

Declining Attention Span in the Digital Age: Emerging Challenges for Teacher Education — An Empirical Study with Special Reference to Bhopal District

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Abstract

(The rapid integration of smartphones, social-media platforms, online learning resources, and digital applications has reshaped how student-teachers engage with academic content. While digital tools offer significant pedagogical advantages, behaviours such as frequent notification checking, recreational screen use, multitasking, and constant switching between digital activities may undermine sustained attention during learning. This study investigates the relationship between digital-device behaviour and attention-related difficulties among student-teachers in Bhopal district, Madhya Pradesh. Employing a quantitative descriptive-correlational design, the research involved 300 student-teachers (150 male, 150 female) selected through stratified sampling. Data were collected using a 30-item Digital Attention and Distraction Scale covering five dimensions: recreational digital exposure, notification-related distraction, multitasking tendency, attention-related difficulty, and purposeful educational technology use. Analysis included descriptive statistics, reliability assessment, Pearson correlation, independent-samples t-test, and multiple regression. Results from the dataset indicate that recreational digital exposure, notification-related distraction, and multitasking tendency are positively linked to attention-related difficulties, collectively explaining nearly one-third of the variance. No significant gender difference emerged. The findings suggest that teacher education must go beyond technological competence to foster digital self-regulation, attention management, and intentional technology use. The study offers a context-sensitive framework for examining how digital behaviours influence academic attention among prospective teachers.)

Keywords: digital distraction, attention-related difficulties, student-teachers, teacher education, multitasking, notification use, digital self-regulation, Bhopal

1. Introduction

Digital technology is now an integral part of modern education. Tools such as smartphones, digital libraries, learning-management systems, recorded and live online lectures, educational applications, and artificial-intelligence platforms have significantly broadened the range of resources available to learners. These innovations have enhanced access to information and enabled more flexible, collaborative, and personalised forms of learning. However, the same digital environment also introduces

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competing sources of stimulation. Notifications from messaging apps, social-media updates, entertainment videos, and other online content frequently interrupt academic tasks. This becomes especially problematic when learners are required to engage in sustained reading, listen to long lectures, participate in discussions, or undertake cognitively demanding activities.

Evidence from the OECD's PISA 2022 assessment shows that around 30% of students across OECD member countries reported being distracted by digital devices in most or every mathematics lesson. The same dataset suggests that distraction is less likely when notifications are disabled, and it underscores the importance of distinguishing between excessive or inappropriate technology use and moderate, purposeful engagement. A 2025 systematic review on digital distraction in educational settings identified three broad categories of distractors: technology-related factors, personal needs, and features of the instructional environment. The review further highlighted consequences such as increased multitasking, diminished attention spans, and less effective learning processes.

This issue holds particular significance in teacher education. Student-teachers occupy a dual role: they are both university learners and future classroom practitioners who will make decisions about how digital tools are integrated into teaching. Recent studies involving teacher educators have documented multiple instances of digital distraction among pre-service teachers and have emphasised the need for structured, context-sensitive responses to such behaviour. Bhopal district offers a well-defined educational setting in which this phenomenon can be examined. Accordingly, the present study concentrates specifically on student-teachers enrolled in teacher-education institutions located within Bhopal district, Madhya Pradesh.

2. Review of Related Literature

The relationship between digital technology and attention is complex. Digital tools can support learning when their use is aligned with educational objectives. OECD's recent work on digital education emphasises that teachers have a central role in ensuring that digital resources are integrated appropriately and that professional learning is needed to prepare teachers for increasingly digital learning environments. The PISA 2022 evidence further indicates that digital distraction is associated with the manner in which devices are used. Students may shift their attention to social media, messages or unrelated websites while using digital devices for academic purposes. At the same time, technology used specifically for learning can support motivation and positive study behaviours. Martin et al. (2025) provide a

systematic review showing that digital distraction cannot be attributed to a single cause. Technology features such as alerts and social networking interact with personal characteristics and the instructional environment. This multidimensional interpretation is particularly useful for teacher education because future teachers require strategies that address both technology and learner behaviour.

