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Tablet Use, Self-Regulated Learning and Academic Outcomes among Senior High School Students

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Abstract
This research examined the impact of tablet use on self-regulated learning (SRL), digital distraction and academic performance in senior high school students in Ghana. Specifically, it sought to determine if tablets assist in the development of effective learning behaviours, or if they are a source of distraction, and how these factors may have an impact on academic performance. To achieve this goal, a quasi-experimental design with pre-test and post-test measures was employed using three groups (Control, unguided tablet use, and guided tablet use) and a total of 150 students participated in this research. Data was obtained using self-regulated learning questionnaires, digital distraction Scales, observation checklists, and academic achievement tests, and was analysed using ANOVA, ANCOVA, Correlation, Regression and Mediation analysis. The results indicated that students who used tablets in a guided manner (M=70.5) achieved higher academic performance compared to those who used tablets in an unguided manner (M=60.2) and those in the control group (M=58.3). Additionally, students who used tablets in a guided manner exhibited significantly higher self-regulated learning and significantly lower levels of distraction than those who used tablets in an unguided manner. Self-regulated learning was a strong predictor ($\beta = 0.45$) of students' academic performance, while digital distraction had a negative impact ($\beta = -0.38$) on performance. Mediation analysis confirmed that self-regulated learning mediated the positive relationship between tablet usage and student achievement; and conversely, digital distraction mediated the negative relationship. Data collected for this study indicates that tablet use only enhances learning when students are provided with clearly defined instructional guidance on how to use tablets. When students do not have this assistance, tablets contribute to student distractions, with greater negative impacts on student learning outcomes. Results of this study provide educators and educational policy makers in Ghana with the necessary evidence to create structured digital learning environments that enhance student engagement and performance.

Keywords: Tablet-mediated learning, self-regulated learning (SRL), academic performance, guided instruction.

INTRODUCTION

Background to the Study

Recent changes and reforms in education have led to the move from the use of textbooks toward digital tools in schools. The shift has changed how teachers teach and how students learn in many educational settings. Reform in the curriculum of secondary education has led to the introduction of tablets to replaced textbooks because they are easy to carry and allow students to interact with multimedia content (Enriquez, 2014). The ministry of education the one student one tablet policy in 2025 in second cycle schools in Ghana (MoE, 2025). The policy introduced these devices into classrooms to get students more involved in their lessons and to give them easier access to digital textbooks and materials.

Studies have found that tablets offer many possibilities but actual effect on learning is still a topic of debate. Some researchers find that students participate more and get better grades when using them (Haßler et al., 2016). Others worry that the same devices cause distractions, lead to off-task behaviour and make it harder for students to stay focused (Aagaard, 2015). Literature suggests that tablets are not simply good or bad; instead, their value depends on how they are used during a lesson.

A quick way to understand the literature and trends in using tablet in the second cycle institutions is through Self-Regulated Learning (SRL). Self-Regulated learning a student's ability to plan, track, and manage their own thinking and behaviour while they study (Zimmerman, 2002). In a classroom full of technology, Self-Regulated learning is a necessity so that students have more freedom with tablets, but they also have more chances to get sidetracked, so they must learn to manage themselves better (Dabbagh & Kitsantas, 2012).

The use of digital tools can help or hurt the learning process. It is acknowledged that tablets provide quick feedback and personalized resources that can help a student stay on track (Persico & Steffens, 2017). These tablets also come with non-academic apps (like Facebook, TikTok, WhatsApp, etc) and sim card slots the temptation to multitask. Applications and features on tablets create a conflict during studies: tablets might help a student build better study habits, or they might just provide more ways to lose focus.

Senior High Schools (SHS) in Ghana using tablets is a relatively new practice in the education sector. EdTech programs to encourage digital learning do exist but there is no hard evidence on how these devices affect self-regulation and grades in real classrooms. Few local studies on the use of tablets use simple surveys rather than experiments that can show a clear cause-and-effect relationship. Under this reason this study uses a quasi-experimental approach in Ghanaian SHS classrooms to see how tablets really influence the way students manage their learning.

Purpose of the Study

This study examines how tablet use affects self-regulated learning and academic results for Senior High School students in Ghana; whether tablet use promotes effective study discipline or increases distraction, and how these factors influence students' academic performance

Objectives of the Study

The study intends to:

1. Measure how using tablets affects self-regulated learning among Ghanaian SHS students.
2. Find out how much tablets contribute to digital distraction in the classroom.
3. See how a student's ability to self-regulate affects their grades.
4. Compare students who have guided tablet use with those who use them without specific teacher direction.
5. Look at the link between distraction, self-regulation, and academic success.

