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Challenges of Science Learning in the Era of Short Attention Span: Elementary School Teachers' Perspectives

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Abstract
The phenomenon of short attention spans is one of the challenges in learning Natural Sciences (IPA) in elementary schools in the digital era. Changes in student attention characteristics require teachers to implement learning strategies that are able to maintain student focus and engagement. This study aims to describe the challenges of science learning in the short attention span era based on the perspective of elementary school teachers. The research uses a quantitative approach with a descriptive survey method. The research sample consisted of 30 elementary school teachers who were selected using purposive sampling techniques. Data were collected using a Likert scale questionnaire that had been validated through expert judgment and analyzed using descriptive statistics in the form of mean, median, and standard deviation. The results showed that teachers still showed diverse perceptions in identifying the characteristics of short attention span in students (mean = 3.21; SD = 1.06) so that it is in the category of doubt. Meanwhile, the teacher stated that he agreed that digital technology and gadgets had an effect on the short attention span (mean = 3.87; SD = 1.01), this phenomenon has an impact on science learning (mean = 3.62; SD = 1.01), and is a challenge in the implementation of science learning (mean = 3.98; SD = 0.94). The indicator with the highest score was the teacher's strategy in overcoming the short attention span (mean = 4.38; SD = 0.69) which belongs to the category is very agreeable. These findings suggest that teachers view the implementation of active, interactive, and varied learning strategies as an important effort to retain students' attention. Therefore, improving teachers' competence in recognizing the characteristics of short attention spans and designing adaptive science learning is an important need in the digital era.

Keywords:
short attention span, science learning, elementary school, student attention, learning strategies

INTRODUCTION

The development of digital technology has changed the way children obtain information, communicate, and learn. The use of gadgets, social media, and various digital platforms has become part of the daily lives of elementary school-age children. The use of digital media is related to aspects of attention, mental health, and children's academic performance (Cardoso-Leite et al., 2021). Along with increasing access to digital technology, students are also increasingly accustomed to interacting with various sources of information that are available quickly and diversely. On the other hand, this condition poses new challenges in the world of education, especially related to students' ability to maintain attention during the learning process. Social media is one of the sources of distraction that can distract individuals from the task at hand (Koessmeier & Büttner, 2021). In addition, digital distractions are one of the factors that have the potential to disrupt students' focus and involvement in learning activities (Martin et al., 2025). This condition shows that students' ability to concentrate during learning is an important issue that needs serious attention from educators and education researchers. The phenomenon of decreasing attention span or short attention span is one of the issues that is increasingly discussed in the context of 21st century education. This condition refers to the

tendency of individuals to have difficulty maintaining attention on an activity over a period of time, making it more easily distracted by other stimuli that arise around them (Rosen et al., 2013). In the digital environment, students' attention is exposed to various sources of distraction, such as social media, app notifications, and digital content that is constantly updated. Social media is one of the sources of distraction that can distract individuals from the task at hand (Koessmeier & Büttner, 2021). In addition, the habit of moving from one digital activity to another quickly can lead to attention fragmentation and decrease an individual's ability to maintain focus in learning activities (Cardoso-Leite et al., 2021). At the elementary school level, this phenomenon is of special concern considering that the ability to focus and concentrate is an important foundation in cognitive development and learning success of students.

This condition is a serious challenge in learning Sciences. Science learning is not only oriented towards mastering concepts, but also emphasizes the process of scientific inquiry, observation, experimentation, data analysis, and drawing conclusions based on evidence (National Research Council, 2012). These activities require continuous attention, active engagement, and critical thinking skills from students. Student engagement is known to have a positive relationship with understanding of science concepts and learning success (Fredricks et al., 2020). Therefore, the ability to maintain focus is one of the important factors that determine the success of science learning in elementary school (Sinatra et al., 2015). However, the characteristics of students in the digital era that tend to be easily distracted make efforts to maintain attention during science learning a challenge that needs to be overcome through the right learning strategies.

