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Enhancing Attention through Digital Mindfulness: Teacher Perspectives on Implementation in Preschool Settings

Dijital Mindfulness Yoluyla Dikkatin Artırılması: Okul Öncesi Ortamlarda Uygulamaya İlişkin Öğretmenlerin Bakış Açıları

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ABSTRACT: This study investigates the impact of a digital mindfulness application on preschool children's attention skills based on teachers' experiences. Adopting a qualitative case study design, the research was conducted with two preschool teachers and 23 children aged 60-72 months enrolled in public institutions affiliated with the MoNE. Over four weeks, daily 40-minute mindfulness sessions were implemented using the Nowanda digital application. Data were gathered through semi-structured interviews conducted before and after the intervention and analyzed using content analysis. Findings indicate that technology-supported mindfulness activities positively influenced children's attention in the short term, particularly in group settings. Teachers observed increased focus, emotional regulation, and motivation; however, the effectiveness varied depending on individual differences, classroom dynamics, and external distractions. While the digital format was engaging and accessible, challenges emerged, including screen time management, spatial limitations, and insufficient pedagogical support. Teachers noted that children with pre-existing attention difficulties benefited less unless activities were applied systematically and consistently. The study concludes that when thoughtfully integrated and developmentally appropriate, digital mindfulness tools can support attention development in early childhood. Effective use requires teacher training and active family engagement. Further research is recommended to examine long-term effects and compare different mindfulness technologies in early learning environments.

Keywords: Mindfulness, early childhood education, teacher perspectives, attention skills, digital application.

ÖZ: Bu çalışma, okul öncesi dönemdeki çocukların dikkat becerileri üzerinde dijital farkındalık uygulamasının etkilerini öğretmen görüşlerine dayalı olarak değerlendirmeyi amaçlamaktadır. Araştırma, nitel araştırma yöntemlerinden durum çalışması deseniyle yürütülmüş olup, Millî Eğitim Bakanlığı'na bağlı iki kurumda öğrenim gören 60-72 ay aralığındaki 23 çocuk ve iki okul öncesi öğretmeni ile gerçekleştirilmiştir. Dört hafta boyunca her gün 40 dakikalık farkındalık temelli etkinlikler sınıfa Nowanda adlı dijital uygulama aracılığıyla entegre edilmiştir. Veriler, uygulama öncesinde ve sonrasında öğretmenlerle yapılan yarı yapılandırılmış görüşmeler yoluyla toplanmış ve içerik analizi ile çözümlenmiştir. Bulgular, dijital farkındalık uygulamalarının çocukların dikkat sürelerini ve grup etkinliklerine katılım düzeylerini kısa vadede olumlu etkilediğini göstermektedir. Öğretmenler, dikkat süresi, duygu düzenleme ve motivasyonda artışlar gözlemlemişlerdir. Ancak bireysel farklılıklar, çevresel uyaranlar ve sınıf rutinleri uygulamanın etkilerini sınırlamaktadır. Ayrıca ekran süresinin yönetimi, fiziksel ortamın yetersizliği ve pedagojik donanım eksiklikleri vurgulanmıştır. Özellikle dikkat eksikliği olan çocukların uygulamadan sınırlı fayda sağladığı, etkinlikler düzenli uygulanmadığında etkilerin kalıcı olmadığı ifade edilmiştir. Sonuç olarak, gelişim düzeyine uygun dijital farkındalık uygulamaları dikkat gelişimini destekleyebilir. Okul öncesi eğitimde dijital farkındalık uygulamalarının uzun vadeli etkileri incelemek ve farklı farkındalık teknolojilerini karşılaştırmak için daha fazla araştırma yapılması önerilir.

Anahtar kelimeler: Farkındalık, erken çocukluk eğitimi, öğretmen görüşleri, dikkat becerileri, dijital uygulama.

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Early childhood is a critical period during which the foundations of an individual's cognitive, social, and emotional development are established. The skills acquired during this period directly influence a child's future learning processes, social relationships, and overall quality of life (Selçuk & Yavuz, 2018). Therefore, a child's ability to effectively use mental processes, such as focusing, following instructions, and processing information, in interactions with the environment is of great developmental significance. At the core of these skills lies attention. Attention is a key factor in children's academic success and is regarded as a fundamental skill that supports information processing mechanisms. From a neuropsychological perspective, the prefrontal cortex is considered a central neural substrate of executive functioning, supporting inhibitory control, attentional regulation, and the organization of planned, goal-directed behavior (Diamond, 2013; Friedman & Robbins, 2022; Miller & Cohen, 2001)

Attention is one of the fundamental cognitive functions and is defined as a state of mental alertness and focusing efficiency (Posner & Peterson, 1990). Posner and Petersen (1990) developed a theoretical framework explaining the mechanisms of attention, identifying three distinct attention systems: (i) the orienting system, (ii) the executive attention system, and (iii) the alerting system. Current studies primarily focus on the alerting system, which enables individuals to direct and sustain their attention on a particular task. A child's ability to maintain attentional control is considered a significant indicator of functionality in daily life activities (Swaab-Barneveld et al., 2000).

