

The Case Against Classroom Digitization: Curtailing Tablet Dependency, Reviving Paper Books, and Re-envisioning Pedagogical Landscapes

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Abstract

The rapid digitization of classrooms has proceeded with limited empirical scrutiny of its effects on learning outcomes, attention, and student well-being. This mixed-methods study investigates the impact of excessive tablet and screen reliance in educational settings, examining both student perceptions and teacher experiences. A questionnaire was administered to 156 secondary school students, and semi-structured interviews were conducted with 12 teachers. Quantitative results indicate that while students acknowledge the convenience of digital devices, they consistently prefer paper for deep reading, studying, and information retention. Teachers reported significant challenges with digital distraction and expressed concerns about declining student attention spans. The findings support the argument for curtailing excessive digitization, restoring paper books as primary learning tools, and re-envisioning pedagogical landscapes around evidence-based, medium-appropriate instruction. This article concludes with practical recommendations for policy and practice.

Keywords : Classroom digitization, Paper books, Screen-based reading, tablets-based learning, Teacher attitudes, Student preferences.

1. Introduction

Over the past two decades, educational institutions worldwide have embarked on an unprecedented experiment: the wholesale digitization of classroom learning. From one-to-one tablet programs to fully integrated learning management systems, the assumption that "more technology equals better education" has become deeply embedded in educational policy and practice. Governments have invested billions in digital infrastructure, often driven by commercial interests and a cultural anxiety about being left behind in the digital age.

However, a growing body of research challenges this uncritical embrace of classroom technology. Studies in cognitive psychology and educational neuroscience have consistently demonstrated that reading on screens leads to shallower processing, reduced comprehension, and impaired retention compared to reading on paper. Eye-tracking research reveals that students reading on screens exhibit more scanning behavior, fewer fixations, and less re-reading of complex passages—all indicators of superficial engagement. Importantly, students appear largely unaware of these differences, consistently overestimating their comprehension when reading digitally.

This study responds to calls for more nuanced, context-sensitive research on educational technology by investigating the actual experiences and perceptions of the primary stakeholders : students and teachers. While experimental studies have established causal relationships between reading medium and comprehension outcomes, fewer studies have examined how students and teachers 'experience' and 'make sense of' these differences in authentic classroom contexts. This mixed-methods study addresses that gap.

2. Literature Review

2.1 The Cognitive Costs of Screen-based Reading

A substantial body of evidence indicates that reading on paper confers advantages over screen reading for comprehension, particularly for longer or more complex texts. Delgado et al.'s (2018) meta-analysis of 54 studies found a consistent, significant advantage for paper-based reading, with an effect size that was robust across different age groups and text types. More recent research using eye-tracking technology has identified mechanisms underlying this effect: screen readers engage in more non-linear scanning, fewer regressions to previously read text, and less rereading of challenging passages.

The explanation for these differences lies partly in the physical properties of media. Paper provides haptic and spatial cues—the weight of pages, the tactile sensation of turning a page, the visual landmarks of page numbers and chapter headings—that help readers construct mental maps of text. Digital devices lack these affordances; scrolling disrupts spatial memory, and the absence of fixed page layouts impairs the ability to locate information.

2.2 Distraction and Cognitive Load

Beyond comprehension differences, digital devices introduce unique challenges related to attention and cognitive load. The presence of notifications, the temptation to multitask, and the ease of switching between applications fragment student attention. Classroom observations have documented that students using laptops or tablets spend substantial portions of class time on non-academic activities. Even when students resist overt distractions, the mere presence of a device reduces available cognitive capacity—a phenomenon termed the "brain drain" effect.

2.3 Student Preferences and Attitudes

Despite the prevalence of digital devices in their personal lives, students often express preferences for paper for academic tasks. Research conducted across multiple countries has found that students consistently prefer paper for reading, studying, and completing assignments that require sustained concentration. In a study of over 1,100 university students, books and paper were rated as the most preferred resources for learning, followed closely by laptops, while tablets and smartphones were significantly less preferred for educational tasks. Students cited better memory retention, reduced distraction, and greater tactile satisfaction as reasons for preferring paper.

However, this preference exists alongside an appreciation for digital tools' convenience and accessibility. Students desire flexibility and the ability to choose the right tool for the task. This suggests that optimal learning environments may be hybrid, not purely digital or analog.

