

ANALYSIS OF DIGITAL MULTITASKING HABITS ON SHORT-TERM MEMORY OF GRADE XII STUDENTS OF OUTSTANDING G AT AL-AZHAR SENIOR HIGH SCHOOL MEDAN

Syifa Sahira Purba¹, Al Fathir Aruli², Annisa Nailatul Izzah³, RM. Bimo SWKP⁴,

Rafi Anaya Marwan⁵, Nurjamiaty⁶

^{1,2,3,4,5,6} SMAS Unggulan Al-Azhar Medan, Class XII Leading G, Medan, Indonesia

Syifasahiraa2009@gmail.com

Received: 11/08/2026 | Revised: 23/08/2026 | Accepted: 19/09/2026 | Published: 13/10/2026

Abstract

The development of digital technology has changed the way students obtain information and interact with devices during learning activities. One increasingly common habit is digital multitasking, which involves studying while using social media, messaging services, music, videos, or other applications. Repeated attention shifts can increase demands on cognitive resources and potentially impact the ability to retain information in the short term. This study aims to analyze the relationship between digital multitasking habits and short-term memory in grade XII Unggulan G students at Al-Azhar High School, Medan. The study used a quantitative approach with a correlational design. Data were planned to be collected through a digital multitasking habits questionnaire and a short-term memory test. Analysis included descriptive statistics and a Pearson Product Moment correlation test if statistical assumptions were met. This study is expected to provide an empirical overview of the relationship between digital device usage habits and students' cognitive processes and serve as a basis for developing more targeted learning strategies.

Keywords: digital multitasking, short-term memory, working memory, high school students, learning focus.

1. INTRODUCTION

Advances in digital technology have provided numerous benefits to education. Smartphones, the internet, learning platforms, and various apps can help students find information, communicate, and complete assignments more quickly. However, these conveniences also present various stimuli that can distract students while learning. In everyday life, a student might access course materials on the same device they use to receive messages, check social media, watch videos, or listen to music. This situation is often referred to as media multitasking. In practice, activities that appear to be occurring simultaneously often involve alternating attention shifts, or task switching. Attention is a crucial part of the learning process because learned information needs to be selected, processed, and retained for future use. If attention is constantly diverted by notifications or other digital activities, students may need additional time to refocus on the material. This is especially relevant when students must simultaneously grasp new concepts and retain newly acquired information. Short-term memory is the ability to retain information for a short period of time. Working memory studies demonstrate that information can be retained and manipulated to aid mental activity. This ability plays a role in reading comprehension, following instructions, solving problems, and connecting new information to prior knowledge. Twelfth-grade students face various academic demands, making attention management skills crucial. Furthermore, the use of digital devices is an integral part of their learning and communication lives. Therefore, research into the relationship between digital multitasking habits and short-term memory can provide a more relevant picture of students' learning environments. This study focuses on grade XII students of Unggulan G Senior High School Al-Azhar Medan. This focus was chosen to ensure the research has clear subject boundaries and can be implemented appropriately in the field. The study does not intend to assert that every use of technology is detrimental, but rather to examine whether the level of digital multitasking habits has a measurable relationship with short-term memory scores.

1.1 Problem Formulation

- What is the level of digital multitasking habits among students in class XII Unggulan G of Al-Azhar Medan High School?
- What is the level of short-term memory of students in class XII Unggulan G?
- Is there a significant relationship between digital multitasking habits and students' short-term memory?
- What form of digital device management can help students maintain their focus on learning?

1.2 Research Objectives

- Identifying the level of students' digital multitasking habits.
- Measuring students' short-term memory through prepared instruments.
- Analyze the direction and strength of the relationship between the two variables.
- Provide information that can be used as a consideration in building more focused learning habits.

1.3 Benefits of Research

- For students: increase awareness regarding the use of digital devices during learning.
- For teachers: this can be used as a consideration in designing learning activities that minimize distractions.
- For schools: provide information that can support digital literacy education and learning habits.
- For parents: to provide understanding regarding the importance of managing the use of digital devices.
- For further researchers: to be an initial reference for research with different variables, instruments, or student groups.