LITERATURE REVIEW

Theoretical Framework

Definitions of Self-Regulated Learning (SRL) differ across theoretical perspectives (e.g., behavioural, cognitive, and constructivist); however, nearly all define SRL as an active, goal-directed process whereby the learner engages in strategic use of their thoughts, motivation, and behaviours to meet their learning objectives. (Zimmerman & Schunk, 2011). Students learn through digital tools, they often have more freedom, which makes SRL even more important. Students who can manage their time and ignore the many distractions get better grades than those who are distracted (Broadbent & Poon, 2015).

Self-regulated learning is not just a personality trait some people are born with; it is a skill that teachers can help students build. Panadero (2017) explains that structured feedback and clear learning paths help students understand how to evaluate their own progress. Studies on self-regulated learning have looked closer at how digital apps like organizers, and reminders, progress bars in an app -can guide students to stay focused on their goals (Greene, 2021). Theobald (2021) shows that when digital environments provide explicit training on SRL strategies, students show a marked improvement in their academic resilience.

Mardiyah (2024) found that small, timely interventions in online courses can help students who otherwise struggle with self-discipline to complete their assignments on time. The classroom environment itself influences how much effort a student puts into self-regulation (De Smul, Heirweg, Devos, & Van Keer, 2020). When teachers create a space that encourages checking one's own work and setting realistic goals, students are more likely to internalize these habits. Barz (2024) confirmed that digital tools designed with SRL in mind lead to deeper engagement, as they force learners to be mindful of their own learning pace.

Cognitive Load Theory

Cognitive Load Theory -CLT is based on the idea that our human memory systems sensory, working, and long-term memory have specific limits (Young, Van Merrienboer, Durning, & Ten Cate, 2014). Our working memory can only handle a small amount of information at once; it often becomes a "bottleneck" during the learning process. Teaching strategies that are effective try to manage three types of loads: intrinsic (the difficulty of the task itself), extraneous (distractions or poor design), and germane (mental effort that helps build knowledge) (Sortwell et al., 2026). If the total mental effort required exceeds what a student can handle, learning and performance tend to drop significantly (Vasilaki, & Mavrogianni, 2025). While we use tablet-based and digital learning, how we structure information is vital for preventing this kind of overload.

The Cognitive load theory also suggests that learners who already struggle to pay attention or learn language find it difficult to concentrate in class. Learners find it more challenging when working memory is overloaded with too much information. Unnecessary repetition of information on tablets increases extraneous cognitive load. Digital multitasking on tablets is another major factor that changes how we process information and cause cognitive over-load. Switching between tasks or apps on educational tablets splits attention of learners and reduces the amount of information that can be properly stored and understood by learners (Curum & Khedo, 2021).

From the perspective of cognitive load theory studies also suggest that heavy media multitasking is linked to poorer memory and a harder time filtering out irrelevant details, even when students are just trying to focus on a single task (Hasan, 2024). On the other hand, well-structured environments that use multimodal content (like combining audio and visual channels) can help avoid overload and keep students engaged because information is shared across different channels in a balanced way, reducing strain on a single cognitive resource. (Sortwell et al., 2026)

Constructivist Learning Theory and Mobile learning

Knowledge is best acquired through active mental construction, with social constructivism emphasising social interaction and radical constructivism concentrating on individual subjective interpretation according to constructivist learning theory (Chand, 2023). The theory holds that knowledge is co-constructed through social interactions and cooperative activities. it emphasises how important social and cultural elements are in forming personal comprehension (Rai, 2025). Learning is a holistic process with neurological, psychological, and sociological components in which people constantly create new understandings based on their interactions and life experiences (Suhendi, Purwarno, & Chairani, 2021).

While mobile learning presents new technological opportunities for education, it also brings up concerns about privacy and omnipresent knowledge building (Yakar, Sülü, Porgalı, & Çaliş, 2020). In a Mobile learning also promotes cooperative knowledge creation and communication in a variety of learning contexts (Naveed, Choudhary, Ahmad, Alqahtani, & Qahmash, 2023). Mobile devices used in social constructivist learning environments support and challenge students' thinking. It also promotes concept testing and offers chances for reflection on both pedagogies and content knowledge (Marzouki et al., 2017).