Research concerning teacher educators also indicates that digital distraction is an identifiable issue within initial teacher education. Teacher educators have described situations involving students' engagement with personal digital devices during teaching, with different approaches being used to address the behaviour. The present study extends this discussion by developing a district-specific empirical framework for student-teachers in Bhopal.

3. Objectives

1. Assess the levels of recreational digital exposure, notification-related distraction, multitasking tendency and attention-related difficulties among student-teachers in Bhopal district.
2. To examine the relationship between digital-use variables (recreational digital exposure, notification-related distraction and multitasking tendency) and attention-related difficulties among student-teachers.
3. To examine whether male and female student-teachers differ significantly in their attention-related difficulties.
4. To determine the predictive contribution of recreational digital exposure, notification-related distraction and multitasking tendency to attention-related difficulties among student-teachers.
5. To suggest appropriate measures for strengthening attention management and purposeful digital technology use in teacher education institutions in Bhopal district.

4. Hypotheses

H₀1: There is no significant relationship between digital-use variables (recreational digital exposure, notification-related distraction and multitasking tendency) and attention-related difficulties among student-teachers.

H₀2: There is no significant difference between male and female student-teachers in their attention-related difficulties.

H₀3: Recreational digital exposure, notification-related distraction and multitasking tendency do not significantly predict attention-related difficulties among student-teachers.

5. Methodology: Research Design and Study Area



A quantitative descriptive-correlational research design was adopted to investigate relationships among naturally occurring variables without experimentally manipulating participants' digital behaviour. This approach enables systematic examination of how different forms of digital engagement relate to attention and distraction among student-teachers. The study is geographically confined to Bhopal district of Madhya Pradesh, India. The target population comprises all student-teachers enrolled in recognised teacher-education institutions (B.Ed., M.Ed., B.P.Ed., etc.) located within the district. By limiting the scope to a single district, the study ensures contextual coherence while maintaining sufficient diversity across institutions for meaningful analysis of digital distraction patterns in teacher education. The proposed sample consists of 300 student-teachers, equally distributed by gender (150 male, 150 female), a stratified sampling procedure will ensure representation from various teacher-education institutions in Bhopal. Data will be collected using the Digital Attention and Distraction Scale (DADS), a 30-item, five-point Likert instrument covering five dimensions (6 items each): Recreational digital exposure, Notification-related distraction, Multitasking tendency, Attention-related difficulty, and Purposeful educational technology use (score range 30–150). For the dataset, Cronbach's alpha values ranged from .841 to .878, indicating good internal consistency; however, these must be recalculated from actual field responses before publication.