2. THEORETICAL STUDY

2.1 Digital Multitasking

Digital multitasking is the behavior of performing or switching between several activities using digital media within a short period of time. These activities can include studying while browsing social media, replying to messages, listening to music, watching videos, or using other applications. In the context of learning, the frequency of switching between activities is an important aspect to observe.

2.2 Short-Term Memory and Working Memory

Short-term memory refers to the ability to retain information for a short period of time. This information can be numbers, words, symbols, or other simple pieces of information. This ability is essential in the learning process when students receive new information and need to use it immediately. The concept of working memory has a broader scope because it encompasses more than just retaining information but also enabling it to be processed. Baddeley defines working memory as a cognitive system that supports the temporary storage and manipulation of information. Therefore, the discussion of short-term memory in this study is placed within the context of the ability to briefly retain information relevant to learning activities.

2.3 Attention, Task Switching, and Cognitive Load

Attention helps individuals select relevant information from a variety of stimuli. When students switch between learning materials and other applications, the process can require readjustment to the primary task. Repeated switching can make the learning process less efficient, especially when the task requires concentration. Cognitive load also needs to be considered because human mental capacity is limited. If cognitive resources are used to handle multiple stimuli simultaneously, the resources available for processing learning material may be reduced. However, this relationship must be tested based on research data and should not be assumed before data collection.

2.4 Previous Research

Researcher Focuses on Relevance

Baddeley (1992; 2000) Working memory and episodic buffer Become the basis of the concept of information storage and processing. Cain et al. (2016) Media multitasking in adolescents Demonstrates the importance of studying multitasking in the adolescent age group.

ANALYSIS OF DIGITAL MULTITASKING HABITS ON SHORT-TERM MEMORY OF GRADE XII STUDENTS OF OUTSTANDING G AT AL-AZHAR SENIOR HIGH SCHOOL MEDAN

Syifa Sahira Purba et al

Martín-Perpiñá et al. (2019) Multitasking, executive function, and academic performance Supporting the importance of the relationship between media use and cognitive function. Minear et al. (2013) Working memory and media multitasking Relevant to the relationship between multitasking and cognitive abilities. Soldatova et al. (2019) Media multitasking in school-age children Providing context for digital media use at school age. Zhang et al. (2024) Multitasking and metacognitive monitoring Shows the relevance of multitasking to cognitive processes in learning.

2.5 Framework of Thinking

Digital Multitasking Habits (X) Attention & Task Switching Short Term Memory (Y)

Frequency, duration, type of digital activity, app switching, and distractions Changes in focus and information processing demands Ability to recall information after brief exposure

2.6 Hypothesis

Ha: There is a significant negative relationship between digital multitasking habits and students' short-term memory.

H0: There is no significant relationship between digital multitasking habits and students' short-term memory.

3. RESEARCH METHODS

3.1 Types and Approaches

The research used a quantitative approach with a correlational design. This approach was used because both variables will be expressed as scores and analyzed statistically. Correlational designs are used to determine the direction and strength of relationships, not to directly prove causation.

3.2 Location and Time

The research was conducted at Al-Azhar High School, Medan, on students in grade XII Unggulan G. The research stages included preparation, instrument development, instrument trials where possible, data collection, analysis, and report preparation. Implementation was adjusted to school permits and schedules in 2026.

3.3 Population and Sample

The research population is all students of class XII Unggulan G. If the population size allows for the entire study, a total sampling technique can be used. Otherwise, the sample size and technique are determined based on field conditions and methodological considerations. The final number of respondents must be written according to actual data and should not be determined before the research takes place.

3.4 Research Variables

Variable X is digital multitasking habits, while variable Y is short-term memory. Multitasking habits are measured through behavioral indicators of device use during learning, while memory is measured through standardized recall test scores.