Mobile learning method acknowledges that knowledge is a human product that was first created in a social environment before being internalised, rather than an internal, individualistic activity (Irfan, Mursyida, & Mubai, 2024). Mobile learning environments also create a dynamic arena for knowledge sharing and co-construction. (Yakar et al., 2020). Again, mobile learning methods encourage knowledge access and allow connection within a worldwide network, digital technology (such as computers, tablets, and mobile devices (Rashid, Fatima, & Sajid, 2024). When a constructivist flipped direct instruction model is used for mobile learning, students' cognitive and psychomotor skills are more effective as a result (Fuentes, An, & Alon, 2015). Individual learning objectives and constructivist pedagogy when put in place helps the integration of mobile devices into classroom practices and pedagogy. Mobile devices and constructivist learning theories go hand in hand. Constructivism promotes active, social, contextual, and self-directed learning, which is made possible by mobile devices. (Alismaiel, Cifuentes-Faura, & Al-Rahmi, 2022).

Tablet use in Education

Developments in educational frameworks have made way for electronic gadgets like tablets to introduced modern classrooms. Their popularity stems from being portable, easy to use, and capable of handling various multimedia learning tasks. For instance, studies indicate that tablets effectively support active learning behaviours, which often leads to better academic performance compared to traditional methods (Chou & Feng, 2019).

The impact of digital technology is also seen in specialized areas like literacy and language learning. Recent literature suggests that using digital tools can improve both the quality and the amount of writing students produce. Digital devices also increase students' motivation to complete assignments (Li, Zheng, & Chiang, 2022). Integration of tablets in specific subjects, such as electrical engineering or the sciences, has been shown to facilitate more complex learning activities (Chou & Feng, 2019).

Teacher-barriers like low teacher self-efficacy or a lack of professional development can hinder how well tablets are used in the classroom (Berei & Pusztai, 2022). Availability digital tablets do not mean smooth integration. Issues like digital distraction and network connectivity problems can disrupt the learning process (Kayapinar & Erkir, 2019). According to Mang and Wardley (2012) teachers' ability to implement structured lessons that includes pedagogical support for instructors and clear guidelines for student behaviour promtes effective tablet use in education.

Self-Regulated Learning in Digital Environments

Self-regulated learning (SRL) has become a central topic in research. According to Broadbent (2017) specific strategies, particularly managing time and regulating effort, are strong indicators of whether a student will succeed in a digital setting. Self-regulated learning strategies and technologies support academic success, but face challenges like limited access to digital resources and inadequate instructor training (Faza & Lestari, 2025). Ateş (2024) discusses how structured guidance within digital platforms helps students who otherwise struggle to apply self-regulatory behaviours independently. Self-regulated learning is effective in improving academic achievement in online and blended learning environments, particularly in STEM fields (Broadbent, & Poon, 2015).

The SRL has three phases planning (forethought), doing the work (performance), and looking back (reflection). Teachers in traditional classrooms often prompt follow these phases than teachers in digital learning environment such as where educational tablets are used planning, doing the work and looking back is paced on the learners. Wong et al. (2019) in a study on SRL found out shift from traditional learning to digital devices often creates a gap for learners who lack intrinsic motivation and self-regulation. Studies in computers and education and the internet and higher education, three strategies consistently stand out:

1. Goal setting: The first phase of the SRL is gaol setting, this involves defining specific goals before actual work or studies (Conde Gafaro, 2022).
2. Metacognitive monitoring: The second phase of the SRL involves the learner constantly asking themselves if they understand the content not.
3. Help-seeking: The last phase is where learners use digital tools to reach out to peers or instructors rather than struggling in isolation.

A dark side to digital SRL is "Cyberloafing". Cyberloafing is the act of using the internet for non-academic purposes during study hours. Agrawal and Krishna (2025) mention that fatigue and technical issues often lead to a breakdown in self-regulation.

Digital Distraction in Technology-Enhanced Learning

Digital distractions in technology-enhanced learning is common among learners. When students have their phones, tablets, or laptops with them, they often get pulled away from their schoolwork and lose focus on what they are supposed to be learning. Scholars have examined how digital devices pull people's attention away from their tasks (Monge Roffarello, Lukoff, & De Russis, 2023).

Biedermann, Schneider and Drachsler (2021) compared various studies to see which methods help people stop jumping between different types of media. Biedermann looked at 28 different ways people try to control their digital use, sorting them by how they work and what happened after people used them. They found that programs which simply tried to make people more aware of their habits didn't lead to much change. Methods that punished users for becoming distracted performed better, but only when the punishment was severe enough to deter the behaviour. If the penalties were lenient, most people disregarded them.

Dontre (2021) examined how laptops, smartphones, and social media apps, particularly Facebook, divert students' attention away from their work. It used to be a highly contested issue whether computers in the classroom were beneficial or detrimental to student learning, but it is not as relevant today because the technology available for educators and students has changed dramatically. Cellphones and social media have had a much more pronounced negative effect on student learning than they did back then and, as a result, more students than ever have access to their own devices (Kuncoro et al., 2023).

