, The Section of Design and Do

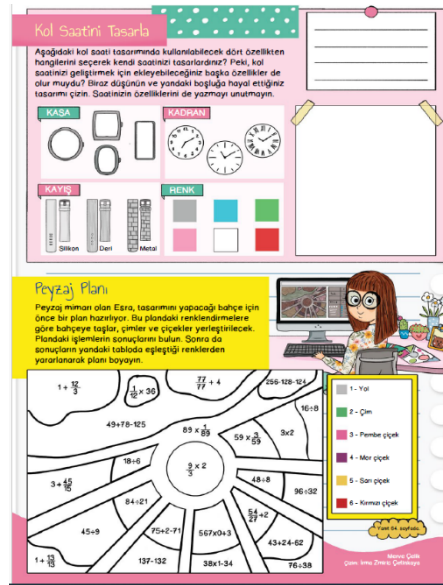


Figure 3. Science Kid Magazine, August, 2023. The Section of Science Kid Dictionary

In Figure 3, examples are provided illustrating how the design process offers children practical opportunities to plan a project, implement it, and evaluate the results. Through these examples, the primary expectation is to enhance creativity and mature the thought process of design among readers.

Design is the connection between creativity and innovation. Innovation, on the other hand, is the process of renewing science and technology in ways that provide economic and social

benefits. From another perspective, in design thinking, the idea being designed should be innovative and applicable. In this context, when a design idea is created in popular science publications, it is expected to be innovative.

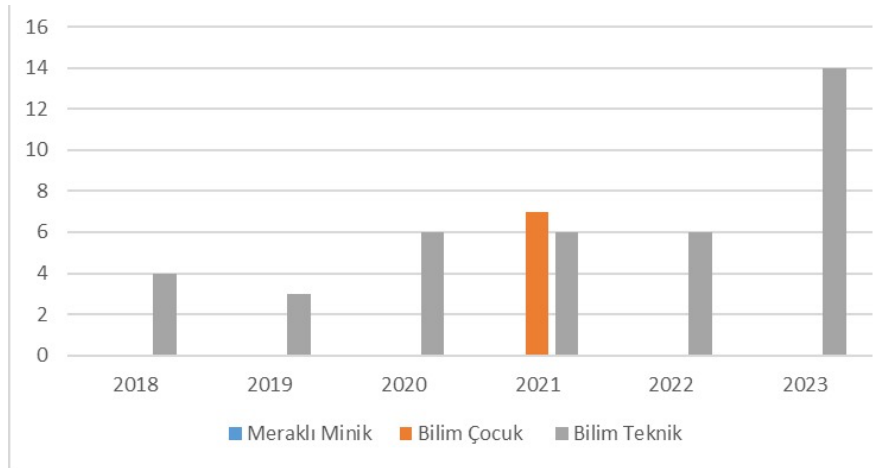


Table 2. Data on Innovation

Table 2 shows that among popular science publications published between 2018 and 2023, there has been a significant increase in publications containing the word "innovation," particularly within the adult magazine Bilim ve Teknik. During these years, the word "innovation" appears in 46 different articles in popular science publications. It is evident that there has been a substantial amount of content published in Bilim Çocuk Magazine in the year 2021.

Especially during the pandemic, the rapid incorporation of research, vaccines, and other scientific content into our lives and their widespread use in the media has led to these topics being selected as subjects in popular science publications, with individuals clicking on mentioned content in research sites. In Meraklı Minik Dergisi, aimed at children aged 3 and older, the direct use of the word "innovation" or its appearance as a concept in the content is not observed in the table, likely due to its abstract nature, but it is supported through activities that can generate new ideas and foster different thoughts.

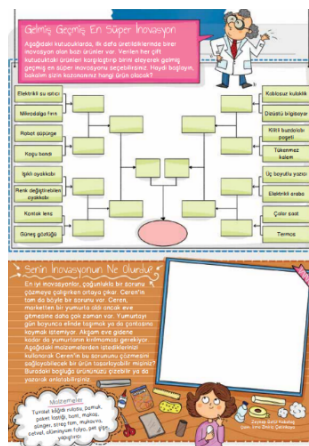


Figure 4. Science Kid Magazine, September, 2021, The Section of Science Kid Dictionary.

At the same time, in design thinking, besides preparing visual content, the idea must find practical application at every stage to reach its final product. The feasibility of the idea requires the use of various methods within publications. As seen in Figure 4, guidance is provided on topics such as how modeling is done for better understanding of design or the idea. Suggestions are offered for prototyping, testing, and iteratively refining the idea.



Figure 5. Science Kid Magazine, September,2023, the writing inside the magazine.