The ability to ignore potential distractions and reduce impulsivity is assumed to play a crucial role in selectively attending to the most relevant information in the environment and optimizing learning outcomes (Passler et al., 1985). Research indicates that the development of children's attention skills directly influences learning processes and academic success from an early age. For instance, Duncan et al. (2007) and Roth et al. (2020) found that children's ability to regulate their attention allows them to focus on specific events or objects and sustain this focus, leading to better information processing and higher academic performance. Furthermore, the impact of attention skills on children's social development is also noteworthy. Zelazo and Lyons (2012) highlighted the positive effects of attention skills on social relationships, emphasizing that these skills help children establish more effective communication processes and improve their emotional regulation in social settings. These findings underscore the necessity of supporting children's attention skills from an early age.

Sustained attention shows a gradual developmental progression from infancy to early childhood. During early exploratory play, one-year-old infants typically focus on a single object for only a few seconds, whereas by around three years of age children are able to maintain their attention for approximately eight to nine seconds, reflecting emerging improvements in attentional control (Ruff & Lawson, 1990; Ruff & Capozzoli, 2003). As children grow, these increases in attentional capacity are closely intertwined with the development of executive functions—particularly inhibitory control and attentional regulation—which enable them to sustain engagement in goal-directed activities despite environmental distractions (Diamond, 2013). Neurodevelopmental accounts further suggest that these behavioral changes parallel the gradual maturation of the prefrontal cortex and its associated neural networks, which

play a central role in supporting cognitive control processes during early childhood (Miller & Cohen, 2001; Friedman & Robbins, 2022).

The ability to sustain attention is sometimes considered an intrinsic and stable characteristic related to temperament (Colombo, 2001). However, developmental theorists have suggested that parents and social contexts also play a role (e.g., Kopp, 1982; Parrinello & Ruff, 1988; Vygotsky, 1978). Studies have shown that early attention deficits are associated with later academic failure and social adaptation problems (Willoughby et al., 2021); attention development facilitates children's active participation in learning experiences (Rueda et al., 2005); and poor attention skills negatively affect children's ability to establish and maintain social relationships (Greenberg & Harris, 2012). In this context, the importance of school-based early interventions for children with attention difficulties is emphasized, with mindfulness programs specifically suggested as effective in enhancing children's attention spans and academic success (Zelazo & Lyons, 2012). In this regard, mindfulness practices emerge as effective methods for supporting children's attention skills.

Mindfulness contributes to the development of skills such as attention, focus, and cognitive flexibility by enabling individuals to consciously direct their attention to the present moment (Kabat-Zinn, 1994). By its nature, mindfulness is a global concept that does not rely on any particular spiritual or theological framework but instead focuses on cultivating conscious awareness (Kabat-Zinn, 2003). This concept is structured around the individual's present experience, allowing them to observe their thoughts, emotions, and sensations and to pay attention to these elements in a conscious manner (Bishop et al., 2004). The four fundamental components underlying mindfulness practice include attention regulation skills, emotional awareness, body awareness, and self-compassion (Tang et al., 2015). Attention skills can be enhanced through mindfulness practices, enabling individuals to perform their tasks and responsibilities more effectively (Chiesa & Serretti, 2009; Sedlmeier et al., 2012). Mindfulness practices have been observed to reduce stress levels while positively impacting attention, emotional regulation, empathy development, and relaxation.

Mindfulness has also been widely implemented in early childhood education. These practices have been found to enhance children's learning experiences and well-being, providing them with a strong developmental foundation (Duncan & Magnuson, 2013). During these sensitive years of childhood, mindfulness has been recognized as a tool to introduce children to positive behaviors such as kindness, tolerance, and peace (Whitehead, 2011). Since children's future developmental trajectories are significantly influenced by the quality of education they receive during early childhood, mindfulness interventions are likely to have lasting benefits (Pholphirul, 2016). Mindfulness training can help shift attention to breathing and steer individuals away from negative emotions such as anxiety, depression, and fear (Yuan, 2021).

