Journal of Humanistic Social Management
Volume 1, Issue 1 (2025)
Pages. 18 - 40

Concentration in the Digital Learning Era: A Review of Challenges and Educational Innovations in Social Studies Learning

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Article History:

Received
2025-07-07

Revised
2025-07-10

Accepted
2025-07-16

Published
2025-07-21

Abstract. This literature review explores the challenges to student concentration in the digital learning era, with a specific focus on social studies education. The increasing presence of digital technologies—such as social media, online gaming, and streaming platforms—has created both opportunities and distractions in the learning environment. This review employs a Systematic Literature Review (SLR) method to analyze studies published between 2019 and 2025, aiming to identify internal and external factors that influence student concentration. Findings show that digital distractions, irregular sleep patterns, and poor time management negatively impact learning focus. Conversely, motivation, structured routines, family support, and an engaging learning environment contribute positively. The study underscores the need for innovative strategies in social studies instruction, including the use of interactive methods and human-centered classroom management, to maintain students' concentration and engagement in digitally driven educational settings.

Keywords: *Digital Learning; Concentration; Social Studies Education; Educational Innovation; Student Engagement*

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Introduction

The fast advancement of digital technology has had a substantial impact on students' learning processes across all levels of school. Purwanto et al. (2021) suggest that the usage of digital technology, such as gadgets and the internet, has skyrocketed, particularly after the COVID-19 pandemic, which has fuelled significant online learning. On the one hand, digitisation improves access to knowledge and learning flexibility. However, this convenience presents difficulties, such as reduced concentration caused by exposure to social media, online games, and digital entertainment (Putra & Susanti, 2022).

Concentration is essential for developing a meaningful and successful learning experience. This is crucial because students are developing study habits and cognitive skills that will prepare them for the next level. Unfortunately, various phenomena such as students daydreaming, chatting in class, and not responding to the teacher's instructions are still common and reflect low levels of concentration during learning.

This phenomenon of diminished concentration in learning might have an impact on students' academic progress as well as their psychological health. According to Yulianti and Rahman (2023), more than 60% of students find it challenging to concentrate when learning with digital gadgets. UNICEF data from 2020 indicate that 87% of students wanted to return to in-person instruction, while 66% of pupils felt uneasy about studying from home (Dwitama et al., 2023). Other studies, such as those by Dwitama et al. (2023) and Winata (2021), have demonstrated that pupils struggle to maintain focus when learning online.

Previous research has examined the impact of technology on learning concentration, specifically focusing on social media, online gaming, and gadget use (Misbah & Pratama, 2022). However, most of these studies look at one element in isolation, failing to account for the various factors that interact in real life.

In fact, learning concentration is influenced by a combination of internal factors (such as health, boredom, motivation, and emotions) and external factors (such as sitting position, learning environment, and smartphone use). Unfortunately, research that comprehensively examines the interaction of these various factors is still limited. Therefore, this study was conducted as a systematic literature review to fill this gap.

Learning concentration itself is defined as the ability to focus attention, thoughts, and activities on the subject matter while ignoring irrelevant things (Riinawati, 2021; Anggeriani & Ain, 2024; Husna et al. in Widyati et al., 2023; Novianti in Sativa & Purwanto, 2022; Afifah in Yunita et al., 2024). In addition to offering suggestions for educators, parents, and legislators, this study aims to analyse the elements that affect students' ability to focus while studying in the digital age from the standpoint of educational psychology.

Furthermore, this study provides recommendations for educators, parents, and policymakers on how to maintain student concentration amidst the challenges of digital learning. Thus, the study results will provide a comprehensive overview of the dynamics of factors influencing concentration in the digital age.

Methods

This study applies a Systematic Literature Review (SLR) approach to identify and analyse factors that influence students' learning concentration in the digital era. The main variables studied include learning concentration as the core variable, with influencing factors categorised into internal factors (such as learning motivation, exercise, breakfast habits, sleep quality) and external factors (such as learning environment, parental support, learning methods, smartphone use, and noise).