In a design process, establishing empathy is one of the crucial aspects. Empathy should be used as a tool in the design process, transforming emotion and feeling into a quality. Additionally, in the innovation process and in seeking solutions to problems, individuals need to gain insight through empathy. Recognizing empathy as an important skill in interpersonal relationships has led to various studies and applications focusing on its development through education.

In the design thinking process, it is essential for the entire design team to empathize with each other to understand the emotions of users towards the solutions they design. In this context, as seen in Table 3, there has been an increase in content related to empathy, especially during the pandemic period. Between 2018 and 2023, there are 96 different publications focusing on empathy. The year 2021 stands out as the period when empathy-related content was most discussed in the Bilim Çocuk Dergisi. Content labeled as empathy can be found in magazine supplements, games, cards, and books.

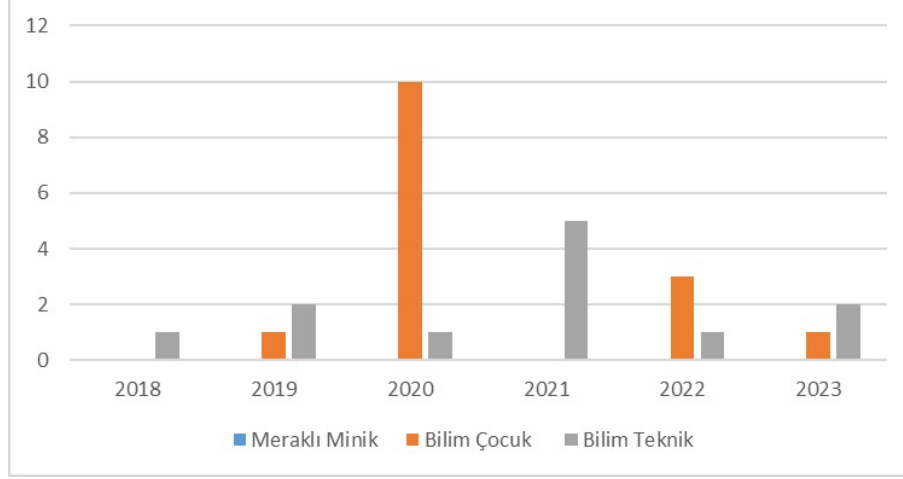


Table 3. Data on Empathy

In Meraklı Minik Magazine, due to its thematic nature and target audience of ages 3 and above, the topic of empathy is not directly addressed. However, it is observed that empathy is occasionally implicitly conveyed throughout various topics covered in the magazine.



Figure 6. Meraklı Minik Magazine, October, 2023



Figure 7. Meraklı Minik Magazine, May, 2021.

In Picture 6, the booklet about emotions contains many activities that help us understand our emotions and how to understand the emotions of others. Picture 6 also uses storytelling techniques to emphasize the need to understand not only human emotions but also the needs of

all living beings around us. In this context, it is observed throughout the magazine that sensitivity is shown for the understanding of empathy in children aged three and above.

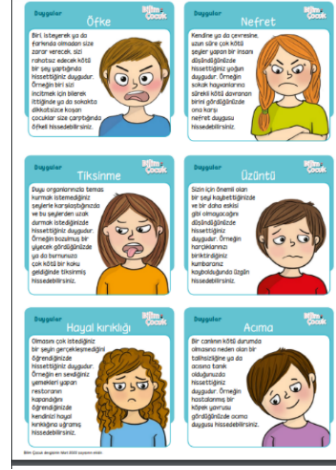


Figure 8. Science Kid Magazine, March, 2022

Figure 9. Science Kid Magazine, February, 2022

In the framework of design thinking, one of the most important steps is the development of empathy. It is crucial to create awareness of empathy from a young age for the development of self-awareness, the ability to manage emotions, the initiative to act, understanding others' emotions, and enhancing social skills. In this context, it is observed in Pictures 8 and 9 that content is created in children's magazines regarding understanding their own emotions, reflecting on encountered problems, and searching for solutions by considering possible emotions.

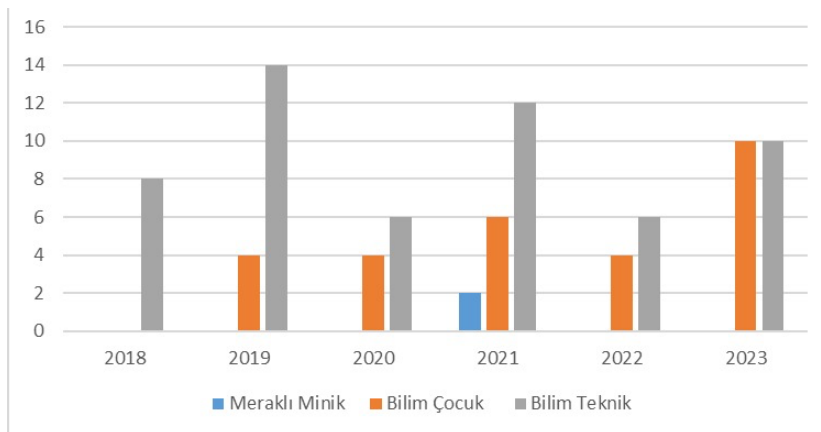


Table 4. Data on Problem-solving

Table 4 shows that in the adult magazine Bilim Teknik, which targets ages 15 and above, the term "design" was included in content in the year 2018. However, no occurrences of the word "design" were observed in activities or topics for preschool and school-age children during these