Digital distractions can hinder children's ability to learn in Class. Teachers need to create strategies to deal with digital distractions in Class. Roffarello & De Russis (2023) studied why and how people create self-control tools as part of their research into self-control tools for digital devices. To determine the goals of other similar software programs, Roffarello & De Russis identified digital tools that would help students minimize their use of electronic devices.

Tablets and Self-Regulated learning

Research on the impact of tablets on self-regulated learning (SRL) shows an inconsistent trend. Evidence indicates that these devices aid students in accessing a variety of educational resources rapidly and allows for independent or self-paced learning (Anthonysamy, Ah Choo, & Soon Hin, 2021). When students feel they have control over these devices, they tend to report higher levels of motivation and increased capacity to create and reach their own learning objectives. Other studies find that tablets can damage self-regulation because they provide constant opportunities for distraction. Both social media and gaming notifications frequently distract learners from accomplishing the main task they're working on (Rykard, 2020) and create a situation where the tool that's meant to assist with academic performance turns into the main contributor of academic suspension (Tian et al., 2021).

Students must have good executive functioning skills as the classroom environment shifts to tablet based. Without these skills, the sheer amount of information available on a tablet can cause cognitive overload. Instead of deep learning, students may engage in fragmented learning by switching between tabs and sources without fully comprehending the content (Viberg, Khalil, & Baars, 2020). A recurring issue in this topic is that most findings are based on self-reported questionnaires in which students characterise their own habits, which may not reflect actual classroom behaviour because many overestimate their abilities to stay focused or use digital tools

efficiently. According to Rickey, Panadero and DeLuca, (2025), many students lack the metacognitive awareness required to appropriately report their own levels of distraction.

Experimental and Quasi-Experimental studies in EdTech

Finding good experimental research in educational technology is difficult, especially in authentic classroom situations where researchers cannot readily control all variables (Escueta, Nickow, Oreopoulos, & Quan, 2020). In many schools, teachers cannot simply discontinue their regular curriculum to accommodate a randomised controlled experiment. According to recent research, without clear cause-and-effect data, it is impossible to determine whether a digital tool works or if other factors, such as instructor excitement or kids' socioeconomic background, are to blame.

A majority of current research, in fact, is descriptive, which describes rather than reasons or explains how to improve something. This casual lack of depth makes it hard for an analyst to determine whether technology is worth investing in as a public policy (Scherer, 2019). Using quasi-experimental designs offers an alternative. Researchers can make inferences about the effects of different treatments (e.g., using tablets to teach compared to traditional methods) without randomly assigning students to treatment groups, which often cannot be done in an educational setting.

Academics are able to assess how, for example, local internet access and classroom size impact how technology is utilized, when they observe already established classes through these designs. This provides an opportunity for the evaluation of interventions in a real-world setting, such as at a senior high school in Ghana. This research offers more realistic insights than laboratory tests, which do not account for the daily challenges that teachers experience in underdeveloped countries, such as power cuts or limited technical support (Agasisti et al., 2020). Quasi-experiments allow for extended observation periods, which aids in knowing how student behaviour changes when the novelty of the tablet fades (Yousof et al., 2022).

Conceptual Framework

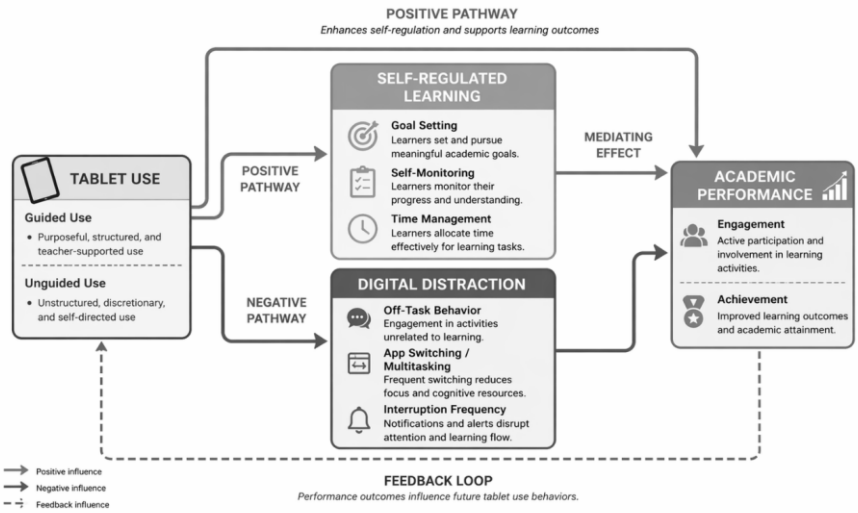

Figure 1: (Sutarni, Ramdhany, Hufad, & Kurniawan, 2021; Li, & Chen, 2026)