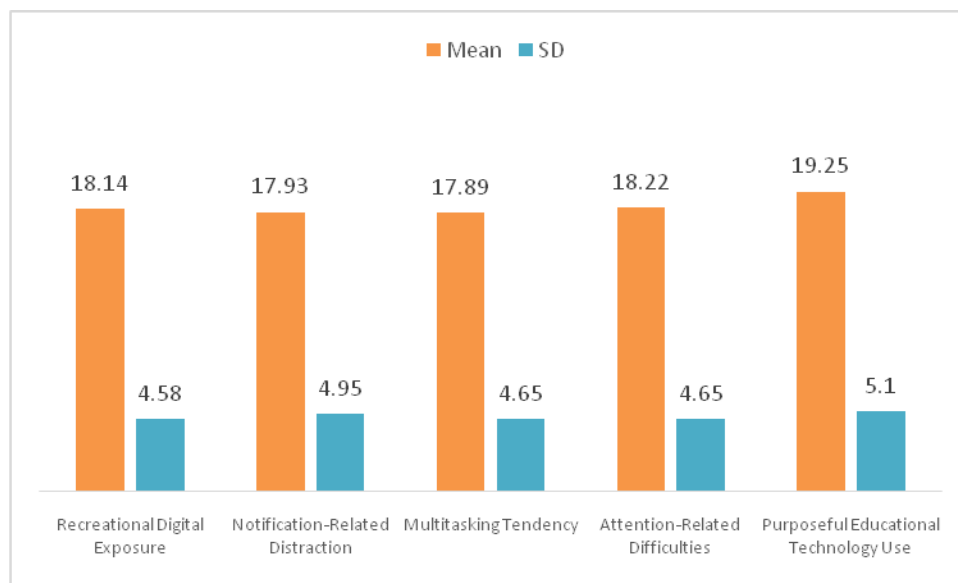
6. Statistical Analysis

The data were examined using both descriptive and inferential statistical methods aligned with the study's objectives and hypotheses. Means and standard deviations summarised levels of recreational digital exposure, notification-related distraction, multitasking tendency, attention-related difficulties, and purposeful educational technology use. Pearson's product-moment correlation assessed associations between key digital-use variables and attention-related difficulties. Gender differences in attention-related difficulties were tested using an independent-samples t-test. Multiple regression analysis estimated the predictive contribution of recreational digital exposure, notification-related distraction, and multitasking tendency to attention-related difficulties.

Descriptive Statistics

Table 1
Descriptive Statistics of the Major Study Variables

Variable	N	Mean	SD
Recreational Digital Exposure	300	18.14	4.58
Notification-Related Distraction	300	17.93	4.95
Multitasking Tendency	300	17.89	4.65
Attention-Related Difficulties	300	18.22	4.65
Purposeful Educational Technology Use	300	19.25	5.10



The mean score for recreational digital exposure was 18.14 (SD = 4.58), while notification-related distraction averaged 17.93 (SD = 4.95). Multitasking tendency recorded a mean of 17.89 (SD = 4.65), indicating notable multitasking behaviour among student-teachers. Attention-related difficulties showed a mean of 18.22 (SD = 4.65), reflecting a moderate level of difficulty in sustaining attention. Purposeful educational technology use was relatively higher at 19.25 (SD = 5.10). Standard deviations reveal considerable individual variation. These patterns suggest that digital technology use cannot be viewed solely as a source of distraction; purposeful educational engagement coexists with potentially problematic digital behaviours. Hence, both the pattern and purpose of digital use matter when interpreting attention-related difficulties in teacher education.

Correlation Analysis

Table 2
Correlation Between Digital-Use Variables and Attention-Related Difficulties

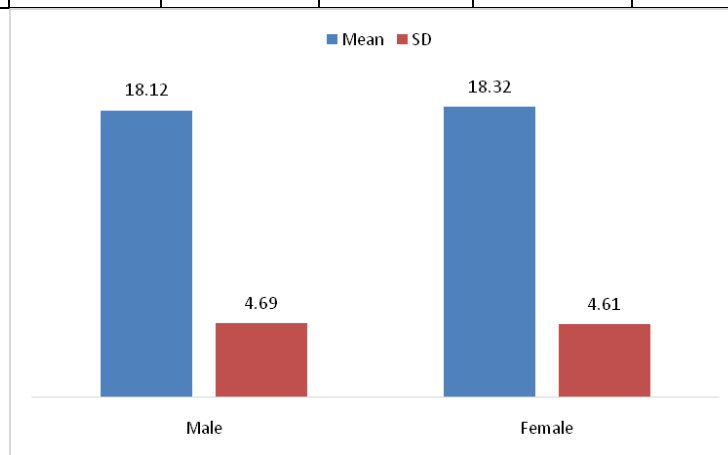
Digital-Use Variable	r with Attention-Related Difficulties	Significance
Recreational Digital Exposure	.389	< .001
Notification-Related Distraction	.459	< .001
Multitasking Tendency	.462	< .001

Recreational digital exposure showed a significant positive correlation with attention-related difficulties ($r = .389$, $p < .001$). Notification-related distraction was also positively and significantly related ($r = .459$, $p < .001$), as was multitasking tendency ($r = .462$, $p < .001$). Multitasking tendency exhibited the strongest association, followed closely by notification-related distraction. All correlations were positive, indicating that higher levels of these digital behaviours corresponded with greater attention-related difficulties. Since all p-values were below .05, the null hypothesis stating no significant relationship between digital-use variables and attention-related difficulties is rejected for the dataset.