The phenomenon of short attention span has the potential to hinder the achievement of science learning goals. Students who are easily distracted tend to have difficulty following experimental procedures, understanding the relationships between concepts, and completing tasks that require continuous concentration. Studies on digital distractions in education show that attention deficits can reduce learning engagement, reduce the effectiveness of the learning process, and have an impact on students' academic achievement (Koessmeier & Büttner, 2021; Martin et al., 2025). If not handled appropriately, the phenomenon of short attention span can be a significant obstacle in the development of students' science competencies and scientific thinking skills.

In dealing with these conditions, teachers are required to develop learning strategies that are able to maintain students' attention. Various approaches such as active learning, the use of interactive media, practicum activities, brain breaks, and experiential activities are starting to be widely applied to increase student involvement during learning (Fredricks et al., 2020; OECD, 2023). Research shows that learning that involves students' active participation and a variety of learning activities can increase student attention, motivation, and involvement in the learning process (Fredricks et al., 2020). Therefore, teachers need to design more interactive and student-centered learning to accommodate the characteristics of learners in today's digital era.

Although much research has been done on digital distractions and attention to learning, most research has focused on the influence of technology on student attention or distraction management strategies in learning in general. Research that specifically examines the challenges of science learning in the short attention span era based on the perspective of elementary school teachers is still relatively limited. In fact, teachers are parties who interact directly with students and have empirical experience regarding various challenges that arise during the science learning process. Research by Cardoso-Leite et al. (2021) found that the use of digital media is related to aspects of children's attention and academic performance. Research by Koessmeier and Büttner (2021) shows that social media can be a source of distraction that distracts individuals from the task at hand. Furthermore, Martin et al. (2025), through a systematic study, revealed that digital distractions have the potential to reduce student focus, learning engagement, and learning outcomes. However, most of this research

focused on the influence of digital distractions on students' attention in general, while studies that specifically examine the challenges of science learning in the short attention span era based on the perspective of elementary school teachers are still relatively limited.

Nonetheless, most previous research has focused on the influence of digital technology on student attention or strategies for increasing learning engagement in general. Research that specifically examines the challenges of science learning in the short attention span era is still limited, especially those that place elementary school teachers as the main source of data. In fact, teachers are parties who interact directly with students and face various challenges in maintaining students' attention during the science learning process, which requires observation, experimentation, and scientific reasoning.

Based on this description, this study aims to describe the challenges of science learning in the short attention span era based on the perspective of elementary school teachers. This study also aims to identify the factors that affect the appearance of short attention spans in students and describe the various strategies used by teachers to maintain students' attention during science learning. The results of this research are expected to provide empirical information that is useful for the development of science learning strategies that are more adaptive to the characteristics of students in the digital era.

METHOD

This study uses a quantitative approach with a descriptive survey method. The descriptive survey method is used to describe phenomena based on respondents' perceptions without giving specific treatment to the research subjects (Creswell & Creswell, 2018). This study aims to describe the challenges faced by elementary school teachers in implementing science learning in the short attention span era.

The target population of the study is elementary school teachers who are actively teaching. The research sample was determined using the purposive sampling technique, which is the selection of respondents based on certain criteria that are in accordance with the research objectives (Sugiyono, 2021). The criteria for respondents in this study include: (1) elementary school teachers who are actively teaching, (2) have at least one year of teaching experience, (3) have taught science or social science subjects, and (4) are willing to be research respondents. Respondents were recruited voluntarily through the distribution of online questionnaires using Google Forms, which were shared through social media and teacher communication groups. Therefore, the results of this study illustrate the perceptions of teachers who were willing to participate in the survey and are not intended to be generalized to the entire population of elementary school teachers in Indonesia.