3.5 Operational Definition

Digital multitasking habits are defined as the frequency and pattern of students switching from one learning activity to another during a learning period. Short-term memory is defined as the ability to recall simple information after brief exposure and a break according to test procedures.

3.6 Data Collection Techniques

- Questionnaire: used to obtain a digital multitasking habit score. Statements are made based on predetermined indicators.
- Memory test: respondents receive stimuli in the form of numbers, words, symbols, or simple combinations, then are asked to recall the information within a specified time.
- Documentation: used to a limited extent to record research administrative needs, such as the number of respondents and implementation of activities.

3.7 Measurement Scale

Interpretation Category Score

- 4 Very often The behavior is done very often
- 3 Frequent Behavior is often done
- 2 Rarely Behavior is rarely done
- 1 Never Behavior not performed

4. RESEARCH INSTRUMENTS

4.1 Instrument Structure

- Section A – General data: respondent's initials, age, class, and device usage information relevant to the study.
- Part B – Digital multitasking: frequency of opening other apps, duration of use, app types, task switching, and notification interruptions.
- Part C – Memory test: recall score of the stimuli given in the research procedure.

4.2 Questionnaire Grid

Indicators Aspects measured Example statements

Frequency How often do I switch apps while studying? I open other apps while studying.

Duration of use of digital activities other than studying I use other applications for quite a long time while studying.

Types of distractions Social media, messages, videos, music I check messages or social media while studying the material.

Task switching Moving from study tasks to digital activities I move from study material to another application and then back again.

Notifications Distractions from device notifications Notifications distract me from the study material.

4.3 Short-Term Memory Test Procedure

- Researchers gave the same instructions to all respondents.
- The stimulus is displayed or read aloud for a short time according to the test design.
- After a predetermined pause, respondents are asked to write down or retell the information they remember.
- Scores are calculated based on the amount of information that can be correctly recalled.
- Execution conditions, such as environmental disturbances and working time, are kept relatively uniform.

4.4 Validity and Reliability

Before being used on the main sample, the questionnaire should be reviewed and pilot tested. Item validity can be checked using item-total correlation or Pearson Product Moment, depending on the analysis design. Internal reliability can be checked using Cronbach's Alpha. Test results should be reported based on actual data. Memory tests should also have consistent instructions, timing, and scoring systems.

4.5 Research Ethics

The research was conducted after obtaining permission from the school and the necessary approvals. Respondents were given an explanation of the research objectives, the procedures for completing the questionnaire, and the use of the data. Personal identification does not need to be disclosed in the report. The data is used for academic purposes and is presented in aggregate form.

5. DATA ANALYSIS TECHNIQUES

5.1 Descriptive Analysis

Descriptive analysis is used to describe data for each variable. Statistics that can be presented include the number of respondents, minimum, maximum, mean, and standard deviation values. For questionnaires, total scores can be grouped according to established criteria. For memory tests, score distributions can be used to illustrate variations in respondents' abilities.

5.2 Prerequisite Test

Before using Pearson's correlation, the data are checked for compliance with the necessary statistical assumptions, including normality and a linear relationship. If Pearson's assumptions are not met, researchers can consider appropriate nonparametric correlation techniques. The choice of test should be justified based on the characteristics of the data.

5.3 Correlation Test

The relationship between variables X and Y can be tested using the Pearson Product Moment test if the requirements for its use are met. The correlation coefficient indicates the direction and strength of the relationship. Negative values indicate that the scores of the two variables tend to move in opposite directions, while positive values indicate a tendency to move in the same direction. Statistical significance is determined based on the established level of significance.

5.4 Interpretation of Results

Interpretation should follow the actual statistical results. If a significant negative relationship is found, the discussion could state that higher levels of multitasking are associated with lower memory scores in the study sample. If the relationship is not significant, the study should report that the statistical evidence obtained is insufficient to support the relationship. Because the study design is correlational, the results should not be directly interpreted as evidence that multitasking causes memory decline.