In early childhood education, mindfulness practices are typically adapted to children’s developmental characteristics and learning needs. Unlike adult-oriented mindfulness practices that often involve prolonged meditation, mindfulness activities for young children are generally structured as short, play-based, and movement-supported exercises such as breathing activities, body awareness practices, and guided imagery integrated into daily classroom routines (Zelazo & Lyons, 2012). In recent years, mindfulness practices have increasingly been supported through digital

technologies such as mobile applications and online platforms, which allow mindfulness-based programs to be delivered in flexible and accessible formats (Mitsea & Drigas, 2023; Lahtinen & Salmivalli, 2020). In this context, digital mindfulness refers to the integration of technology-supported tools into mindfulness-based practices to facilitate the implementation of mindfulness activities in educational environments, particularly in early childhood classrooms.

With the increasing integration of digital technologies into psychological interventions, mindfulness programs have progressively been adapted for delivery through mobile applications and online platforms (Singer, 2025). Mindfulness interventions are often delivered in short (e.g., 10-minute) recorded sessions, contrasting with longer in-person workshops. Despite these differences, app-based interventions have been effective in adults. Studies have shown that such interventions reduce stress (Goldberg et al., 2020; Hirshberg et al., 2022) and improve various aspects of an individual's well-being, including mood (Economides et al., 2018). To date, no quantitative study has been conducted on the use of app-based mindfulness interventions among pre-adolescent children. However, several studies with adolescents have yielded positive outcomes. A pilot study involving a six-week mindfulness app intervention with a normative adolescent population found that adolescents who used the app exhibited healthier weight-focused behaviors (Turner & Hingle, 2017).

While all previous mindfulness intervention studies involving children have utilized trained adult instructors to assess effectiveness, in practice, many schools prefer to implement mindfulness instructions using app-based programs. One such program, Inner Explorer, consists of guided mindfulness recordings by various speakers and is designed for multiple age groups, including children aged 8-10. Inner Explorer has been implemented in over 3,000 schools across all 50 states in the U.S., reaching more than 2 million students (Inner Explorer, 2023). In one study, 383 students from grades 1 to 5 were randomly assigned by class to either a 10-week daily 10-minute Inner Explorer intervention or a waitlist control condition. Compared to the waitlist control, students in the intervention group demonstrated improvements in mathematics scores and overall academic performance (Bakosh, 2013). A meta-analysis by Zoogman et al. (2015) examined the effects of mindfulness-based interventions on individuals under the age of 18. The analysis concluded that mindfulness-based interventions have positive effects on children and adolescents.

Research conducted in schools has identified several benefits of mindfulness, including increased levels of calmness, relaxation, self-acceptance, emotional regulation, awareness, and clarity among students (Broderick & Metz, 2009; Huppert & Johnson, 2010). For instance, findings from a study by Meiklejohn et al. (2012) indicate that implementing the Mindfulness-Based Stress Reduction (MBSR) program for 14 weeks through teachers strengthened students' attention skills and helped them cope more effectively with academic challenges. Various technologies, such as mobile applications and virtual reality, support mindfulness practices by providing reminder notifications and facilitating online sessions, thereby enhancing this practice (Li et al., 2024). Digital mindfulness and well-being technologies have the potential to transform mental health interventions by addressing individuals' needs and providing more positive and transformative psychological support (Mitsea & Drigas, 2023).

The literature highlights the positive effects of mindfulness-based approaches on the development of attention skills; however, studies on how these approaches can be implemented through digital tools remain limited. As the pedagogical use of technology in early childhood education gains increasing importance, it becomes a valuable research area to examine how mindfulness practices can be structured in digital environments and how teachers experience this process. Accordingly, this study aims to analyze teachers' perspectives on digital mindfulness applications and evaluate their potential in supporting children's attention skills. The research seeks to explore the effects of digital mindfulness applications on the attention skills of preschool children within the context of learning environments. Within this framework, a pilot field study was conducted, and the perspectives of preschool teachers in the classroom where the implementation took place were examined in depth.

This study sought to answer the question of what the effects of digital mindfulness applications are on the attention skills of preschool children. For this purpose:

1. How do preschool teachers perceive and evaluate the implementation of digital mindfulness applications, and what effects do they observe on children's attention span and sustained attention?
2. According to teachers' experiences, what are the applicability and pedagogical benefits of digital mindfulness applications in the classroom?
3. How do teachers describe the difficulties and limitations encountered in the use of digital mindfulness applications in the classroom?

Method

Research Design

This study was designed as an exploratory qualitative case study, aiming to explore preschool teachers' perceptions and experiences regarding the implementation of digital mindfulness applications and their observed effects on children's attention skills. Qualitative case studies are characterized by the researcher directly interacting with the case to examine and evaluate the meanings of events (Irvine & Gaffikin, 2006; Stake, 2010). According to Yin (2018), exploratory case studies are particularly appropriate when the aim is to investigate a contemporary phenomenon within its real-life context and to gain an initial understanding of processes and relationships that have not yet been sufficiently examined.