The research instrument was a closed questionnaire compiled using a five-level Likert scale, namely Strongly Agree (SS), Agree (S), Hesitate (R), Disagree (TS), and Strongly Disagree (STS). The instrument consists of 30 statements developed based on theoretical studies on short attention spans, digital distractions, student engagement, and science learning in elementary schools. The instrument includes five indicators, namely: (1) the characteristics of student attention span, (2) the influence of digital technology and gadgets, (3) the impact of short attention span on science learning, (4) teacher challenges in science learning, and (5) teacher strategies in overcoming students' short attention spans.

Before being used in the research, the instrument was validated through expert judgment by two experts who have competence in the fields of Elementary Education and Science Education. The validation process was carried out by assessing the suitability of each statement item to the research indicators, language clarity, and relevance of the instrument's content to the research objectives. Based on the validation results, several statements were revised according to the validators' input, especially related to the wording of the statements and the suitability of the indicators. After revisions, the instrument was declared suitable for use as a data collection tool.

After the expert validation process, the instrument was tested on a limited basis with a number of elementary school teachers to ensure readability, editorial clarity, and ease of filling out the questionnaire. The results of the trial showed that all statement items could be understood well by the respondents, so that the instrument was used at the main data collection stage after minor improvements were made according to the input obtained.

Table 1. Validators' Assessment of the Research Instrument

Aspects Assessed	Validator 1	Validator 2	Verdict
Indicator suitability	Good	Good	Worthy
Language clarity	Minor revisions	Good	Revised
Content relevance	Good	Good	Worthy

Data collection was carried out online through Google Forms. The questionnaire link was disseminated through social media and various teacher communication groups. All respondents filled out the questionnaire voluntarily after obtaining information about the research objectives and providing a statement of consent as respondents.

The data were analyzed using descriptive statistics. The analysis was carried out through the calculation of mean, median, and standard deviation. The interpretation of the average score refers to the categories presented in Table 2. The results of the analysis are presented in the form of tables to provide an overview of the challenges of science learning in the short attention span era based on the perspective of elementary school teachers.

Table 2. Interpretation Categories of the Average Score

Score Interval	Category
4.20 – 5.00	Strongly agree
3.40 – 4.19	Agree
2.60 – 3.39	Hesitation
1.80 – 2.59	Disagree
1.00 – 1.79	Strongly disagree

RESULTS AND DISCUSSION

Research Results

This study involved 30 elementary school teachers from various regions in Indonesia who met the criteria as research respondents. All respondents have at least one year of teaching experience and have taught science or social science subjects. The data obtained were analyzed using descriptive statistics in the form of mean values to describe teachers' perceptions of the challenges of science learning in the short attention span era.

In general, the results of the analysis show that the challenges of science learning in the short attention span era are in the high category, with an overall average score of 3.81. These findings show that elementary school teachers feel a change in students' attention characteristics that has an impact on the science learning process. Teachers also acknowledge that this phenomenon requires adjustments in learning strategies so that students remain focused and involved in learning activities. Based on the five indicators measured, the results are presented in Table 3.

Table 3. Average Score of Each Indicator

Indicator	Mean	Median	SD	Category
Characteristics of short attention span students	3.21	3.50	1.06	Hesitation
The influence of digital technology and gadgets	3.87	4.00	1.01	Agree
The impact of short attention	3.62	4.00	1.01	Agree

span on science learning				
Teachers' challenges in science learning	3.98	4.00	0.94	Agree
Teachers' strategies in overcoming short attention span	4.38	4.00	0.69	Strongly agree

1. Characteristics of Short Attention Span Students

The indicator of students' short attention span characteristics obtained a mean score of 3.21, a median of 3.50, and a standard deviation of 1.06, so it is included in the hesitation category. These results show that teachers' perceptions of the characteristics of short attention spans in elementary school students have not fully converged on a single common tendency. The average score in the hesitation category indicates that teachers have different levels of confidence in identifying the characteristics of students who experience short attention spans.