2.4 Teacher Perspectives

Teachers occupy a critical but often overlooked position in debates about classroom technology. Research on teacher attitudes reveals a complex picture: while teachers recognize the potential benefits of technology for engagement and differentiation, they also report significant challenges, including student distraction, technical difficulties, and insufficient training. Rural teachers, in particular, face unique challenges related to infrastructure and support. Teachers' acceptance and integration of technology are strongly influenced by perceived usefulness, perceived ease of use, and facilitating conditions.

2.5 Research Gaps

While existing research has established cognitive differences between paper and screen reading and has documented student preferences, fewer studies have employed mixed-methods designs that integrate quantitative and qualitative data from both students and teachers within a single study.

Furthermore, most research has focused on reading comprehension outcomes, with less attention to broader pedagogical questions about how and when different media should be deployed in classrooms. This study addresses these gaps.

3. Theoretical Framework

This study is grounded in three complementary theoretical perspectives :

Cognitive Load Theory (Sweller, 1988) posits that working memory is limited and that instructional designs should minimize extraneous cognitive load—processing that does not directly contribute to learning. Screens introduce extraneous load through scrolling, navigation, and distraction management ; paper minimizes it.

Medium Theory (McLuhan, 1964) suggests that media are not neutral conduits but actively shape cognitive processes and habits. Digital media privilege speed, fragmentation, and interactivity; print media privilege linearity, depth, and reflection.

The Technology Acceptance Model (Davis, 1989) provides a framework for understanding how perceived usefulness and perceived ease of use influence technology adoption. This study extends TAM by examining not only acceptance but also resistance and preference for traditional media.

4. Methodology

4.1 Research Design

This study employed an explanatory sequential mixed-methods design. Phase 1 consisted of a quantitative survey administered to students. Phase 2 involved semi-structured interviews with teachers to elaborate on and contextualize the quantitative findings.

4.2 Participants

Student Sample : A convenience sample of 156 secondary school students (grades 9-12) from three public schools participated in the questionnaire. The sample was 52% female, 48% male, with a mean age of 15.7 years (SD = 1.2). All participants had access to school-provided tablets or laptops in at least two subject areas.

Teacher Sample : Twelve teachers (7 female, 5 male) from the same schools participated in semi-structured interviews. Teaching experience ranged from 3 to 22 years (M = 11.4, SD = 5.8). Subject areas represented included English/Language Arts (n=4), Science (n=3), Mathematics (n=3), and Social Studies (n=2).

4.3 Instruments

Student Questionnaire : A 24-item questionnaire was developed based on existing validated instruments and adapted to address paper-screen comparisons. The questionnaire comprised four sections :

- Section A : Demographics and technology access (4 items)
- Section B : Reading and study medium preferences (8 items, 5-point Likert scale)
- Section C : Perceived distraction and attention (6 items, 5-point Likert scale)
- Section D : Perceived learning outcomes (6 items, 5-point Likert scale)

The questionnaire demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.84$).

Teacher Interview Protocol : A semi-structured interview guide was developed to explore :

- Teachers' observations of student engagement with digital vs. print materials
- Perceived impacts on learning outcomes and attention
- Challenges and facilitators of technology use

- Recommendations for balancing digital and print media

Interviews lasted 35-50 minutes and were audio-recorded and transcribed verbatim.

4.4 Procedure

Students completed the questionnaire during regular class time in February 2024. Teacher interviews were conducted individually over a three-week period following questionnaire administration. All procedures were approved by the institutional review board, and informed consent was obtained from all participants (and from parents for minor students).

4.5 Data Analysis

Quantitative data were analyzed using descriptive statistics, paired-samples t-tests, and one-way ANOVA. Qualitative data were analyzed using thematic analysis following Braun and Clarke's (2006) six-phase framework. Two researchers independently coded transcripts, with disagreements resolved through discussion.

5. Results

5.1 Quantitative Results: Student Questionnaire

5.1.1 Medium Preferences for Academic Tasks

Students were asked to indicate their preferred medium (paper, screen, or both equally) for six common academic tasks. Table 1 presents the results.

Table 1 : Student Medium Preferences by Task (N=156)

Task	Prefer Paper (%)	Prefer Screen (%)	Both Equally (%)
Reading textbook chapters	67.3	12.8	19.9
Studying for exams	71.2	9.6	19.2
Taking notes	58.3	23.1	18.6
Completing worksheets	29.5	42.3	28.2
Writing essays	48.7	31.4	19.9
Research/Internet searching	8.3	79.5	12.2

Note : Percentages may not sum to 100 due to rounding.