Data were collected from empirical research articles published in national and international scientific journals between 2019 and 2025. The article search process was carried out systematically through databases such as Google Scholar, SINTA, DOAJ, and Scopus, using the keywords "learning concentration", "learning concentration factors", "digital era", "learning", and equivalent relevant terms in English.

The inclusion criteria were based on empirical research articles discussing the relationship between internal and external factors and student learning concentration, encompassing subjects from elementary to tertiary education levels in Indonesia. Articles lacking full text or based on laboratory experiments less relevant to the context of digital learning were excluded from the analysis.

Articles that met the criteria were then analysed by recording key information such as title, author, year of publication, research method, research subjects, data collection

instruments, and research results. The research results were then compiled into a grid synthesis table to facilitate the identification of patterns and interrelationships between factors. Findings from multiple studies were synthesised using a thematic approach to qualitative data analysis. Furthermore, because this research was literature-based, statistical analysis was not performed directly. The consistency and variety of results across research were assessed using comparative analysis, enabling thorough conclusions on the variables affecting students' ability to focus while studying in the digital age.

Results

The results of a comprehensive review of 15 relevant journal articles published between 2019 and 2025 are compiled in this section. Every article was examined according to its primary goal, methodology, and conclusions regarding the variables that affect learning concentration in classroom settings. The following table summarises the key elements of each study reviewed to support the in-depth discussion in the following sections.

Table 1.
Synthesis Grid of Research Results

No	Article Identity	Method	Results
1	**Title:** The Relationship between Anxiety Levels and Menstrual Pain Intensity with the Concentration of Studying in Adolescent Girls **Writer:** Putri Rismawati, N. N Haiya, I. Ardian, IR Azizah **Journal:** Journal of Health and Nutrition Sciences. Year of publication, vol., pp.: 2025, 3, 59-64	**Research Design:** Quantitative research method with cross-sectional analytical approach Participants **Data Analysis Techniques:** Spearman Rank test correlation technique	There is a moderate relationship between anxiety and learning concentration; the higher the anxiety, the lower the concentration.
2	**Title:** The Impact of Fast Food Consumption Behavior on High School Students' Concentration **Writer:** Mahfud, Erica Jihan Fahira **Journal:** Janah: Journal of Education and Teaching. Year of publication, vol., pp.: 2025, 2, 52-59	**Research Design:** Quantitative research method with experimental design **Data analysis:** T-test, by testing the assumptions of normality and homogeneity	Consuming fast food has a negative impact on concentration due to impaired metabolism and cognitive function.

3	**Title:** The Influence of Health Conditions on the Learning Concentration of D2 Class Students of the PGMI Study Program at UIN KHAS Jember **Writer:** Asri Ika Nurmaela, Intan Kartika Sari, Nurul Azizah, Saadatul Istianah **Journal:** Jurnal Ibtida. Year of publication, vol., pp.: 2023, 4, 47-61	**Research Design:** Comparative causal type quantitative research method **Data Analysis Techniques:** Simple linear regression analysis, validity and reliability test	Health conditions have a very strong influence on concentration; the healthier you are, the higher your concentration in studying.
4	**Title:** The Influence of Online Games on Students' Learning Concentration **Writer:** Ni'am Syafi, Fathurohim, Pipit Muliyah **Journal:** Asy-Syukriyyah Journal. Year of publication, vol., pp.: 2023, 24, 143-151	**Research Design:** Quantitative correlation research method based on positivism philosophy **Data Analysis Techniques:** Product moment correlation analysis	Playing online games is significantly related to concentration; it can be positive if moderate, negative if excessive.
5	**Title:** The Relationship Between Self-Control and Students' Concentration in Learning During the Month of Ramadan **Writer:** Vika Nurul Mufidah **Journal:** Mosaic: Islam Nusantara. Year of publication, vol., pp.: 2023, 9, 69-80	**Research Design:** Quantitative research methods **Data analysis:** Pearson Product Moment Correlation Statistical Test	Self-control has a positive effect on concentration; the higher the self-control, the better the focus on learning.
6	**Title:** Seating Position Determines Study Concentration **Writer:** Annisa L Lestari, Aulya Z Mawadah, Ghianu A Herlambang, Laila Auliya **Journal:** Student Research Parade. Year of publication, vol., pp.: 2023, 1, 531-542	**Research Design:** Experimental research method with multiple subject design **Data analysis:** Descriptive Test, T-Test, and Histogram	Students who sit at the front have higher concentration than those who sit at the back.
7	**Title:** Differences in Student Concentration Levels in Online and Offline Learning Methods for Physiotherapy	**Research Design:** Quantitative descriptive research method with cross-sectional design	Offline learning is more effective in increasing concentration than online learning.