Participants

Two preschool teachers and a total of 23 preschool children between the ages of 60-72 months old participated in the study. One of the teachers works in a preschool affiliated with the Ministry of National Education in the Western Mediterranean Region of Turkey, while the other works in a kindergarten class within a primary school. Participants were determined using the criterion sampling, a purposive strategy in which all cases are chosen because they meet specific predetermined criteria relevant to the research objectives (Patton, 2015). The following criteria were taken into consideration in the sample selection: (1) Teachers working in both an independent kindergarten and a kindergarten class within a primary school were included in the study, thus ensuring that

different educational environments were taken into account. (2) The children participating in the study were in the 60-72 months group and had typical developmental characteristics.

Measurement Tools

The researchers who conducted the study created semi-structured interview forms by reviewing the relevant literature and consulting experts. Before the application, the research questions included a question about children's attention spans, but this question was revised in line with expert opinions. Considering that the first question needed to be addressed in a more general framework, it was replaced with a question that asked whether the teacher had heard of the concept of mindfulness before and aimed at understanding his/her current knowledge about this concept. Although the topics were determined before the interview, semi-structured interviews provide the researcher with the opportunity to conduct an in-depth examination (Megaldi & Berler, 2020). Separate interviews were conducted with the teachers at the beginning and end of the mindfulness practices. In these interviews, children's experiences and possible changes in their awareness levels were evaluated. A total of 24 questions were asked of the teachers, 13 before the application and 11 after the application. Examples of the questions asked before the application are as follows: (i) What are the in-class or out-of-class factors that affect children's attention skills? (ii) What do you think about the effect of technology on children's attention skills and behaviors? Examples of questions asked after the application are as follows: (i) Did the mindfulness applications make a difference in the children you think have attention deficit? How? (ii) Did you observe an increase in the participation of children with attention deficit in class activities after the application? These semi-structured interview questions aimed to evaluate the effects of the mindfulness applications implemented in the teacher's classroom on the children's attention skills. The questions were developed based on Kabat-Zinn's (2003) mindfulness framework. The questions were inspired by the literature in the field of mindfulness (Kabat-Zinn, 2003; Bishop et al., 2004) and previous studies in the field of early childhood education. The questions were used to collect comparative information before and after the application.

Data Collection Process

This study employed Nowanda, an AI-powered mindfulness application available on iOS, Android, and Huawei AppGallery. Nowanda can be downloaded and installed for free, but in-app purchases are required to access premium content. The app provides structured mindfulness activities tailored to different age groups, including focused attention exercises, sleep stories, and stress-relief exercises specifically designed for children. Content is categorized by age group (e.g., 3–4, 5–6, 7–10 years old) and aims to enhance children’s coping skills, attention, and self-confidence. In addition to child-focused content, Nowanda offers resources for parents and educators on emotional development, empathy, and mindfulness-based teaching strategies.

In this study, researchers guided the implementation of the app-based mindfulness activities. The program was conducted in two classrooms, with 11 children in one class and 12 in the other, and sessions were implemented as group activities due to the class sizes. Prior to the intervention, teachers received training from the

researchers on how to apply the mindfulness activities, observe children's responses, and integrate the techniques into daily classroom routines. This training ensured that teachers were competent in facilitating the sessions and maintaining the fidelity of the intervention.

Mindfulness sessions were conducted for 40 minutes per day over 4 weeks. During each session, one of the researchers was present in the classroom to support and guide teachers, provide immediate feedback, and ensure proper implementation of the activities. Each session was structured to allow observation of children's attention spans and emotional responses. Then, to evaluate the effects of the program, semi-structured interviews were conducted with teachers both before and after the mindfulness activities. The initial interviews gathered information on teachers' knowledge, attitudes, and expectations regarding mindfulness practices and children's attention skills. The follow-up interviews focused on teachers' evaluations of the implementation process, observations of changes in children's attention and emotional regulation, and reflections on the potential educational benefits of integrating mindfulness into the classroom. This structured and supervised approach was designed to maximize the accuracy, reliability, and validity of the collected data (Creswell & Poth, 2018; Merriam & Tisdell, 2015).

Table 1

Stages of the Digital Mindfulness Activity Implemented in the Classroom

Stage	Duration	Content and Implementation	Purpose
1. Preparation and Classroom Arrangement	5 min	Children are seated comfortably in the classroom. Distracting stimuli in the environment are minimized, and a moment of silence is created before the activity.	To facilitate children's transition to the activity and prepare them for focusing.
2. Emotional Awareness (Check-in)	5 min	The teacher initiates a short conversation by asking questions such as "How do you feel today?" Children are encouraged to express their emotional states.	To develop emotional awareness and direct children's attention toward their internal experiences.
3. Digital Mindfulness Practice	10–12 min	A guided mindfulness activity selected from the Nowanda application (e.g., breathing exercises, focusing activities, or story-based meditations) is implemented via a smart board or tablet in the classroom.	To support children's ability to direct their attention to a specific stimulus and sustain attention.
4. Body Awareness Activity	8–10 min	Slow movements, breathing awareness, or short body awareness exercises are conducted following the instructions provided in the application.	To strengthen the mind–body connection and support the relationship between attention and bodily awareness.