The data reveal a clear pattern : students strongly prefer paper for tasks requiring sustained concentration and memory (reading textbooks, studying, note-taking). Conversely, screens are preferred for information-seeking tasks (research) and routine exercises (worksheets). Writing essays shows a more balanced distribution, with a slight preference for paper.

5.1.2 Perceived Differences in Learning Outcomes

Students rated their agreement with statements about learning outcomes on a 5-point scale (1=Strongly Disagree, 5=Strongly Agree). Table 2 presents mean scores and paired comparisons.

Table 2 : Perceived Learning Outcomes by Medium (N=156)

Statement	Mean (SD)	t-value	p-value
"I remember what I read better when I read on paper"		4.12	
"I remember what I read better when I read on a screen"	2.78 (1.01)	12.34	<.001
"I concentrate better when using paper"	4.31 (0.82)		

"I concentrate better when using a screen"	2.54 (1.12)	15.67	<.001
"I understand complex topics better with paper"	3.98 (0.94)		
"I understand complex topics better with a screen"	2.91 (1.05)	9.45	<.001

Students rated paper significantly higher than screens for memory, concentration, and comprehension of complex material (all $p < .001$, Cohen's d ranging from 0.76 to 1.02, indicating moderate to large effect sizes).

5.1.3 Distraction and Multitasking

Students reported significantly higher distraction when using screens for academic work. On a 5-point scale, mean agreement with "I get distracted by other apps/notifications when using a screen for schoolwork" was 4.43 (SD = 0.78). Conversely, mean agreement with "I find it easy to stay focused when using paper" was 4.21 (SD = 0.85). A paired t-test confirmed this difference was significant, $t(155) = 8.92, p < .001$.

Students also reported multitasking more frequently when using screens. The mean reported frequency of "using social media or messaging while doing schoolwork on a screen" was 3.87 (SD = 1.12) on a 5-point scale (1=Never, 5=Always), compared to 1.45 (SD = 0.67) for "doing other activities while using paper."

5.1.4 Demographic Differences

One-way ANOVA revealed no significant differences in preferences by gender or grade level. However, students who reported higher daily screen time (>6 hours) showed slightly weaker preferences for paper, though the difference was not statistically significant ($p = .08$).

5.2 Qualitative Results : Teacher Interviews

Thematic analysis of teacher interviews yielded six major themes, organized below with representative quotations.

Theme 1 : The Distraction Epidemic

All 12 teachers identified student distraction as the most significant challenge of classroom digitization. Teachers consistently observed that when students use tablets or laptops, attention fragments rapidly.

"I'll be teaching, and I look out, and half the class is on social media. They think I don't notice, but I do. Even the good students—the ones who want to learn—they get pulled away by notifications." (Teacher 4, English, 8 years)

"The devices are designed to be addictive. We're asking students to focus on one thing while holding a machine that offers them a thousand other things. It's an unfair battle." (Teacher 9, Science, 15 years)

Theme 2 : Paper a a Tool for Depth

Teachers described paper as facilitating deeper engagement with text. Several teachers explicitly connected paper use to improved comprehension and retention.

"When I give them a paper text, they annotate. They underline. They write questions in the margins. When it's on a screen, they scroll. They don't mark it up. They don't engage with it as a text to be wrestled with." (Teacher 1, English, 22 years)

"I've done experiments in my own classroom. Same text, same questions. One class gets paper, one gets the digital version. The paper group always scores higher on comprehension questions. Always." (Teacher 7, Social Studies, 11 years)

Theme 3 : The Metacognitive Gap

Consistent with experimental research, teachers observed that students appear unaware of how screens affect their learning.

"They genuinely believe they're just as focused on the screen. But when you look at their work, when you talk to them about what they've read, it's clear they haven't processed it the same way. They just don't know what they're missing." (Teacher 3, English, 6 years)

"I've had students tell me they 'read' something on their tablet, but then when we discuss it, they can't recall basic details. I don't think they're lying. I think they genuinely believe they read it. But their brains were somewhere else." (Teacher 11, Mathematics, 4 years)

Theme 4 : The Physicality of Learning

Teachers emphasized the importance of tactile and spatial dimensions of learning that screens cannot replicate.

"There's something about the physical book. The weight of it. The ability to flip back and forth. To put sticky notes on pages. To see how much you've read and how much is left. That's all lost on a screen." (Teacher 2, English, 18 years)

"When students are studying for an exam with a paper textbook, they remember where information was on the page. 'It was near the bottom of the left page, with a diagram.' That spatial memory is real, and it helps them retrieve information. You don't get that with scrolling." (Teacher 5, Science, 9 years)

Theme 5 : Equity and Practical Concerns

Teachers raised equity concerns related to differential access to reliable devices and internet connectivity.