	Students at Suaka Insan Health College, Banjarmasin **Writer:** Bernadus Sadu, Wendelinus Imus, Dadan Prayogo, Utomo Wicaksono, Martinus Ahok **Journal:** Sang Pencerah: Scientific Journal of Muhammadiyah University of Buton. Year of publication, vol., pp.: 2022, 8, 385-394	**Data Analysis Techniques:** Bivariate Analysis, Normality Test using Shapirowilk Test, TTest Test	
8	**Title:** The Role of the Learning Environment on Students' Learning Concentration at Muktyaca Catholic Vocational School **Writer:** Yasinta Pemba, Darmawang, Nur Risnawati Kusuma **Journal:** Journal of Education and the Teaching Profession. Year of publication, vol., pp.: 2022, 2, 12-20	**Research Design:** Qualitative research methods **Data Analysis Techniques:** Thematic analysis, namely through the stages of data reduction, categorization, data presentation, and drawing conclusions	A comfortable learning environment and positive social relationships improve students' concentration on learning.
9	**Title:** The Effect of Boredom on Learning Concentration and How to Overcome It in Students at SDN 1 Pandan **Writer:** RO Rahma, Vita Rahmawati, Agung Setyawan **Journal:** PANCAR: Educators of Smart and Clever Children. Year of publication, vol., pp.: 2022, 6, 242-250	**Research Design:** Qualitative descriptive research method that conducts observations with case studies **Data Analysis Techniques:** Using an inductive approach, namely concluding data to be verified with existing theories	Boredom due to monotonous learning environments and methods reduces students' concentration in learning.
10	**Title:** The Influence of Emotional Management Skills on Students' Learning Concentration at State Senior High School 3, Jambi City **Writer:** Qodriyah, Akmal Sutja, Hera Wahyuni **Journal:** Journal on Education. Year of publication, vol., pp.: 2023, 05, 10778-10784	**Research Design:** Quantitative research method with ex post facto method **Data Analysis Techniques:** Using Formula C, Normality Test, Linearity Test, Simple Regression Analysis	The ability to manage emotions affects concentration in learning; the better the emotional management, the higher the learning focus.

11	**Title**: Breakfast Habits, Sleep Quality, and Parental Support for Learning Concentration During the COVID-19 Pandemic **Writer:** S. Wati, Harna, R. Nuzrina, L. Sitoayu, LP Dewanti **Journal:** Ghidza: Journal of Nutrition and Health. Year of publication, vol., pp.: 2021, 5, 24-35	**Research Design:** Quantitative with cross-sectional design **Data Analysis Techniques:** Chi-Square test (bivariate analysis)	Breakfast and parental support had a significant effect on concentration; sleep quality had no significant effect.
12	**Title:** The Relationship Between Sports and Learning Motivation with Learning Concentration in Students of the Faculty of General Medicine, Malahayati University **Writer:** Vira Sandayanti, Nopi Sani, Achmad Farich, Selly Oktaviani **Journal:** Malahayati Medical Journal. Year of publication, vol., pp.: 2021, 5, 109-116	**Research Design:** Observational analytical research method with cross-sectional method **Data Analysis Techniques:** Spearman Correlation Test	Exercise and learning motivation are positively related to concentration; exercise has a stronger effect.
13	**Title:** The Relationship Between Sleep Quality and Learning Concentration in Civil Engineering Students at Kupang State Polytechnic During the COVID-19 Pandemic **Writer:** Vanda Melinda Sunbanu, Su Djie To Rante, Efrisca M. Br. Damanik **Journal:** Cendana Medical Journal. Year of publication, vol., pp.: 2021, 22, 190–197	**Research Design:** Observational analytical research method with cross-sectional design **Data Analysis Techniques:** Univariate and bivariate analysis with the Contingency Coefficient test	Poor sleep quality causes decreased concentration due to fatigue and lack of focus on learning.
14	**Title:** The Relationship Between Smartphone Use and High School Students' Concentration and Interest in Learning Biology	**Research Design:** Correlational quantitative research method **Data Analysis Techniques:** The Pearson	High duration of smartphone use reduces students' concentration and interest in learning.