This research focused on the impact of tablet devices on self-directed learning and if these devices are a contributing factor to educational distraction. The independent variable (use of a tablet) is operationalized as consisting of both guided and unguided use of the tablet. Therefore, the researched effects of each use of the tablet will yield two distinct outcomes as represented in the

model. The first path is positive. When students utilise tablets for learning, they can build self-regulated learning (SRL) skills. This includes creating their own goals, tracking their progress, and improving their time management skills. SRL functions as a mediator; it is the process by which tablet use improves a student's engagement and ultimate grades. On the other hand, there is a negative trajectory. Tablet use can also cause digital distractions as learners repeatedly switch between multiple apps, or regular notification from social media apps. This distraction serves as a second mediator, but it negatively impacts academic performance.

METHODOLOGY

Research Design

The study used a quasi-experimental design. Quasi-experimental design is a non-equivalent control group setup for schools where you can't just move students around randomly (Anderson-Cook, 2002). Since students stay in their assigned classes, this design lets the researcher compare different groups without messing up their normal school day. The study used a pre-test and a post-test. It measured how students' performances before interventions were made, then assessed students again after the intervention. Comparing these two points, interventions help to test where there was a significant improvement in performance after the tablets rather than differences that were already there between the groups (Creswell & Creswell, 2018). Three groups will be used in the study: the control group, the first experimental group and the second experimental group. The control group was taught with traditional pedagogies without tablets. The first experimental experience lessons and material on tablets but the instructions were not in specific guidance (unguided tablets use). The second experimental group had lessons on tablets with SRL supports like goal-setting prompts. SRL supports setup helped the researcher to find out if the way tablets are used matters as much as the tools themselves (Wong et al., 2026).

Population of the Study

The study's target population was senior High school students in Ghana who use a technology like tablets for learning. The researcher focused on schools that have already received their tablets, so the study reflects a real-world setting. According to Zimmerman (2000). Teens must take more charge of their own schoolwork but often struggle with the distractions that come with digital devices.

Sample and Sampling Techniques

Sample Size

The study's sample size included between 150 students across the three groups name the control group (group 1), first experimental group (Group 2) or second experimental group (Group 3). This size provided enough data to spot clear differences between the groups (Cohen, Manion, & Morrison, 2018).

Sampling Techniques

The study used a multi-stage approach. "Multi-stage" or "multi-step" approaches appear in many fields, generally to decompose a complex task into sequential, easier sub-tasks, often improving accuracy, robustness, or efficiency (Jeon, Bak, & Bu, 2019). First, purposive sampling was used to select students from school that already used tablets for instructions and learning. The second approach was cluster sampling where the entire classes were selected rather than individual

students. Cluster sampling is much easier for the study to manage and keeps the classroom environment natural. The classes selected for the study were then grouped into control group (group 1), first experimental group (Group 2) or second experimental group (Group 3). The study could not randomize individual students, so the researcher worked to keep the groups as similar as possible and generate a valid result (Creswell & Creswell, 2018).

Instruments for Data Collection

The study used A quasi-experimental quantitative study using a multi-method data collection. Quasi-experimental research designs test causal hypotheses using a similar-to-intervention group as a comparison group but lack random assignment (White & Sabarwal, 2014). Research instruments like questionnaires, tests, and observations were used to get a full picture of the studies objectives. The research used self-regulated learning questionnaire to help measures how students set goals, monitor their own progress, and manage their time during lesson (Zimmerman, 2000). Followed by digital distraction scale as the second research instrument. Digital distraction scale (DDS) captures cognitive (attention, multitasking) and emotional (emotion regulation, addiction, procrastination) aspects of distraction and show strong reliability, clear factor structures, and meaningful links to problematic technology use and well-being (Abd Alrazeq & Zakaria, 2025). Digital distraction scale also helps trace often students multitask or get off-track and results in lower grades among students (Uncapher et al., 2017).

Observation checklist was the third instrument used to see how engaged or distracted students looked in class. Observation checklists are versatile tools for systematically capturing behaviour, practice quality, and study reporting (Hickey et at., 2025). Observation checklists help balance out what leaners say about themselves in surveys and the actual situation on the grounds (Creswell & Creswell, 2018). Finally, academic achievement test based on the school curriculum was used given both before and after the intervention. According to academic achievement (grades, test scores, report cards) is widely used as a core data source in education research and practice. Academic performance achievement instruments also show predominantly positive associations with physical activity, but some studies report non-significant or negative associations (Lestari & Setiawan, 2017).