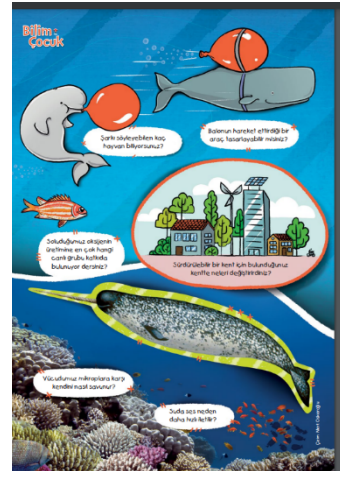
years. Nevertheless, indirect references to problem-solving were found in 86 different written contents and supplements. Starting from 2019, design-focused contents began to be produced in Bilim Çocuk Dergisi, and over the years, activities were enriched, with one of the two contents in 2023 mentioning the term "design." Since 2018, there has been an observed increase in the number of contents in children's magazines specifically addressing problem identification, analysis, determining solution options, implementation, and evaluation of results (Figure 10).



Figure 10. Science Kid Magazine, March, 2023



Figure 11. Science Kid Magazine, sample back cover



In popular science magazines, sections have been added that center around human-focused problems, innovations, solutions, and questions that can inspire ideas to support the development of design thinking (Figure 11).

RESULTS AND DISCUSSION

The aim of Design Thinking is to develop insights based on observations that can lead to products or services that improve or impact lives (Ambrose & Harris, 2009). Developing insights to transform products or services that improve lives needs to start from a very early age. Especially during the preschool years, it is important to create publications that guide parents in the time they spend with their children. Among popular science publications, it is possible to see many important concepts of design thinking such as problem-solving, self-recognition, empathy, and questioning in Curious Little Magazine. Encountering popular science publications that discuss today's new world and its new problems outside the curriculum for school-aged children will increase their awareness. Engaging students in activities where they will think deeply about these problems, practice, ask questions, and develop solutions could be a starting point for design thinking.

The global wave of problems such as water pollution, migration, population growth, environmental pollution, pandemics, rapidly increasing and changing technology, natural disasters, and epidemics surrounds our environment. Can Design Thinking help us identify and create solutions to these problems we encounter? Especially from our childhood years, how will we cope with these unfamiliar problems of the new world? Creating family awareness about these problems or approaching needs identified through popular science publications when education in schools is not enough can increase awareness in children through creative and innovative solutions, questioning, empathy, design, testing, and content.

The goal of Design Thinking is to solve a problem, create family awareness, seek different solutions that are not immediately visible, and thus ensure continuous and versatile questioning. A design process that centers around humans involves Empathy, Definition, Idea Generation, Prototype Creation, and Testing as five fundamental stages, which currently do not seem to occur spontaneously within schools or families. Designing thematic topics within TÜBİTAK Popular Science publications in the context of these stages can create awareness from early childhood to a wide age range over 15 years. For example, Curious Little Magazine's thematic topics are part of a broader project-based learning education model and using a creative, systematic approach to teach problem-solving forms the basis of design thinking. Designing innovative and empathetic learning experiences within popular science magazines can have a significant impact on students and educators.

Design thinking is one of the best methods that can be used in this age. Whether integrated into the curriculum in schools under project-based teaching frameworks or designed as a tool that can be used with popular science publications, future design thinking studies should be considered and developed by educators/politicians.

Author Statements

Data Availability: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethical Rules: Since this research is a theoretical study, no ethics certificate was required.

Authors Contributions: This research is a single author study.

Conflict of Interest: The authors declare that they have no conflict of interest related to this study.