	Writer: Luh Putu Marhaeni, Putu Budi Adnyana, Ni Luh Putu Manik Widiyanti **Journal:** Undiksha Journal of Biology Education. Year of publication, vol., pp.: 2020, 7, 137-147	Correlation (Product Moment)	
15	**Title:** The Effect of Noise and Learning Motivation on Students' Learning Concentration **Writer:** Haslianti **Journal:** Psychoborneo Journal. Year of publication, vol., pp.: 2019, 7, 608-615	**Research Design:** Descriptive statistical research method **Data Analysis Techniques:** Multiple Regression Model	Noise reduces, while motivation increases, students' concentration in learning.

The results of this synthesis indicate that at least 15 factors influence learning concentration, both internally and externally. Internal factors include learning motivation, health, anxiety, self-control, sleep quality, exercise, and breakfast habits. Meanwhile, external factors include the learning environment, learning methods, seating position, boredom, parental support, noise, fast food consumption, and the use of smartphones and online games.

Some articles present supportive results, but there are also conflicting findings between studies. This suggests that the influence of various factors on learning concentration is contextual and can vary depending on student characteristics, learning methods, and sociocultural background. These differences form an essential basis for critical analysis in the discussion section, which aims to identify scientific contributions and directions for further research.

Discussion

A systematic literature review synthesis showed that a complex interaction of internal and environmental influences regulates learning concentration. Internal factors include learning motivation, breakfast habits, sleep quality, exercise, health conditions, psychological conditions such as anxiety, self-control, and the ability to manage emotions. Meanwhile, external factors include the learning environment, seating position, parental support, learning methods, noise levels, fast food consumption, and the use of smartphones and online games.

Each of these factors contributes differently to increasing or decreasing learning concentration. The results of the research on the grid synthesis will be further explained as follows.

Motivation to learn

It has been demonstrated that learning attention and learning motivation, two crucial internal factors, are closely intertwined. According to Sandayanti et al. (2021), learning motivation accounted for 51.3% of learning concentration ($R^2 = 0.513$; $p < 0.001$). According to Haslianti (2019), students' levels of focus and intrinsic motivation are positively correlated. Basri et al. (2022) found that increasing internal motivation led to an increase in concentration duration, while Fatimah and Alwi's (2024) study revealed that students with strong learning motivation exhibited more consistent learning attention.

Overall, students with higher learning motivation have better concentration, which includes enhanced focus and attention to the learning material. This is consistent with Deci and Ryan's Self-Determination Theory (Hamzah, 2019), which posits that intrinsic motivation prompts individuals to set objectives, manage distractions, and maintain focus during the learning process. Although the study's findings may be influenced by contextual variables such as age and assessment instruments, they generally emphasise the importance of interventions that promote higher motivation to improve learning concentration.

Health Conditions

Physical health and well-being have a substantial impact on educational preparation. Health and concentration were found to be positively correlated by Nurmaela et al. (2023), with an R value of 0.68 and a p-value of less than 0.01. The results demonstrate that improved concentration is a direct result of improved health. To receive and process information as effectively as possible, one must be both physically and mentally fit.