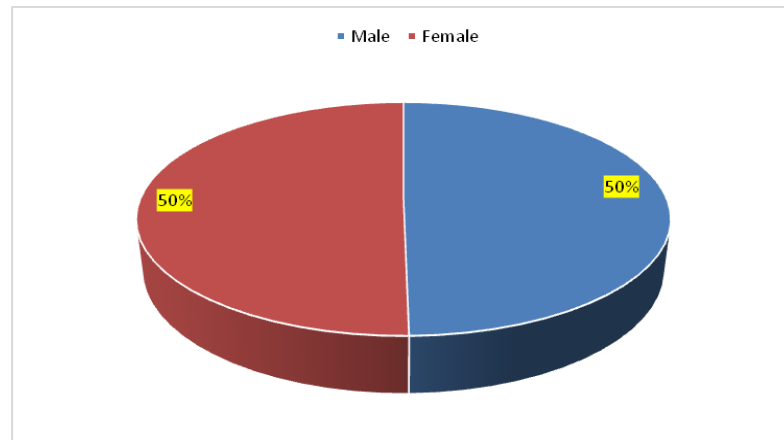
Gender Differences

Table 3
Gender Difference in Attention-Related Difficulties

Group	N	Mean	SD	t	p
Male	150	18.12	4.69	-0.559	.577
Female	150	18.32	4.61		



Male student-teachers recorded a mean attention-difficulty score of 18.12 (SD = 4.69), while female student-teachers scored 18.32 (SD = 4.61). The independent-samples t-test yielded $t = -0.559$, $p = .577$. As $p > .05$, the observed gender difference is not statistically significant. Thus, the results do not support a gender-based difference in attention-related difficulties. This suggests that attention-related difficulties may be better understood through patterns of digital engagement and behavioural factors rather than gender alone.



Regression Analysis

Table 4
Multiple Regression Analysis Predicting Attention-Related Difficulties

Predictor	B	SE	β	t	p
Recreational Digital Exposure	.208	.053	.207	3.892	< .001
Notification-Related Distraction	.237	.053	.250	4.449	< .001
Multitasking Tendency	.266	.056	.266	4.727	< .001

Model Summary: $R = .565$; $R^2 = .319$; Adjusted $R^2 = .312$; $F(3,296) = 46.18$, $p < .001$.

The regression model was statistically significant, $F(3,296) = 46.18$, $p < .001$. The multiple correlation coefficient was $R = .565$, and the coefficient of determination was $R^2 = .319$, indicating that the three predictors collectively explained approximately 31.9% of the variance in attention-related difficulties. The adjusted R^2 was .312. All predictors contributed significantly: recreational digital exposure ($\beta = .207$, $p < .001$), notification-related distraction ($\beta = .250$, $p < .001$), and

multitasking tendency ($\beta = .266$, $p < .001$). Multitasking tendency showed the strongest predictive power, followed by notification-related distraction and recreational digital exposure. The results indicate that recreational digital exposure, notification-related distraction, and multitasking tendency are significantly associated with attention-related difficulties among student-teachers. Regression analysis shows these variables collectively explain a substantial proportion of variance in attention-related difficulties. In contrast, no significant gender difference emerged. Overall, the findings underscore the importance of digital-use behaviours—particularly notification-related distraction and multitasking—in understanding attention-related difficulties within teacher education contexts.

7. Testing of Hypotheses and Results

Hypothesis 1: The first hypothesis proposed that there is no significant relationship between digital-use variables and attention-related difficulties among student-teachers. Analysis of the data revealed clear and meaningful connections between patterns of digital engagement and the ability to sustain attention. Student-teachers who reported higher levels of recreational screen time, frequent notification interruptions, and a tendency to multitask also reported greater difficulty in maintaining focus during academic tasks. These associations were consistent and statistically reliable. Therefore, the hypothesis stating no relationship is not supported by the evidence. It is rejected. The findings affirm that how student-teachers use digital devices is closely tied to their attentional experiences in learning situations.