Data Collection and Analysis

The researcher will first obtain ethical permission to ensure that the study met established guidelines for working with human subjects. This included practical efforts like as obtaining informed consent and ensuring that everyone participated voluntarily and privately (Head et al., 2021). A pre-test was administered to ensure that the experimental and control groups were initially similar. This is a normal step in quasi-experimental settings where the researcher cannot simply select participants at random (Matta, Flournoy, & Byrne, 2018). Following that, the intervention will last for four to eight weeks. Previous educational research suggests that this timescale is sufficient to determine if pupils progress without other extraneous factors interfering with the results (Lortie-Forgues and Inglis, 2019). The researcher used the same techniques for each session to ensure consistency and prevent personal bias from influencing how the lessons were given.

The researcher utilised SPSS to analyse data from different research tools and generate means and standard deviations per group for an overall appreciation of how each group was represented (Ghasemi & Zahediasl, 2019). ANOVA and ANCOVA were both used to test for

differences between the groups with ANCOVA being the preferred analysis for this type of research as it considers that the students were at different levels prior to starting (van Breukelen, 2019). The researcher also completed a mediation analysis to assess the number of students that were distracted from their studies or the extent to which they managed their own time to see if this could help explain why tablets had an impact on their marks. This type of analysis allows the researcher to see the causal mechanisms through which one factor causes another (Rucker, Preacher, Tormala, & Petty, 2021).

Ethical Considerations

This study follows conventional ethical guidelines for doing research with human volunteers. People joined voluntarily and expressed their approval before any data was collected. Everyone was informed of the purpose of the study, their rights, and their ability to withdraw at any moment without penalty. Personal names and identifiers were excluded from the dataset to ensure privacy. All information was maintained in a secure location that only authorised individuals could access. These steps are consistent with worldwide ethics standards that prioritise human rights and data protection (Head et al., 2021). The data was collected just for educational study and is reported in groups so that no particular person can be identified.

RESULTS

Table 1: Descriptive Statistics of Study Variables

Variable	Control (n=50)	Unguided (n=50)	Guided (n=50)
SRL Post	3.05 (0.47)	3.10 (0.50)	3.65 (0.42)
Distraction Post	2.40 (0.50)	3.20 (0.55)	2.10 (0.48)
Achievement Pre	54.2 (8.1)	55.0 (7.9)	54.8 (8.0)
Achievement Post	58.3 (8.5)	60.2 (8.8)	70.5 (7.6)

Table 1 presents the means and standard deviations for self-regulated learning (SRL), digital distraction, and academic achievement across the three groups. The guided group recorded the highest post-test SRL (M = 3.65, SD = 0.42), compared to the unguided (M = 3.10, SD = 0.50) and control groups (M = 3.05, SD = 0.47). For digital distraction, the unguided group reported the highest levels (M = 3.20, SD = 0.55), while the guided group reported the lowest (M = 2.10, SD = 0.48). Pre-test academic scores were comparable across groups. Post-test scores showed clear differences, with the guided group achieving the highest mean (M = 70.50, SD = 7.60), followed by the unguided (M = 60.20, SD = 8.80) and control groups (M = 58.30, SD = 8.50).

Table 2: Baseline Equivalence

Source	Sum of Squares	df	F	Sig.
Between Groups	14.32	2	0.21	0.81
Within Groups	5002.18	147		

A one-way ANOVA confirmed no significant differences in pre-test academic performance across groups, F (2,147) = 0.21, p = .81. This indicates that the groups were comparable prior to the intervention.

Table 3: Effect of Tablet Use on Academic Achievement

Source	Sum of Squares	df	F	Sig.	Partial Eta²
Group	2456.18	2	24.67	0.000	0.25
Pre-test (Covariate)	1834.55	1	18.45	0.000	0.11
Error	7320.44	146			

An ANCOVA was conducted to examine group differences in post-test academic achievement while controlling pre-test scores. There was a significant effect of group, $F(2,146) = 24.67$, $p < .001$, $\eta^2 = .25$, indicating a large effect size. The covariate (pre-test scores) was also significant, $F(1,146) = 18.45$, $p < .001$, $\eta^2 = .11$, suggesting that baseline performance contributed to post-test outcomes. Post hoc comparisons (Tukey HSD) showed that the guided group outperformed both the control (Mean Difference = 12.20, $p < .001$) and unguided groups (Mean Difference = 10.30, $p < .001$). A smaller but significant difference was observed between the unguided and control groups (Mean Difference = 1.90, $p = .045$).