Safitri et al. (2024) also confirmed that physical fatigue reduces concentration, as evidenced by self-report data from 175 students, with 60% of respondents reporting an inability to focus when sick. This means that if a student is in good health, their concentration will also improve, and vice versa. As a result, staying physically healthy is a prerequisite for maintaining a focused learning environment.

Psychological Conditions

The psychological condition has a significant impact on learning focus. A substantial correlation between anxiety and learning concentration was shown by Rismawati et al. (2025) ($p = 0.000$; $r = 0.515$), with higher anxiety levels correlated with lower student concentration levels. The association is moderate, yet this is a meaningful result. Dewi et al. (2021) also reported similar results, emphasising that anxiety can impair learning focus. They found a negative correlation between anxiety and learning concentration in female students at Malahayati University's Faculty of General Medicine ($r = -0.187$; $p < 0.05$).

Apart from worry, it has also been demonstrated that self-control and emotional regulation affect focus. Self-control and learning concentration were found to be significantly positively correlated by Mufidah (2023) ($r = 0.205$, $p = 0.010$), suggesting that individuals with greater self-control are more likely to be attentive when studying. With a regression equation of $Y = 31.473 + 0.568X$, Qodriyah et al. (2023) discovered that emotional regulation skills accounted for 23% of the variance in learning concentration ($R2 = 0.232$). This suggests that pupils with emotional regulation skills may improve their ability to focus while learning. To enhance learning effectiveness, psychological factors such as anxiety, self-control, and emotional regulation are crucial.

Online game

Online games have a mixed effect on learning focus. Online gaming and learning concentration were found to be significantly positively correlated by Syafi et al. (2023) ($r = 0.455$; $p = 0.001$). Playing games before studying can, when done in moderation, enhance focus, typing speed, collaboration, and stress reduction. On the other hand, excessive game playing can actually impair concentration, lead to addiction, waste time, and have a detrimental effect on students' learning outcomes.

In contrast, Lukiyana & Wulandari (2023) found no evidence of a significant correlation between gaming and focus ($p = 0.907 > 0.05$). This suggests that the impact of online gaming on focus is primarily influenced by the intensity of play and effective time management. Through the development of focus and strategy, balanced gaming sessions can enhance learning readiness; nevertheless, prolonged gaming might tax students' cognitive abilities. This is consistent with the Cognitive Resource Allocation theory, which states that when excessive gaming exceeds attentional capacity, learning-related cognitive resources are not

appropriately allocated, resulting in a reduction in focus. Because of this, it is impossible to generalise about how online gaming affects focus; instead, it must be evaluated in light of specific circumstances and individual traits.

Learning methods

Online and offline learning significantly differed in concentration levels ($p < 0.000$), with offline learning producing higher concentration (76.06 ± 7.10) than online learning (70.16 ± 3.18), according to research by Sadu et al. (2022). This is because lecturers' close monitoring and direct engagement with students help maintain their attention throughout the learning process. Kuraesin et al. (2022), who found that 74.2% of students preferred offline learning because they thought it was more favourable to learning concentration, support this finding. Additionally, according to 66.1% of respondents, teachers found it challenging to effectively convey material through online learning, which ultimately led to decreased student comprehension and focus.

However, different learning strategies are not necessarily equally successful. Students with independent learning styles are really better suited for online learning models, according to Rohmanto and Setiawan (2022). This research suggests that personal preferences and traits are crucial considerations when designing the most effective learning systems. To enhance learning concentration in various educational environments, it may be beneficial to develop a hybrid learning approach that combines the benefits of in-person engagement with the flexibility of online learning.

Seating Position

Lestari et al. (2023) discovered that seating posture has a significant effect on learning focus. The average concentration score of students seated in the front was greater (8.10) than that of students sitting in the rear (2.80). Additionally, the front group's more minor standard deviation ($0.738 < 0.919$) suggested a more stable concentration. A significant difference was indicated by the t-test's significance value of $p < 0.001$. While sitting at the back was linked to poorer concentration, sitting in the front was seen to promote active engagement and concentration.