A median value of 3.50 indicates that most respondents' answers fall between the categories of hesitation and agree. This condition indicates that although some teachers are beginning to recognize the characteristics of short attention spans in students, other respondents have not given a firm assessment. This difference in perception can reflect variation in teachers' experiences in dealing with student characteristics, differences in the learning environment, and the intensity of teachers' observation of student behavior during the learning process.

The standard deviation of 1.06 indicates that the spread of respondents' answers is relatively high compared to other indicators. This indicates that the level of agreement among respondents regarding the characteristics of short attention spans still varies. Thus, these results show that teachers' understanding of the characteristics of short attention span in students is not yet completely uniform, so efforts are needed to improve teachers' understanding in recognizing indicators of short attention span as a basis for designing appropriate learning strategies.

2. The Influence of Digital Technology and Gadgets

The indicator of the influence of digital technology and gadgets obtained a mean value of 3.87, a median of 4.00, and a standard deviation of 1.01, so it is included in the agree category. These results show that, in general, teachers have a positive perception that the use of digital technology and gadgets contributes to the emergence of the short attention span phenomenon in elementary school students. The average score in the agree category indicates a tendency for respondents to acknowledge the relationship between the use of digital devices and students' ability to maintain attention during learning.

A median score of 4.00 indicates that most respondents gave answers in the agree category. This indicates that the majority of teachers have relatively similar views on the influence of digital technology and gadgets on students' attention spans. However, the average score, which has not reached the strongly agree category, indicates that some respondents still gave lower ratings, so the level of approval is not entirely uniform.

The standard deviation of 1.01 shows that the spread of respondents' answers is still quite varied. This variation indicates a difference in perception among teachers regarding the extent to which digital technology and gadgets affect the emergence of short attention spans in students. However, based on the average and median scores in the agree category, it can be concluded that the majority of teachers view the use of digital technology and gadgets as one of the factors related to the phenomenon of short attention span in the context of elementary school learning.

3. The Impact of Short Attention Span on Science Learning

The indicator of the impact of short attention span on science learning obtained a mean score of 3.62, a median of 4.00, and a standard deviation of 1.01, so it is included in the agree category. These results show that, in general, teachers perceive that the phenomenon of short attention span has an impact on the implementation of science learning in elementary schools. The average score in the agree category indicates that the majority of respondents acknowledge the influence of short attention span on the effectiveness of the learning process.

A median score of 4.00 indicates that most respondents gave answers in the agree category. These findings indicate a relatively uniform tendency in perceptions that short attention span affects the science learning process. However, the average score, which has not reached the strongly agree category, indicates that some teachers still gave different assessments of the magnitude of the impact caused.

The standard deviation of 1.01 shows that respondents' answers still have a fairly high level of variation. This indicates that teachers' perceptions of the impact of short attention span on science learning are not entirely homogeneous. However, based on the average and median scores in the agree category, it can be concluded that the majority of teachers view short attention span as one of the factors affecting the implementation of science learning, particularly in learning activities that require sustained student attention and involvement.

4. Teachers' Challenges in Science Learning

The indicator of teachers' challenges in science learning obtained a mean score of 3.98, a median of 4.00, and a standard deviation of 0.94, so it is included in the agree category. These results show that, in general, teachers feel that there are challenges in carrying out science learning amid the short attention span phenomenon experienced by students. The average score, which is close to the strongly agree category, indicates that the challenge is felt by most respondents.

A median score of 4.00 indicates that the majority of respondents gave answers in the agree category. This indicates that most teachers have relatively similar perceptions of the various challenges faced during the science learning process, particularly in maintaining students' attention, managing learning activities, and ensuring student involvement during learning. However, the average score, which has not reached the strongly agree category, shows that a small number of respondents still hold a different perception of the level of challenge.