5. Reflection and Sharing	5–8 min	After the activity, a short evaluation is conducted with the children. Children share their experiences or create a short drawing/artwork.	To help children make sense of the mindfulness experience and express their awareness.

Figure 1

Classroom Application Photos of Mindfulness Practices



Data Analysis

Records of semi-structured interviews with participating teachers were analyzed using the content analysis method. With careful data preparation, coding, and interpretation processes, the results of content analysis in qualitative research can support the development of new theories and models, validate existing theories, and provide detailed explanations of specific settings or phenomena (Zhang & Wildemuth, 2009).

Table 2

Examples of Coding Related to the Data Analysis Process

Participant Statement	Code	Sub-theme	Theme
"I had not heard of the concept of mindfulness before, but I used to do breathing exercises to calm the children."	Limited knowledge about mindfulness	Level of knowledge about the concept of mindfulness	Teachers' perceptions and implementation experiences regarding the concept of mindfulness
"Mindfulness practices helped	Increase in	Change in attention	Effects of mindfulness

Participant Statement	Code	Sub-theme	Theme
children sustain their attention for a slightly longer period."	attention duration	after mindfulness	practices on attention skills
"Some children focused better after breathing exercises, but we did not observe the same effect during desk-based activities."	Activity-based attention change	Classroom effects of mindfulness practices	Effects of mindfulness practices on attention skills
"Children's attention is better in the morning, but it decreases toward noon."	Daily variation in attention	Effects of daily routines	Factors affecting attention span in the classroom environment
"When the noise level in the classroom decreases, children's attention span increases."	Effect of environmental stimuli	Classroom environment factors	Factors affecting attention span in the classroom environment
"When we used the digital application, children's interest increased."	Attractiveness of digital tools	Use of digital tools	Contributions of digital platforms in mindfulness practices
"The audio instructions on the tablet or smart board helped children follow the activity more easily."	Digital guidance support	Technology-supported mindfulness	Contributions of digital platforms in mindfulness practices
"We observed short-term benefits in children with attention problems, but they were not permanent."	Short-term attention improvement	Individual differences	Factors affecting attention span in the classroom environment

Validity and Reliability

Yıldırım and Şimşek (2008) recommend that analysis methods should be explained, and findings should be reported in detail to ensure validity in qualitative research processes. The validity of this study was ensured by presenting the analysis steps and presenting the findings in detail. In addition, a second expert opinion was obtained regarding the interview questions and their reliability was verified. In addition, two different researchers coded the data separately before creating the themes. In addition, the transcripts of the interview process were sent to the participants and their approvals were obtained. Yıldırım and Şimşek (2008) suggest that reliability in qualitative research can be ensured through participant confirmation or expert opinions. In addition, after expert opinions were obtained, additions were made to the questions to be asked of teachers before the application. Within the scope of the suggestions, questions were added to the interview questions regarding whether the teacher had previously heard of the concept of conscious awareness and what he/she knew about this concept.

Ethical Procedures

The necessary permissions for the conduct of the study were obtained with the decision of Burdur Mehmet Akif Ersoy University the Clinical Research Ethics Committee No. dated 05.11.2024 and numbered 2024/690. All ethical rules were complied with before, during and after data collection. All ethical principles were

complied with during the research process. Informed consent forms were obtained from the participating teachers and voluntary participation permission forms were obtained from the parents, thus ensuring compliance with ethical rules. The identities of the participants were kept confidential and used only for research purposes. To increase the accuracy of the data, the interviews were recorded and later transcribed. The participants were given the right to withdraw from the study at any time (Kvale & Brinkmann, 2009). This structured data collection process aimed to better understand how mindfulness practices are perceived and implemented by early childhood teachers. The findings made significant contributions to the integration of mindfulness techniques into educational processes.

Results

As a result of the interviews with the teachers, the following main and sub-themes are shown in Table 1 to analyze teachers' observations regarding the role of mindfulness practices in children's attention spans.