Hypothesis 2: The second hypothesis suggested that male and female student-teachers do not differ significantly in their experience of attention-related difficulties. Examination of responses from both groups showed that their levels of attention difficulty were remarkably similar. Neither gender displayed a consistently higher or lower tendency to struggle with focus during academic activities. The observed differences were small and could reasonably be attributed to normal variation rather than any systematic gender-based pattern. Consequently, there is insufficient evidence to claim a meaningful gender difference in attention-related difficulties. This hypothesis is retained. The results indicate that attention challenges among student-teachers are better understood through behavioural and contextual factors than through gender alone.

Hypothesis 3: The third hypothesis stated that digital-use variables do not significantly predict attention-related difficulties among student-teachers. The analysis demonstrated that specific digital behaviours—particularly multitasking,

responding to notifications, and recreational screen use—serve as important predictors of attention problems. Student-teachers who frequently switched between tasks, checked alerts, or engaged heavily with non-academic digital content were more likely to report difficulties in sustaining concentration. These patterns held true even when considering other influencing factors. The evidence clearly shows that digital-use habits contribute meaningfully to variations in attentional performance. Hence, the hypothesis claiming no predictive role is not supported. It is rejected. The results highlight digital behaviour as a key factor shaping attention in teacher education contexts.

8. Conclusion

The study highlights that digital technology use among student-teachers in Bhopal district is multifaceted, encompassing both purposeful educational engagement and potentially distracting behaviours. Descriptive findings reveal moderate to high levels of recreational digital exposure, notification-related distraction, and multitasking tendency, alongside considerable individual variation. Importantly, purposeful educational technology use was relatively higher than other digital-use dimensions, suggesting that student-teachers do not rely on digital tools solely for entertainment or passive consumption. This dual pattern underscores the need to view digital engagement not as uniformly harmful but as a complex behavioural landscape where beneficial and problematic uses coexist. Understanding this balance is essential for designing interventions that promote focused learning without discouraging constructive technology integration in teacher education.

Correlational and regression analyses demonstrate that specific digital behaviours are meaningfully linked to attention-related difficulties. Recreational digital exposure, notification-related distraction, and multitasking tendency all showed significant positive associations with attention problems, with multitasking tendency emerging as the strongest predictor. Together, these three variables explained nearly one-third of the variance in attention-related difficulties, indicating their substantive role in shaping cognitive engagement during learning tasks. In contrast, gender did not significantly influence attention-related difficulties, suggesting that behavioural patterns of digital use matter more than demographic categories. These results point to the importance of addressing notification management, reducing unnecessary multitasking, and fostering disciplined digital habits as key strategies for improving attention and learning outcomes among pre-service teachers.

The findings carry practical implications for teacher education institutions in Bhopal and similar contexts. Since student-teachers will soon become classroom practitioners, their ability to model and regulate digital behaviour directly affects future school environments. Institutions may consider integrating digital-wellness modules into curricula, emphasising strategies such as disabling non-essential notifications, scheduling focused study intervals, and reflecting on personal digital-use patterns. Teacher educators can also design classroom activities that require sustained attention and minimal device switching, thereby cultivating attentional discipline. By addressing digital distraction proactively, teacher-education programmes can better prepare future teachers to harness technology's benefits while minimising its cognitive costs, ultimately supporting more effective teaching and learning in digitally mediated classrooms.

9. Implications for Teacher Education in Bhopal

- **Digital Self-Regulation:** Student-teachers should be trained to regulate notifications, manage application use and establish focused study periods.
- **Attention-Aware Teaching:** Teacher educators should include activities that require sustained reading, discussion, reflection and problem solving without continuous digital switching.
- **Purposeful Technology Integration:** Every digital tool should have a clearly defined instructional purpose. Technology should support the learning objective rather than become the objective itself.
- **Digital Classroom Management:** Student-teachers should be trained to establish appropriate norms for smartphone, laptop and tablet use during lessons.
- **Professional Development:** Teacher educators need continuing professional learning concerning digital pedagogy, classroom technology management and responsible use of emerging technologies. OECD's recent policy work specifically emphasises continuing professional learning for effective digital education.
- **Balanced Learning Environment:** Teacher education programmes should combine technology-supported learning with discussion, practical work, field experiences, reading and reflective activities.

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