"I have students whose internet goes out at home. I have students whose devices are old and slow. I have students who can't afford repairs when their tablet breaks. A paper book doesn't need Wi-Fi. It doesn't need to be charged. It's the great equalizer." (Teacher 10, Mathematics, 7 years)

"We've bought into this idea that digital is more 'modern' and therefore better. But we haven't thought through the practical realities. The tech support alone is a nightmare. The amount of instructional time lost to 'my tablet won't turn on' or 'I forgot my charger' is staggering." (Teacher 6, Science, 13 years)

Theme 6 : Recommendations for Balance

Despite their concerns, teachers did not advocate for eliminating technology entirely. Instead, they called for thoughtful integration that respects the strengths of each medium.

"I don't want to go back to chalkboards and no technology at all. But I want to be intentional. Tablets for some things—research, simulations, collaboration. Paper for reading, for deep study, for writing. It's not either/or. It's about using the right tool for the job."* (Teacher 12, Social Studies, 5 years)

"We need to stop assuming that more technology is always better. Sometimes less is more. A classroom that uses paper books for reading and laptops for coding—that's fine. The problem is when we replace paper entirely without asking what we're losing."* (Teacher 8, Mathematics, 14 years)

6. Discussion

6.1 Integration of Quantitative and Qualitative Findings

The findings from the student questionnaire and teacher interviews converge on several key points, supporting a consistent narrative about the costs of excessive classroom digitization.

Convergence 1 : Paper Supports Deeper Processing. Students reported better memory, concentration, and comprehension with paper (quantitative), while teachers described paper as facilitating annotation, engagement, and spatial recall (qualitative). This convergence aligns with cognitive research demonstrating the haptic and spatial advantages of print .

Convergence 2 : Screens Promote Distraction. Students acknowledged high rates of off-task behavior and multitasking when using screens (quantitative), and teachers identified distraction as the primary challenge of digitization (qualitative). This suggests that the distraction problem is not merely a matter of student self-control but a structural feature of digital devices in learning environments.

Convergence 3 : Students Lack Metacognitive Awareness. The quantitative finding that students rate screens as adequate for learning despite reporting better outcomes with paper, combined with teachers' observations that students underestimate the impact of distraction, suggests a significant metacognitive gap. This finding mirrors experimental research showing that students are unaware of how reading medium affects their comprehension .

Divergence : The Role of Familiarity. While students expressed clear preferences for paper for academic tasks, teachers reported that students sometimes resist paper-based assignments, preferring the familiarity and convenience of devices. This divergence suggests that preference and actual learning benefit may not always align, highlighting the need for teacher guidance and structure.

6.2 Implications for Theory

These findings extend the Technology Acceptance Model by demonstrating that perceived usefulness and actual learning outcomes may diverge. Students perceived screens as useful and convenient, yet reported better learning outcomes with paper. This suggests that technology acceptance research in educational contexts must attend not only to user perceptions but also to empirically demonstrated learning effects.

The findings also support Medium Theory's claim that media are not neutral. Students' differential experiences with paper and screens—their reported differences in concentration, memory, and engagement—suggest that the medium itself shapes the learning experience in ways that are not reducible to content alone.

6.3 Implications for Practice

For Classroom Teachers :

- Conduct a technology audit to identify tasks where paper may be more effective than screens (e.g., reading long texts, studying for exams, taking notes).
- Experiment with "paper-first" instructional blocks, reserving screens for tasks that genuinely require digital affordances (e.g., research, multimedia creation, simulations).
- Teach students explicitly about medium effects on learning. Help them develop metacognitive awareness of how different formats shape their attention and comprehension.

For School Administrators :

- Resist vendor-driven "digital transformation" initiatives that assume more technology is always better. Allocate budget to maintain print collections and paper resources alongside digital infrastructure.
- Establish guidelines for screen time limits in classrooms based on evidence rather than convenience or marketing pressure.
- Provide professional development that includes critical evaluation of technology, not just training in its use.

For Curriculum Designers :

- Design assessments that reflect the different affordances of paper and screens. For deep comprehension, consider paper-based assessments. For information retrieval and application, digital formats may be appropriate.
- Build in dedicated "deep reading" time using paper texts, protected from digital distraction.