6. RESULTS AND DISCUSSION PLAN

6.1 Form of Presentation of Results

Analysis of the data presented

Descriptive X Mean, minimum, maximum, and standard deviation of multitasking scores.

Descriptive Y Mean, minimum, maximum, and standard deviation of memory scores.

Correlation Correlation coefficient and significance value.

Discussion Comparison of findings with previous theories and research.

6.2 Direction of Discussion

- Comparing the level of digital multitasking between individuals based on questionnaire scores.
- Describe recall ability based on memory test results.
- Analyze whether there is a relationship pattern between the two variables.
- Relate findings to theories of attention, task switching, and working memory.
- Explain the limitations of the study and avoid causal conclusions that are not supported by the design.

7. LIMITATIONS AND IMPLICATIONS

7.1 Research Limitations

- The research focused on one group of students so generalization to other groups needs to be done carefully.
- The questionnaire relies on respondents' reports so answers can be influenced by perception and accuracy of filling out the questionnaire.
- Memory can be influenced by many other factors, such as learning conditions, level of fatigue, and task characteristics.
- Correlational designs can show relationships, but do not directly prove causation.
- New research results can be concluded after field data is collected and analyzed.

7.2 Implications

If the study finds a meaningful relationship, the findings could serve as a basis for raising student awareness about the importance of managing notifications and digital activity while studying. Schools and teachers can develop study habits that encourage focus, while students can use device features more purposefully. Recommendations must still be aligned with actual research findings.

8. CONCLUSION

This study was designed to analyze the relationship between digital multitasking habits and short-term memory in grade XII Unggulan G students at Al-Azhar Senior High School, Medan. The habit of switching between learning and other digital activities is theoretically related to attention and information processing demands. However, whether or not a significant relationship exists in the study group must be determined based on the data and statistical analysis performed.

8.1 Suggestions

- Students are advised to regulate the use of notifications and limit switching between applications when working on assignments that require concentration.
- Teachers can provide education about digital literacy and strategies for maintaining focus in learning.
- Future research could use larger samples, longitudinal designs, or experimental measures to examine the relationships in more depth.

REFERENCES

- Baddeley, A. (1992). Working memory. *Science*, 255(5044), 556–559. <https://doi.org/10.1126/science.1736359>
- Baddeley, A. (1998). Working memory. *Comptes Rendus de l'Académie des Sciences - Series III - Sciences de la Vie*, 321(2–3), 167–173. [https://doi.org/10.1016/S0764-4469\(97\)89817-4](https://doi.org/10.1016/S0764-4469(97)89817-4)
- Baddeley, A. (2000). The episodic buffer: A new component of working memory? *Trends in Cognitive Sciences*, 4(11), 417–423. [https://doi.org/10.1016/S1364-6613\(00\)01538-2](https://doi.org/10.1016/S1364-6613(00)01538-2)
- Cain, MS, Leonard, JA, Gabrieli, JDE, & Finn, AS (2016). Media multitasking in adolescence. *Psychonomic Bulletin & Review*, 23, 1930–1935. <https://doi.org/10.3758/s13423-016-1036-3>
- Martín-Perpiñá, M.M., Viñas Poch, F., & Malo Cerrato, S. (2019). Media multitasking impact in homework, executive function and academic performance in Spanish adolescents. *Psychothema*, 31(1), 81–87. <https://doi.org/10.7334/psychothema2018.178>
- Minear, M., Brasher, F., McCurdy, M., Lewis, J., & Younggren, A. (2013). Working memory, fluid intelligence, and organizational skills in media multitasking. *Psychonomic Bulletin & Review*, 20, 564–571.
- Soldatova, G., Chigarkova, S., & Dreneva, A. (2019). Features of media multitasking in school-aged children. *Behavioral Sciences*, 9(12), 130. <https://doi.org/10.3390/bs9120130>
- Zhang, W., et al. (2024). The effects of multitasking on metacognitive monitoring in primary and secondary school students. *Journal of Experimental Child Psychology*, 105908. <https://doi.org/10.1016/j.jecp.2024.105908>