Table 3

Teachers' Views on Digital Mindfulness Applications

Theme	Sub-theme
Teachers' Perceptions and Application Experiences of the Concept of Mindfulness	Level of Knowledge Concerning the Concept of Mindfulness
	Teachers' Approaches Toward Mindfulness Practices
Teachers' Observations on Children's Attention Skills	Pre-Implementation Attention Levels
	Post-Implementation Changes
	Children's Engagement and Motivation During Mindfulness Activities
Factors Affecting Attention Span and Cognitive Processes in the Classroom	Daily Routines and Environmental Factors
	Individual Differences and Special Needs
Contribution of Digital Platforms to Mindfulness Applications	Use of Digital Tools and Interaction Power
	Teachers' Experiences with Technology-Supported Mindfulness Practices

Teachers' Perceptions and Implementation Experiences Regarding the Concept of Mindfulness

Level of Knowledge Concerning the Concept of Mindfulness

During the interviews, teachers were asked whether they had previously heard of the concept of mindfulness and what level of knowledge they possessed on the subject. Both teachers stated that they were not familiar with the term in an academic context; however, they reported that they had unknowingly incorporated mindfulness-related activities into their classrooms. T1 expressed her awareness by saying, "I haven't heard

the term mindfulness before, but I do breathe exercises to calm the children. Apparently, I have been using such practices without realizing it."

According to the teachers' perspectives, mindfulness is considered a strategy that can help regulate stimuli from the external environment for children in early childhood. Nonetheless, some teachers stated that implementing mindfulness practices with this age group could be challenging. The main difficulties experienced during implementation were identified as follows: i) the limited attention span of young children, ii) the inadequacy of the physical environment for mindfulness activities, iii) the insufficient knowledge or limited access to technology-assisted mindfulness practices. Teachers emphasized that technology-supported mindfulness applications could be effective in enhancing children's attention spans. However, they also highlighted that both teachers and parents need to receive training to use these applications effectively.

Teachers' Approaches toward Mindfulness Practices

When examining teachers' approaches toward mindfulness practices, it was observed that T2 perceived these activities as a pedagogical tool, while T1 was more hesitant to comment due to her unfamiliarity with the concept. Nevertheless, T1 demonstrated a skeptical attitude toward mindfulness practices, viewing it more as a popular trend than a scientifically grounded concept. On the other hand, T2 stated, "I was not familiar with the concept of mindfulness before, but as I reflected on the practices, I realized that it could be a new tool I could use in the classroom," indicating that her perspective on mindfulness evolved throughout the process.

Teachers' Observations on Children's Attention Skills

Pre-Implementation Attention Levels

Before the implementation of mindfulness practices, teachers reported that children's attention spans varied due to individual differences. According to the participants, while some children struggled to focus on a specific activity, others experienced frequent distractions. T1 stated, "In the classroom, attention spans vary between 5 to 10 minutes, and I observed that children's interest would wane during activities requiring long-term focus." Some teachers noted that children's focus durations were generally longer during group activities compared to individual tasks. However, attention lapses during desk-based and individual activities were commonly reported.

Post-Implementation Changes

Following the regular application of mindfulness practices over a certain period, teachers observed positive changes in children's attention skills. T1 emphasized the impact of the process, stating, "Thanks to mindfulness activities, children can sustain their attention for longer periods and show greater interest in group activities." Additionally, teachers who implemented breathing exercises and guided meditation techniques reported that these methods helped children become more aware of the present moment and facilitated their ability to concentrate. T2 remarked, "Some children were able to focus better after breathing exercises, but this effect did not persist to the same extent during desk-based tasks," highlighting the variable impact of the

practices. These findings suggest that mindfulness practices have potential as a method for improving attention in early childhood education. However, the effectiveness of these practices depends on consistency and a systematic approach.

Children's Engagement and Motivation during Mindfulness Activities

When evaluating the effects of mindfulness practices on children's attention spans, teachers' observations indicated positive outcomes. T1 remarked, "I observed that, thanks to mindfulness activities, children could sustain their attention for longer. They were especially more eager to participate in group activities," emphasizing the classroom-level impact of the practices.

Teachers stated that attention spans varied among children before the implementation, but mindfulness techniques gradually played a role in enhancing focus. T2 noted, "Some children were able to concentrate better after breathing exercises, but this effect did not carry over as strongly into desk-based activities," sharing her observation.

In evaluations regarding how mindfulness practices influenced children's motivation, teachers stated that mindfulness activities incorporating music, play, and movement captured children's interest more effectively. T1 especially emphasized the effectiveness of these practices by stating, "When we combined mindfulness with dynamic activities such as music and games, children's participation and attention spans increased noticeably."

Factors Influencing Classroom Attention Span and Cognitive Processes

Daily Routines and Environmental Factors

Teachers identified daily routines and environmental factors as primary elements affecting children's attention spans. It was observed that attention spans were generally longer in the morning but decreased as the day progressed, especially before lunchtime. As stated by Teacher 1 (T1), "Children's participation in lessons is much more active in the morning. Toward noon, however, their motivation declines, and their attention span shortens."