Effects on Self-Regulated Learning and Digital Distraction

Table 4: ANOVA for SRL

Source	F	Sig.
Between Groups	19.82	0.000

Table 5: ANOVA for Digital Distraction

Source	F	Sig.
Between Groups	28.11	0.000

Significant differences were observed across groups for both SRL and digital distraction. For SRL, the ANOVA revealed a significant effect, $F = 19.82$, $p < .001$. For digital distraction, (Table 5) the effect was also significant, $F = 28.11$, $p < .001$. These results indicate that guided tablet use is associated with higher levels of self-regulated learning and lower levels of distraction, whereas unguided use is linked to increased distraction.

Mediation Analysis

Bootstrapped mediation (5,000 samples) was conducted.

Table 6: Mediation Effects

Pathway	Effect	95% Confidence Interval
Tablet → SRL → Achievement	4.20	[2.10, 6.35]
Tablet → Distraction → Achievement	-3.75	[-5.90, -1.80]

A bootstrapped mediation analysis (5,000 samples) examined the indirect effects of tablet use on academic achievement through SRL and digital distraction. The indirect effect through SRL was positive and significant (Effect = 4.20, 95% CI [2.10, 6.35]), indicating that tablet use improved achievement by enhancing self-regulated learning. In contrast, the indirect effect through digital

distraction was negative and significant (Effect = -3.75, 95% CI [-5.90, -1.80]), suggesting that increased distraction reduced academic performance. These findings show that SRL functions as a positive pathway, while digital distraction operates as a negative pathway linking tablet use to academic outcomes.

DISCUSSION

Summary of Key Findings

The study revealed five major findings:

- The findings showed that structured training using tablets was more beneficial than either unguided or control groups in terms of academic success. Differences were due to established teaching methods and processes. Students receiving technology only (without established teaching methods) did not demonstrate improved academic performance, suggesting that technology does not lead to improved educational results without clear pedagogical guidelines.
- A group of students with guidance showed an ability to develop self-regulated learning competencies. They were able to develop an awareness of how to plan for, manage and monitor their own learning process. This was a clear indication that the students were becoming more autonomous learners as well as receiving appropriate instructional scaffolding.
- The unguided group had difficulty maintaining attention on the assignment. When no clear learning objectives were given, students were generally more likely to be involved with off-task activities and digital distractions than they were likely to be engaged in doing their assignments. Without instructional structure, the absence of pedagogical control diminished the educational value of the devices and reduced their contributions to learning.
- The findings from the research indicate two competing pathways related to how using tablets may influence students' academic success: 1) use of tablets in a structured manner assisted the development of positive learning habits, such as managing time and being involved in their work; therefore, students performed better, or 2) improper use of tablets resulted in cognitive distractions and disengagement from classroom activities, thereby negatively affecting academic performance for those students
- The success of using tablets as a learning device in the classroom will be determined by the way they are designed and implemented in relation to the curriculum through instruction. Technology alone does not lead to student success, but only if it has been incorporated into the way that you teach will you achieve success.

Discussion of Findings

Tablet Use and Academic Performance

The results show that supervised tablet use enhances academic achievement. Students in the directed group had the highest mean score (M = 70.5), followed by the unguided group (M = 60.2) and the control group (M = 58.3). This implies that tablets do not necessarily increase learning outcomes. The manner in which the tablets is integrated into instructions determines its academic usefulness. Effective learning is dependent on how learners are taught to digest information, not on the technology itself (Dunlosky et al., 2013). Unguided use resulted in only a slight improvement

over the control group, implying that access to tablets without structured learning support is insufficient for significant academic advances.

Role of Self-Regulated Learning

According to the findings, pupils in the guided tablet group had the highest level of self-regulated learning (SRL). The substantial association between SRL and academic success (r = 0.62) suggests that students who actively plan, monitor, and assess their learning perform better. The current study supports the results of past research showing Self-Regulated Learning (SRL) can predict successful outcomes within an academic context, especially within technology integrated type of curriculum (Bernacki et al., 2015). The findings also provide further evidence that students who have success in controlling their thoughts, emotions and behaviours through varying degrees of mediation are more likely to remain focused on task, utilise positive strategies and complete learning tasks. Furthermore, the findings provide further support for the idea that providing students with appropriate instructional support increases development of SRL, especially in the presence of structured environments in which students are provided with specific instructional support (Azevedo et al., 2010). Unstructured learning environments can create additional demands upon students' self-regulation skills and can hinder the effectiveness of their learning.