These results are supported by research by Safaruddin et al. (2020), which claims that students seated in the back of the room are more likely to be distracted and to participate in

activities that interfere with their ability to learn, such as moving around the classroom. Although interventions such as seating arrangements have been implemented, improvements in concentration have been relatively minor. Afifah et al. (2025) also showed that learning concentration can improve after varying seating arrangements, confirming that seating position is a factor that needs to be considered.

Rahma et al.'s (2022) saturation study demonstrates that learning ennui has a significant negative influence on focus. A lack of intrinsic student motivation, repetitive instructional strategies, and an unsupportive learning atmosphere are some of the causes of this ennui. During the learning process, these circumstances make students disinterested, bored, and unable to concentrate.

Dwitama et al.'s (2023) study found a strong inverse relationship between high school students' boredom and their ability to focus in class, which is consistent with this result. It was shown that students' levels of concentrate declined as their levels of boredom increased, with a significance level of $p = 0.000$ (<0.05) and an r-value of -0.866. Controlling breaks and employing a range of instructional techniques are, therefore, essential for successful implementation.

Learning Environment

According to Pemba et al. (2022), a diversity of teaching techniques, a tidy and comfortable learning environment, effective classroom management, and a good rapport between the teacher and the students all contribute to increased learning concentration. These results align with the findings of the following study. Evriantara (2022) found that the learning environment has a significant impact on learning concentration, with a correlation value of 0.76 (strong category), a contribution of 62%, and a p-value of 0.000 (significant). This implies that students will be more focused on their studies in an environment that is more favourable to learning, that is, tidy, peaceful, clean, and organised. According to Attention Restoration Theory, a well-structured environment can relieve cognitive stress while also increasing attention capacity.

Parental Support

Wati et al.'s (2021) study clarified that parental support had a substantial impact on learning concentration ($p = 0.017$). Encouragement, attentiveness, and access to learning tools

enhanced students' emotional and cognitive readiness during the learning process. Jayanti and Cesaria (2024) discovered a connection between academic outcomes, parental involvement, and concentration. When parents engage in their children's education, it boosts their interest and concentration, ultimately improving learning outcomes.

According to Afriansyah (in Amaliati et al., 2021), parental support refers to the assistance provided by parents to meet their children's living and educational needs. This support provides a sense of security, attention, and motivation during the learning process. Saragih (in Amaliati et al. 2021) also emphasised that the greater the family support, the higher the student's learning motivation. With parental support, students are more motivated, able to manage their emotions, and find it easier to focus while studying, thus indirectly improving their concentration.

Breakfast

Wati et al. (2021) demonstrated that breakfast habits had a significant impact on students' learning concentration ($p = 0.040$; OR = 4.615). A regular breakfast is essential for providing the brain with energy to maintain focus, strengthen memory, and enhance learning resilience during the learning process. This finding is supported by Salsabila & Nareswari (2023), who emphasised that during sleep, blood glucose is used for body metabolism, so energy intake from breakfast is essential as the primary fuel for children and adolescents' cognitive function in the morning.

Furthermore, Rima et al. (2020) found that after students were given a nutritious breakfast containing 600 kcal of energy, their concentration scores increased by 10 points. A statistically significant influence was found in the results of the bivariate analysis ($p < 0.0001$). Caroline (in Rima et al., 2020) emphasised that breakfast contributes 15–30% of daily nutritional needs and has a significant contribution to improving concentration and facilitating the learning process. Similarly, Wachs (in Rima et al., 2020) stated that cognitive and academic performance are determined by individual characteristics and environmental quality, including nutritional fulfilment through breakfast. Thus, breakfast is a crucial factor in supporting optimal learning readiness.