REFERENCES

- Ambrose, G., & Harris, P. (2009). *Basics Design 08: Design Thinking*. Bloomsbury Publishing.
- Brown, T. (2008). Design Thinking. *Harvard Business Review*, 86(6), 84.
- Brown, T. (2019). *Change By Design, Revised and Updated: How Design Thinking Transforms Organizations and Inspires Innovation Hardcover – Illustrated, Harper Business; Revised, Updated Ed. Edition*
- Carlgrén, L. (2013). *Design Thinking as An Enabler Of Innovation: Exploring The Concept And Its Relation To Building Innovation Capabilities. (Phd Thesis)*. Chalmers University Of Technology, Gothenburg.
- Corbin, J. & Strauss, A. (2008). *Basics Of Qualitative Research: Techniques And Procedures For Developing Grounded Theory*. Thousand Oaks: Sage
- Dilli, R. Gözcelioğlu, B. (2019). *Bilim Üzerine Eğlenceli Konuşmalar: Bilim Kafeler, A. İ. Şen (Ed.), Okul Dışı Öğrenme Ortamları, 1. Baskı, Pegem Yayıncılık, 118-134.*
- Dorst, K., & Cross, N. (2001). Creativity In The Design Process: Co-Evolution Of Problem–Solution. *Design Studies*, 22(5), 425-437.
- Gallagher, A. ve Thordarson, K. (2020). *Design Thinking in Play-An Action Guide for Educators*. ASCD. Alexandria, VA.
- Girgin, D. (2020). 21. Yüzyılın öğrenme deneyimi: Öğretmenlerin Tasarım Odaklı Düşünme eğitimine ilişkin görüşleri. *Milli Eğitim Dergisi*, 49 (226), 53-91.
- Hasso Plattner School of Design. (2003). *An Introduction to Design Thinking Process Guide. Design Thinking at Hasso Plattner Institute*, <https://hpi.de/en/school-of-design-thinking.html>.
- Johnson, L. ve Adams, S. (2011). *Challenge based learning: The report from the implementation project* [Research report]. New Media Consortium. Retrieved from <https://eric.ed.gov/?id=ED532404>
- Karakaya, A.F. (2024). *Fizik Eğitiminde Tasarım Odaklı Yaklaşım, A.İ. Şen, A. Kireşçi (Ed.), Disiplinlerarası Fizik Öğretimi, EİT Eğitim Enstitüsü, Ankara, 118-129.*
- Kelly, K., & Mooney, T. (2013). *Design Thinking As An Outreach Activity For Female Students*. In *Proc. 30th Int. Manuf. Conf.* . 58-72.
- Kozan, E. (2022). *Design Thinking Tasarım Odaklı Düşünme, 3. Baskı, Abaküs yay. İstanbul.*

- Lipman, M. (2003). *Thinking in Education*. Cambridge: Cambridge University Press.
- Miller, P. N. (2017). Is “design thinking” the new liberal arts? *The Evolution of Liberal Arts in the Global Age*, 167.
- Owen, Charles (2007). *Tasarım Düşüncesi: Doğası Ve Kullanımına İlişkin Notlar*. Üç Aylık Tasarım Araştırması 2.1, 16-27.
- Painter, D. L. (2018). *Using design thinking in mathematics for middle school students: a multiple case study of teacher perspectives* (Doctoral dissertation, Concordia University (Oregon)).
- Rauth, I., Köppen, E., Jobst, B. & Meinel, C. (2010). *Design Thinking: An Educational Model Towards Creative Confidence*. In *First International Conference On Design Creativity* (Pp. 1–8). Kobe, Japan.
- Razzouk, R., & Shute, V. (2012). *What Is Design Thinking And Why Is It Important?. Review Of Educational Research*, 82(3), 330-348.
- Shanta, S., & Wells, J. G. (2022). *T/E Design Based Learning: Assessing student critical thinking and problem-solving abilities*. *International Journal Of Technology and Design Education*, 32(1), 267-285.
- Şeker, Z. C. (2020). *Dinleme ve konuşma becerilerine yönelik lisansüstü tezlerin anahtar kelimeleri üzerine bir inceleme: Betimsel analiz*. *Rumelide Dil ve Edebiyat Araştırmaları Dergisi*, (19), 128-140.
- Vanada, D. I. (2014). *Balance, Depth, And Beyond: Tapping Into Design Thinking in Art Education*. *The International Journal of Arts Education*, 10(1), 1.
- Zhou, W. (2018). *Application Of" Design Thinking Method" In Training Practice Of Creative Talents In Colleges And Universities In China*. In *8th International Conference On Education, Management, Information And Management Society (EMIM 2018)* (Pp. 386-390). Atlantis Press.
- Zou, P. X., Marsh, D., Evans, M., Sherrard, A., & Howard, J. (2014, June). *Changing Construction Safety Culture and Improving Safety Outcomes By Design Thinking And Co-Production: Research Proposal And Preliminary Results*. In *C1b W099 International Conference on Achieving Sustainable Construction Health And Safety 2-3 June 2014 Lund University, Lund, Sweden Ingvar Kamprad Design Centre (Ikdc)* (P. 118).
- White, C., Wood, K. ve Jensen, D. (2012, October- December). *From brainstorming to C-sketch topprincipals of historical innovators: Ideation techniques to enhance student creativity*. *Journal of STEM Education*, 13(5), 12-24.