The standard deviation of 0.94 shows that the spread of respondents' answers is relatively lower than that of some previous indicators. This indicates that the level of agreement among respondents regarding the challenges faced by teachers in science learning tends to be more homogeneous. Thus, the descriptive analysis shows that the majority of teachers hold a consistent view that the phenomenon of short attention span is one of the challenges that needs to be considered in the implementation of science learning in elementary schools.

5. Teachers' Strategies in Overcoming Short Attention Span

The indicator of teachers' strategies in overcoming short attention span obtained the highest mean score, 4.38, with a median of 4.00 and a standard deviation of 0.69, so it is included in the strongly agree category. These results show that teachers have a very high level of agreement regarding the importance of implementing various learning strategies as an effort to overcome the phenomenon of short attention span in students. The average score in the strongly agree category indicates that learning strategies are seen as an important factor in supporting the success of the science learning process.

A median score of 4.00 indicates that most respondents gave answers in the agree category, while an average score higher than the median indicates that quite a few respondents chose the strongly agree category. These findings show that teachers have a strong tendency to apply various learning strategies to address the limitations of students'

attention spans, such as the use of active learning methods, varied learning media, brain break activities, and more targeted use of digital technology.

The standard deviation of 0.69 is the lowest value compared to other indicators, indicating that the spread of respondents' answers is relatively small. This indicates a high level of agreement and a consistent perception among teachers regarding the importance of implementing learning strategies to overcome short attention spans. Thus, the descriptive analysis shows that, compared to other indicators, teacher strategy is the aspect that receives the strongest support from respondents as an effort to increase the effectiveness of science learning in elementary schools.

Discussion

The results showed that teachers were still hesitant to identify the characteristics of short attention span in students (mean = 3.21). These findings indicate that not all teachers have the same perception of the characteristics of students who experience short attention spans. The variation in perception is reflected in the standard deviation value of 1.06, which indicates a relatively high level of spread in the answers. This condition may be caused by the absence of standard indicators regarding short attention span in the context of elementary school learning, so that teachers tend to identify this phenomenon based on their respective teaching experiences. In addition, the characteristics of short attention span often present symptoms similar to active behavior, high curiosity, and other attention disorders, so they are not always easy to recognize in daily learning activities (Barkley, 2015). Therefore, teachers' ability to observe students' learning behavior is an important aspect in distinguishing the characteristics of short attention span from the characteristics of normal child development.

Subsequent findings showed that teachers agreed that digital technology and gadgets contributed to the emergence of short attention spans (mean = 3.87). These results are in line with various studies showing that continuous exposure to digital media can affect an individual's ability to maintain attention on a single activity over a long period of time. The digital environment provides a variety of rapidly changing stimuli that encourage users to keep shifting attention rather than maintaining focus on a single task (Carr, 2020). Excessive smartphone use is associated with a decrease in the ability to concentrate, exercise self-control, and perform certain cognitive functions. For elementary school students, the use of gadgets without adequate supervision has the potential to form the habit of obtaining information instantly, so that attention span during learning becomes shorter (Wilmer et al., 2017). Teachers need to integrate digital technology more purposefully while implementing appropriate classroom management and engaging instructional strategies to minimize digital distractions and support students' sustained attention during science learning.

The results of the study also showed that teachers agreed that short attention span had an impact on science learning (mean = 3.62). Science is a subject that requires the ability to observe, experiment, analyze, and draw conclusions based on scientific evidence. All of these activities require continuous attention, so that students with short attention spans more easily lose focus during the learning process. According to information processing theory, attention is the main gate before information can be processed into working memory and long-term memory (Slavin, 2018). When students' attention is easily distracted, the information processing becomes less than optimal, affecting concept understanding and learning outcomes. Individuals who are accustomed to media multitasking have a higher tendency to experience distractions when working on tasks that require concentration (Ophir et al., 2009). These findings emphasize the need for science teachers to design learning activities that sustain students' attention through active participation, hands-on investigations, and varied instructional approaches, thereby supporting deeper conceptual understanding and scientific inquiry skills.