Digital Distraction and Learning Outcomes

Experimental groups based on the degree of instruction displayed the greatest number of digital distractions without guidance and received the lowest results regarding their academic achievements. The relationship between distraction and school performance was negatively correlated (R = -0.55), meaning that distractions like digital distractions negatively impacted a person’s ability to learn at school (Sweller, 2011). Specifically, when students share their focus between multiple tasks at once while doing classwork, they overload their cognitive processing abilities due to the number of competing inputs causing them to comprehend and remember what they are trying to accomplish. Studies examining how people perform when they are multitasking in a classroom setting have found that increased amounts of time spent engaged with digital distractions had a significant impact on student academic performance. Therefore, students will likely have a higher opportunity of becoming distracted by these types of activities if they are allowed to use their tablet without being assigned work to complete.

Mediation of SRL and Distraction

The mediation study found that self-regulated learning had a beneficial impact on academic performance (indirect effect = 4.20), while digital distraction had a negative impact (indirect effect = -3.75). These findings indicate that tablet use does not directly influence academic performance, but rather that its impact is communicated through learner conduct. This study is supported by research that shows how learners regulate their behaviour and manage cognitive demands shapes learning results in digital contexts (Winne, 2011). Learners with strong SRL skills can better resist distractions and focus on task-relevant tasks, whereas those with weaker SRL are more prone to off-task behaviour. The directed group did better because the instructional structure improved self-regulation and reduced distraction, but the unguided group demonstrated the opposite trend, which implies that tablets' educational usefulness is strongly dependent on how learning is organised and supported.

Conclusion

The study indicates that tablets have a two-way effect on learning outcomes. Tablets, combined with structured instructional aids, assist in better self-regulated learning and the achievement of learning goals. Deployed with no pedagogical aids, they increase the level of distraction and decrease academic achievement. Thus, the study confirms that the learning phenomenon cannot be achieved with the use of certain technologies. Their learning value will depend on the quality of instructional and technological design. Similar findings confirm that the learning of students with the use of tablets increases according to the level of instructional aids. If no instructional aids are present, the tablets will create a level of distraction, which will lead to lower achievement. Therefore, the value of the teaching aids will be determined by the quality of their integration into the teaching and learning process.

Recommendations

1. Teachers must implement an organised approach to teaching to use tablets effectively in the classroom. To achieve successful learning in subject lessons, stepwise instructions and clear goals of lesson achievement must be given to students. Simply beginning the lesson is not sufficient.
2. Educational institutions must train and retrain their own workforce. This includes imparting training which emphasises handling practical issues in a digital classroom. Tablets can divert students' focus which is why schools should have some strict rules regarding their usage.
3. Strategies for self-directed learning should be incorporated into instructional resources. When digital classes provide cues for students to set their own goals as well as tools for tracking students' progress, it is most effective. Incorporating simple reflection activities at the end of every lesson enables students to monitor their progress.
4. Policymakers, including the Ministry of Education, must introduce a monitoring and evaluating system to ensure that tablets are used for teaching and to improve the learning outcomes of students.
5. The pedagogical, institutional, and capacity building components of educational technology usage should be prioritised. Boosting teachers' digital competencies, enhancing effective teaching practices, linking the use of technology to curriculum objectives, and ensuring ongoing professional development and support structures.

Suggestions for Further Research

1. Future research must focus on large and diverse samples. Current data are chiefly from small-localised clusters which make it tough to say whether results are relevant to pupils from different areas and backgrounds socio-backgrounds.
2. Over a longer time span, it is also required to conduct these intervention studies. Short-term assessments often contain a novelty effect in which students are engaged simply by the fact that the technology is new. Keeping tabs on pupils for a whole school year or for longer would reveal whether the initial enthusiasm develops into life-long habits or merely fades as the devices become the new normal.

3. To complete an understanding of the student experience, researchers require more qualitative data. While exam scores may show a positive upward trend, this number cannot tell us how a student felt, or why they thought a particular activity was stressful.
4. Researchers should investigate the long-term impact of tablet use on student behaviour and learning. When students use tablets for doing almost everything, it may affect how they focus and solve problems when they are not in front of a gadget.

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Data availability
The datasets generated and/or analyzed during the current study are not publicly available due to privacy and ethical considerations but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
Ethical approval was obtained from the appropriate institutional authority at University of Education/ College of Distance Education and permission to conduct the study was granted by the Ghana Education Service and the relevant school authorities.

Informed consent was obtained from all participants involved in the study. For participants under 18 years, consent was obtained from parents or guardians, and assent was obtained from the students.

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