According to teacher observations, the organization of daily routines and the level of stimuli in the classroom environment are key factors influencing attention span and cognitive processes. Teacher 2 (T2) emphasized, "When I established a consistent routine, I noticed an increase in children's attention spans. Particularly after morning mindfulness exercises, they performed better in activities requiring sustained attention."

Moreover, elements such as classroom noise levels, color schemes, and the use of materials were found to significantly influence attention. T1 noted, "After reducing the noise level, children were able to maintain their attention for longer periods. However, when using visuals or materials with excessive stimuli, their attention was easily distracted," thereby highlighting the impact of classroom design.

Additionally, teachers emphasized the limited impact of mindfulness practices due to external environmental factors within the school. T1 explained, "I work in a preschool class within a primary school, and the bell sounds and noise from older students frequently distract my class. Although children can focus more easily at the

start of mindfulness activities, sustaining this focus becomes difficult due to environmental distractions."

Individual Differences and Special Needs

Individual differences and special needs were also found to be significant variables that influenced the effectiveness of mindfulness practices. Teachers observed that children with attention deficits benefited from mindfulness exercises, though the effects were generally short-term. T2 stated, "Mindfulness was effective in the short term for children with attention difficulties, but the effect did not persist over time," drawing attention to the importance of individual differences. Teacher 2 (T2) reiterated, "Children with attention deficits were better able to concentrate after mindfulness activities, but this was not a lasting effect."

Teachers also observed that children with low self-confidence or those who were more introverted initially approached mindfulness practices with hesitation but gradually became more engaged over time. Repetitive implementation of these practices was reported to accelerate the adaptation process.

Furthermore, teachers working with children with special needs noted that individualized mindfulness techniques were more effective. T1 shared, "For my students on the autism spectrum, short but repetitive mindfulness practices were more beneficial. Rather than long sessions, it was more effective to conduct short focusing exercises multiple times a day," underscoring the importance of adapting practices to individual needs.

The Contribution of Mindfulness Practices and Digital Platforms

Use of Digital Tools and Their Interactive Power

The integration of technology into mindfulness practices presented a novel experience for many teachers. Those using tools such as smartboards, speakers, and projectors in their classrooms stated that the use of technology increased children's engagement during mindfulness activities. T2 remarked, "Using technology in mindfulness practices made the process more enjoyable for the children and helped them focus better."

Digital content was observed to be a powerful tool in capturing children's attention. T1 emphasized, "The use of audio and visual content increased both attention spans and participation in activities," highlighting the role of digital tools in mindfulness practices.

Teachers expressed varied opinions on the integration of technology into mindfulness practices. T1 stated, "Guided meditation applications on tablets and smartboards captured children's interest and improved their focus. However, screen time must be carefully managed," pointing to the potential benefits of digital tools.

Interactive applications were also considered by teachers to be effective in developing children's mindfulness skills. As T2 explained, "Auditory instructions and visual support in digital mindfulness applications made it easier for children to follow directions. Compared to traditional mindfulness techniques, these can be more engaging," emphasizing the interactive potential of technology.

Teachers' Experiences with Technology-Supported Mindfulness Practices

Teachers emphasized the need for conscious integration of technology to enhance the effectiveness of mindfulness practices. T2 reflected, "If I had been familiar with mindfulness practices earlier, I could have integrated technology into the process more mindfully," indicating a lack of pedagogical knowledge as a barrier.

Based on the interviews, it was revealed that mindfulness practices had a positive impact on children's attention skills, but the duration and quality of activities must be planned with care. While the integration of technology into mindfulness practices increased children's interest, teachers highlighted the necessity of pedagogical support and training to manage this process more effectively.

Teachers had mixed experiences regarding the effectiveness of digital mindfulness tools. T2 shared, "Short digital mindfulness exercises were beneficial for children with attention deficits. However, some students became overly focused on screens and lost their physical awareness," suggesting that the process must be managed with balance.

In addition, teachers expressed concerns that technological tools might distract children. T1 noted, "Technology can be useful in mindfulness practices, but teachers need to carefully manage the process to prevent children from becoming overly dependent on screens," stressing the importance of controlled use.

Overall, teachers acknowledged that technology-supported mindfulness practices could contribute to the development of attention and emotional regulation in early childhood education. However, they emphasized that these practices should be structured consciously and blended in balance with traditional mindfulness techniques.

Discussion and Conclusion

This study evaluated the potential relationship between digital mindfulness applications and attention development in early childhood. Analyses and teacher interviews indicated that mindfulness-based digital tools may positively contribute to children's attention span and focusing skills. In particular, the integration of technology-supported activities with mindfulness-based approaches provided a structured learning environment aimed at enhancing children's attentional abilities. The research findings revealed that teachers reported positive perceptions regarding the contribution of digital mindfulness applications to children's ability to concentrate and sustain attention. However, the effectiveness of such applications may vary depending on factors such as children's developmental characteristics, duration of exposure to technology, and the guidance provided by teachers. Moreover, teachers emphasized the importance of ensuring that mindfulness applications offer an enjoyable and interactive experience without increasing the cognitive load on children.