Fast Food Consumption and Nutritional Intake

According to Mahfud and Fahira (2025), consuming fast food has a notable negative impact on students' concentration levels. Fast food's high content of trans fat, sugar, and salt can interfere with metabolism and hinder cognitive abilities, making concentration and focus during study sessions more difficult. A well-balanced diet, however, can enhance learning resilience and promote a steadier focus. Additionally, Andriani et al. (2024) clarify that food additives, such as artificial colouring, might lead to hyperactivity and distracted behaviour, particularly in children with learning disabilities. Poor eating habits can also interfere with other learning prerequisites, such as energy for socialising, exercising, or participating.

In contrast to the findings above, which suggest decreased focus due to fast food, several other studies have shown that specific caffeine intakes actually aid focus. This reinforces the need to examine the particular role of additives and consumption frequency on cognitive function. Amini and Akbar (2024) demonstrated, through a Mann-Whitney test, that the group given coffee showed a significant increase in concentration compared to the control group ($p = 0.000$). Furthermore, a literature review by Damayanti et al. (2023) suggests that coffee may significantly enhance memory. This finding aligns with a study by Chairani et al. (2024), which revealed that 35.5% of the variation in learning output was attributed to caffeine usage, a statistically significant finding ($p = 0.019$). Therefore, consuming caffeine in reasonable doses, combined with a healthy lifestyle, can be a supportive strategy in improving concentration and learning effectiveness.

Sleep Quality

Research by Sunbanu et al. (2021) revealed that 50.8% of college students had poor sleep patterns, and 52.3% experienced difficulties with concentration in their studies. This disturbed sleep condition can lead to cognitive function decline, drowsiness, fatigue, and memory loss, ultimately weakening the ability to concentrate while studying. In support of these findings, Djamalilleil et al. (2021) discovered that students who slept well-tended to focus better in class (65.2%), whereas those who slept poorly had less concentration (64.2%). A statistical analysis revealed a strong correlation between concentration and sleep quality ($p = 0.034$; $p < 0.05$).

Zulfa and Mujazi (2021) also confirmed this by showing that elementary school students with irregular sleep patterns tended to have difficulty focusing while studying ($p =$

0.001). Lack of sleep causes daytime sleepiness and impairs the ability to process information effectively. Caesarridha (2021) added that a lack of sleep can impair concentration, memory, and emotional stability. Sleep and Cognitive Performance Theory suggests that quality sleep is crucial for memory consolidation and the recovery of brain function. Therefore, good quality sleep is a necessary prerequisite for maintaining and improving concentration in learning.

Smartphone

Marhaeni et al. (2020) found a significant negative relationship between the duration of smartphone use and students' learning concentration ($r = -0.577$; $p = 0.001$). The longer students used smartphones, the lower their concentration levels during learning. Excessive use of devices for non-educational activities such as social media and games disrupted focus and reduced active participation in class (Susanti et al., 2024). Research at SMA Negeri 6 Prabumulih also supported this finding, with a t-value of 8.63 > t-table 1.68385 and a coefficient of determination of 67%, indicating that the decline in concentration was primarily due to device use (Adelia et al., 2021).

Susanti et al. (2024) also found that the leading causes of poor focus were a lack of supervision, poor time management, content type, and duration of use. Additionally, learning concentration is hindered by psychological effects, such as worry, and physical effects, including eyestrain. These results are consistent with the Media Multitasking Theory, which posits that excessive device use reduces learning efficacy by increasing cognitive load and diverting attention.

Noise

As a loud environment might interfere with information processing, disturb attention, and decrease learning effectiveness, Haslianti's (2019) research indicates that noise has a substantial negative impact on learning concentration ($\beta = -0.197$; $p = 0.036$). The noise level in the school setting varied, according to Claudia et al. (2024), with the lowest level measured at 61.1 dBA (point 2) on the second floor and the highest at 69.8 dBA (point 1). According to the analysis of the questionnaire, 52% of participants said that excessive noise levels in schools make it difficult for kids to focus in class. This implies the influence of a cacophonous setting, which is said to impair pupils' concentration while they are learning.