6.4 Limitations

This study has several limitations. First, the student sample was drawn from three schools in one region, limiting generalizability. Second, the questionnaire relied on self-reported perceptions rather than direct measures of learning outcomes. Future research should combine self-report with objective measures of comprehension and retention. Third, the study did not examine potential differences across subject areas in depth; mathematics and science teachers, for example, may have different experiences than language arts teachers. Finally, the study did not include classroom observations to verify teacher and student reports of distraction and engagement.

7. Conclusion

This mixed-methods study provides converging evidence that excessive reliance on tablets and screens in classrooms carries significant costs for student attention, comprehension, and learning. Students prefer paper for the academic tasks that matter most—reading, studying, and deep engagement with complex material—and teachers observe firsthand how digital devices fragment attention and undermine depth.

These findings do not constitute a rejection of educational technology. Rather, they argue for a more thoughtful, evidence-informed approach that curtails excessive digitization, restores paper books to their central pedagogical role, and re-envision educational landscapes around the values of depth, attention, and durable learning. The most sophisticated educational technology may not be the newest tablet but the humble paper book, used with intention and skill.

The challenge before educators, administrators, and policymakers is not to choose between paper and screens, but to learn when and how to use each. This requires resisting the siren song of techno-determinism and making decisions based on evidence rather than fashion. The future of education depends on it.⁷

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Appendix A : Student Questionnaire

Section A : Demographics and Technology Access

1. What is your grade level ? _____
2. What is your gender ? () Male () Female () Prefer not to say
3. Do you have access to a school-provided tablet or laptop ? () Yes () No
4. On average, how many hours per day do you spend on screens outside of school ? () Less than 2 hours () 2-4 hours () 4-6 hours () More than 6 hours

Section B : Medium Preferences (5-point scale: Strongly Disagree to Strongly Agree)

Please rate your agreement with each statement:

1. I prefer reading textbook chapters on paper rather than on a screen.
2. I prefer studying for exams using paper materials rather than digital materials.
3. I prefer taking notes on paper rather than on a device.
4. I prefer completing worksheets on a screen rather than on paper.
5. I prefer writing essays on paper rather than on a computer.
6. I prefer using screens for research and internet searching.
7. I learn better when I use a combination of paper and screens.
8. I wish my school used more paper books and fewer digital devices.

Section C : Perceived Learning Outcomes (5-point scale: Strongly Disagree to Strongly Agree)

1. I remember what I read better when I read on paper.
2. I remember what I read better when I read on a screen.
3. I concentrate better when using paper for schoolwork.
4. I concentrate better when using a screen for schoolwork.
5. I understand complex topics better when I learn from paper.
6. I understand complex topics better when I learn from a screen.

Section D : Distraction and Attention (5-point scale)

1. I get distracted by other apps or notifications when using a screen for schoolwork. (Never to Always)
2. I find it easy to stay focused when using paper for schoolwork. (Never to Always)
3. I use social media or messaging while doing schoolwork on a screen. (Never to Always)
4. I do other activities while using paper for schoolwork. (Never to Always)
5. I feel tired or have eye strain after using a screen for schoolwork. (Never to Always)
6. I would be more focused if my school used fewer digital devices. (Strongly Disagree to Strongly Agree)

Appendix B : Teacher Interview Protocol

Introduction:

- Thank participant for volunteering
- Review consent form and confidentiality
- Explain study purpose: understanding teacher experiences with digital vs. print media in classrooms

Warm-Up Questions :

1. How many years have you been teaching?
2. What subjects and grade levels do you currently teach?
3. Describe the technology available in your classroom.

Core Questions :

Technology Use and Integration

4. How would you describe your use of digital devices (tablets, laptops) in your teaching ?
5. How would you describe your use of paper-based materials (textbooks, handouts, worksheets) ?
6. What factors influence your decision to use digital vs. print materials for a particular lesson?

Observed Effects on Students

7. What differences, if any, have you observed in student engagement when using digital vs. print materials ?
8. How does student attention and focus differ between digital and print activities?
9. Have you observed differences in student learning outcomes (comprehension, retention, critical thinking) between digital and print formats ?
10. What challenges do you face with student use of digital devices in the classroom ?

Teacher Attitudes and Beliefs

11. Do you believe current levels of classroom digitization are appropriate ? Why or why not ?
12. If you could change one thing about technology use in your school, what would it be ?
13. What training or support would help you use technology more effectively ?

Recommendations

14. What advice would you give to a school district considering expanding classroom digitization ?
15. What role should paper books play in the classrooms of the future ?

Closing:

16. Is there anything else you would like to add about technology, paper, or learning in your classroom ?
17. Do you have any questions for me ?