Specifically, the combination of technology-enhanced activities with mindfulness-based strategies provided a structured setting to support the development of attentional skills in young children. The findings also align with existing literature. For instance, a study by Koch (2016) reported that mindfulness practices improved emotional regulation and attentional skills among elementary school children and had a positive impact on student behavior and anxiety levels. Similarly, a meta-analysis by Vekety et al. (2020) demonstrated that mindfulness-based interventions had a small but

significant effect in reducing inattention and hyperactivity-impulsivity behaviors in children. These findings suggest that mindfulness practices may positively influence children's academic performance and classroom behavior. Nonetheless, the effectiveness of these practices depends on factors such as children's developmental stages, their exposure time to digital tools, and teacher facilitation. Teachers highlighted the importance of designing mindfulness applications that are engaging and interactive, while not overburdening children cognitively. Therefore, it is crucial to develop content appropriate to the age and developmental levels of children in the design of digital mindfulness applications.

In this context, further research is needed on the integration of digital mindfulness approaches into early childhood education. Future studies should explore the long-term effects of such applications to evaluate their sustained impact on children's attentional skills. Additionally, examining the roles of families and teachers in greater depth may offer a more holistic framework for the integration of digital mindfulness practices into early childhood education. This study may also contribute to the development of recommendations for teachers on how to effectively implement technology-assisted mindfulness applications in their classrooms.

Although research on the effects of mindfulness practices in early childhood has gained popularity in recent years, there remain several important gaps in the literature. While promising findings have been reported regarding the impact of mindfulness on individuals' attention skills, much of the existing research has focused on short-term interventions or has been conducted with adult populations (Zhang et al., 2021). There is a limited number of studies investigating the use of digital mindfulness applications with children. Various digital mindfulness tools have been developed to enhance children's attention and concentration skills (Napoli et al., 2005), but research on the effectiveness of these technologies has largely centered on adults. How digital tools can be adapted to different age groups and which design features support learning and attention processes have not been sufficiently addressed.

This study aims to evaluate the effects of mindfulness practices on children's attention skills through digital tools in the context of early childhood. Findings from the literature review indicate that mindfulness education has positive effects on children's attention span, emotional regulation, and cognitive flexibility (Flook et al., 2015). Digital mindfulness applications offer a new paradigm in early childhood education. However, their pedagogical suitability and ethical dimensions have not yet been adequately explored. In particular, the long-term effects of children's interactions with digital tools on their cognitive and social development require further investigation (Greenberg & Harris, 2012).

This study also has certain limitations. First, the sample group was limited to a specific educational institution, which may restrict the generalizability of the findings to broader populations. Another limitation of this study is that data were collected only from teachers. Although the classrooms included children who participated in the mindfulness activities, no direct data were collected from them. Therefore, the findings reflect teachers' observations and perceptions rather than direct measurements of children's attention skills. In addition, only a single digital mindfulness application was evaluated, and the comparative effects of different applications were not examined. Furthermore, longitudinal follow-up studies are needed to explore the long-term effects

of mindfulness practices on the development of attention in children. Future research could examine the effects of digital mindfulness applications on various age groups using larger and more diverse samples.

In conclusion, this study demonstrates that digital mindfulness-based applications have the potential to enhance attention and self-regulation skills in early childhood. However, the effective implementation of mindfulness practices requires the active involvement of both teachers and parents. Future studies that explore the impact of digital mindfulness applications in different contexts may contribute to the development of more comprehensive and sustainable mindfulness programs for early childhood education. The results of our study indicate that mindfulness-based applications can serve as effective tools for improving children's attention skills.

Implications

To enhance the long-term effectiveness of these interventions, they must be implemented regularly, diversified, and adapted to better suit children with attention difficulties. In this regard, digital mindfulness applications offer significant educational potential due to their ability to be customized according to children's individual needs. Ultimately, this study not only highlights the effects of mindfulness-based applications on attention skills in early childhood but also provides important insights into how such practices can be made more effective through digital education platforms. Future research could examine in greater detail the long-term effects of integrating digital technologies into mindfulness programs on attention development. This study may also contribute to the development of practical recommendations for teachers regarding the use of technology-supported mindfulness applications in the classroom.

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Statement of Responsibility

ÖÖ led the conceptualization of the study, developed the research framework and method, and carried out the data analysis. AS contributed significantly to the writing and revision of the manuscript. ÖÇ was responsible for the literature review, data collection, and initial analysis. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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