Indonesian Minister of Health Decree No. 718/Menkes/Per/XI/1987 and Minister of Environment Decree No. 48 of 1996, as cited in Claudia et al. (2024), explain that noise is a physical factor that, if it exceeds a certain threshold, can disrupt comfort and concentration during learning. Auditory Distraction Theory suggests that noise distracts students, reduces the efficiency of information processing, and negatively impacts learning effectiveness.

Sport

Sandayanti et al. (2021) found a significant positive relationship between physical activity and learning concentration, with a moderate correlation ($r = 0.484$, $p < 0.001$). Exercise increases blood flow to the brain, improves cognitive function, reduces stress, and increases alertness. This finding is supported by Putra et al. (2023), who demonstrated that physical fitness has an indirect contribution to students' readiness and focus in learning. Safitri et al. (2024) also confirmed that individuals who exercise regularly are more likely to maintain concentration during the learning process.

Kamaruddin et al. (2024) supported these findings with Pearson correlation results ($r = 0.567$; $p = 0.000$), which demonstrated a strong influence of exercise on improving learning concentration. Through regular exercise, students are better able to absorb and remember learning materials optimally. Therefore, exercise not only impacts physical health but is also a crucial element in strategies to improve learning concentration.

According to Alivyasahra (in Langmui et al., 2025), several strategic approaches can be applied to improve learning concentration in adolescents.

1. First, creating a conducive learning environment is fundamental to supporting focus. This includes selecting a quiet location, ensuring adequate lighting, and utilising ergonomic furniture to promote comfort and proper posture while studying.
2. Second, establishing a structured and consistent study schedule plays a crucial role in establishing a routine that supports cognitive stability. By establishing a consistent routine of studying at a specific time each day, adolescents can enhance their mental readiness and maintain a focused approach.

3. Third, the wise use of technology needs to be emphasised. While technology can be a learning aid, its use must be controlled to prevent it from becoming a source of distraction, for example, by turning off device notifications during study sessions.
4. Fourth, providing positive reinforcement in the form of awards or rewards after learning can serve as an intrinsic motivator. Enjoyable activities, such as watching movies or playing games, can be offered as a token of appreciation for learning achievements, thereby creating positive associations with academic pursuits.
5. Fifth, adequate rest, especially quality sleep, is significantly correlated with concentration levels. Therefore, adolescents are encouraged to maintain regular sleep patterns to support optimal cognitive function during the learning process.

Thus, efforts to improve students' concentration in learning depend not only on individual abilities but also on various interacting external and internal factors. A conducive learning environment, a regular study schedule, wise use of technology, providing rewards as positive reinforcement, and meeting adequate rest needs are all critical components that require attention. Understanding and implementing these strategies is expected to help students optimise their learning potential effectively and sustainably.

Conclusion

This study concludes that students' learning concentration in the digital era is influenced by various internal factors, such as motivation, breakfast habits, sleep quality, and physical activity, as well as external factors, including parental support and the learning environment. However, excessive smartphone use, online games, noise, and less interactive online learning methods can disrupt concentration. The findings also indicate that the influence of online games, caffeine, and noise tolerance is context-dependent, varying according to individual characteristics. Therefore, adaptive and personalised learning strategies are needed, with collaboration between teachers, parents, and the surrounding environment to create a learning ecosystem that supports concentration. Further research is recommended to explore the interactions between these factors and test the effectiveness of personalised approaches in improving learning concentration.

Author's Declaration

Authors' contributions and responsibilities

√ The authors made substantial contributions to the conception and design of the study.
√ The authors took responsibility for data analysis, interpretation and discussion of results.
√ The authors read and approved the final manuscript.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Availability of data and materials

√ All data are available from the authors.

Competing interests

√ The authors declare no competing interests.

Additional information

No additional information is provided for this research.

Acknowledgement

The authors would like to thank the academic colleagues and educational practitioners who provided valuable insights during the drafting of this review. Appreciation is also extended to the editorial team and anonymous reviewers for their constructive feedback. Additionally, the authors are grateful to the students involved in assisting with the collection and categorization of supporting literature.

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