This study also found that teachers felt challenges in carrying out science learning in the short attention span era (mean = 3.98). Science learning requires not only mastery of concepts

but also students' active involvement in scientific inquiry, discussion, and problem-solving activities. This condition becomes even more challenging when students have difficulty maintaining attention for a long time. Teachers are required to be able to manage the classroom, create interesting learning experiences, and provide a variety of learning activities so that students' attention is maintained. The effectiveness of learning is greatly influenced by teachers' ability to choose learning strategies that can maintain student involvement (Hattie, 2012). Therefore, the challenges felt by teachers are related not only to mastery of the material but also to the ability to manage students' attention dynamics during the learning process.

The most prominent finding in this study was the high level of teachers' agreement regarding the importance of learning strategies in overcoming short attention span (mean = 4.38). This value is the highest compared to other indicators and is supported by a low standard deviation (0.69), indicating strong agreement among respondents. These results indicate that teachers recognize the importance of using more active, interactive, and varied learning strategies to retain students' attention. Strategies such as active learning, the use of interactive media, brain breaks, educational games, and targeted technology integration are believed to increase student engagement during learning. Providing regular brain breaks can help restore students' focus and learning readiness (Jensen, 2008). Meanwhile, active learning is able to increase participation, attention, and learning retention compared to lecture-centered learning (Bonwell & Eison, 2005). These findings suggest that the successful implementation of science learning in the era of short attention span depends not only on students' ability to sustain attention but also on teachers' capacity to design engaging, student-centered, and adaptive learning experiences that maintain students' focus throughout the learning process.

Overall, the results of this study show that teachers have a high awareness of the challenges of science learning in the short attention span era. Although perceptions of the characteristics of short attention span are still diverse, teachers agree that the development of digital technology, changes in student characteristics, and the demands of science learning require adjustments to learning strategies. Therefore, improving teachers' competence in recognizing the characteristics of short attention span while designing adaptive learning is an important step in improving the quality of science learning in elementary schools.

Limitation and Future Work

This research has several limitations. First, the data obtained is entirely based on teachers' perceptions through surveys, so it has not described the condition of students' short attention spans directly through observation or measurement of behavior in the classroom. Second, the number of respondents was relatively limited and was selected using purposive sampling techniques, so the results of the study are not intended to be generalized to all elementary school teachers in Indonesia. Third, this study uses a descriptive approach, so it cannot explain the cause-and-effect relationship between the use of digital technology, short attention span, and the effectiveness of science learning.

Based on these limitations, further research is recommended to involve a larger and more diverse number of respondents, combine survey data with classroom observations or in-depth interviews, and test the effectiveness of various learning strategies in increasing students' attention and involvement in science learning. Thus, more comprehensive empirical evidence can be obtained to support the development of science learning that is adaptive to the characteristics of students in the digital era.

CONCLUSION

This research shows that elementary school teachers view the phenomenon of short attention span as one of the important challenges in science learning in the digital era. Overall, teachers' perceptions were in the agree category (mean = 3.81), which indicates that changes in

students' attention characteristics have affected the science learning process and demand an adjustment of learning strategies.

The results of the study showed that teachers agreed that the use of digital technology and gadgets contributes to the emergence of short attention spans, as well as has an impact on the implementation of science learning that requires continuous attention, observation, experimentation, and scientific reasoning. Teachers also acknowledged that they face challenges in maintaining student focus and engagement during learning. On the other hand, the indicator of teacher strategy obtained the highest score, which indicates strong agreement that the implementation of active, interactive, and varied learning strategies, as well as the appropriate use of media and technology, is an important effort to overcome the phenomenon of short attention span.

Nevertheless, teachers still show mixed perceptions in identifying the characteristics of short attention span in students. These findings indicate the need to increase teachers' understanding of the characteristics and indicators of short attention span in order to identify it more accurately and design science learning that is in accordance with the characteristics of students in the digital era.

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