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The Effect of Multitasking on Task Accuracy Among College Students

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Abstract. Multitasking is a skill that has always been part of our everyday life that allows individuals to perform two or more activities simultaneously. This study examined whether multitasking affects the quality of task performance among college students. A quantitative between-subjects experimental design was used with 30 students from the University of Perpetual Help System DALTA–Molino. Each participant completed a visual counting task using a PowerPoint presentation consisting of 10 slides with randomly arranged colored boxes that increased in difficulty. Each slide was shown for 10 seconds. The control group performed a single task, while the experimental group completed the visual task alongside an additional activity. One point was given for every correct answer, and total scores were compared using an independent samples t-test, with Cohen's d used to measure effect size. Statistical significance was set at 0.05. Results showed that the control group obtained a mean score of 7.60 (SD = 2.95), while the experimental group obtained a mean score of 8.40 (SD = 1.72), both interpreted as high performance levels. Findings suggest that multitasking did not significantly impair task quality in simple performance-based activities, indicating that task complexity may play a greater role in determining multitasking effects on performance.

Keywords: Cognitive Load; Level of Performance; Multi-tasking; Quality of Performance; Simultaneous Activities

Introduction

Multitasking is a well-known skill that people use in academic settings, in the workplace, and even in everyday basic activities to do two or more things simultaneously. Some may consider the term 'juggling' each task and making it an efficient way and an alternative to focusing on one task. Although multitasking has proven to be a useful strategy in improving performance efficiency, questions remain regarding its effect on task performance and quality. Some existing research about multitasking suggests that it comes at a high cost, as it increases the number of errors people make and reduces productivity (Mokhtari et al., 2015). A fast and efficient task completion may not result in quality performance. Efficiency may not always have an equal result in performance and quality.

Several studies suggest that there are considerable hidden costs associated with implementing multitasking. Foundational cognitive research on multitasking explains that multitasking can impair cognitive abilities such as memory, focus, and decision-making. Switching tasks leads to switching focus and cognitive processes, making it difficult for our brains to adjust and keep up. According to Rubinstein, Meyer, & Evans (2001), "While multitasking might feel efficient, it often leads to a reduction in accuracy and a decrease in speed compared to doing tasks sequentially." It also further increases the time spent on each task because of the lack of attention to detail and information in each of the tasks. Multitasking has a wide variety and/or range of tasks that an individual might do at the same time depending on which task is related to cognitive processes, while the other can be on the physical aspect.

Similarly, according to Contemori (2022), regardless of the differences between the models, a general characteristic of multitasking is that it brings the cognitive processing system to its limits and results in performance deterioration. No matter what the task is or how it can be performed, an individual's focus is just half of it. One factor that adds to the topic is the digital age. Most students use the accessibility of being on their phones during online classes, as teachers and instructors won't see them. It

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cuts their attention into listening and processing the lessons while also mentally engaging and understanding what they're reading/doing on their phones.

This enters the conversation with the lack of quality in performance that an individual might exhibit. This not only affects the quality of performance, but it also has a negative impact on comprehension. As our attentional and working memory capacities are limited, disruption during reading may have negative effects on text processing and comprehension (Liu & Gu, 2019). This further proves that even though multitasking can be useful, it sometimes can cause more problems with its reduced accuracy and a possible speed decrease. Although prior studies have established an intensive and deep analysis of multitasking as a cognitive overload, some studies focused on the cognitive ability and limitations of an individual multitasking. This study addresses that gap by comparing the set of data involving the effect of multitasking on task performance accuracy. This research intends to focus on the significant difference between an individual's efficiency (the amount of time it takes to finish the task) and their actual task performance (correctness and accuracy) when multitasking. This will help the researchers to identify and investigate whether multitasking affects task quality, even if efficiency appears to be improved. The researchers will analyze the differences and quality outcomes of the experiment, focusing on the difference in the quality of the performances of individuals, specifically students who are multitasking and students who are not. This will conclude and help further research studies about the impact of the quality performance that students have while multitasking. UN SDG 4: Quality Education aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" by 2030. It focuses on providing free, quality primary and secondary education for all children, eliminating gender disparities, and ensuring equal access to vocational and tertiary training. This why this study is significant for the community as it adds additional information and ensures a higher level of understanding about the effect of multitasking.

Research Questions

This study, titled "The Effect Of Multi-Tasking On Task Accuracy Among College Students," seeks to determine whether multitasking significantly affects students' task performance. It aims to answer the following questions:

1. What is the mean task error of students in the single-task condition?
2. What is the mean task error of students in the multitasking condition?
3. Is there a significant difference in task quality between students in single-task and multitasking conditions?

Scope and Delimitation of the Study

The research presents several limitations that must be acknowledged with these findings. The first issue is the small sample size (n = 11 each condition), which reduces the statistical power of the analysis. Additionally, the second tasks was not measured accurately and the level of task was not determined as greatly increased in difficulty, which resulted in a decrease of data quality. Furthermore, the statistical data revealed no significant difference in results between the controlled and experimental groups. The study's external validity is restricted because it was conducted in a specific university context. Lastly, the study's data contains non-significant information, resulting in a non contributing study.

Literature Review

Defining the Problem - Attention and Task Performance

Attention is a limited cognitive resource necessary for processing relevant information while suppressing distractions. When attention is divided across multiple tasks, performance accuracy often declines due to interference and switching costs. Onur and Yavuz (2021) demonstrated that students exposed to concurrent and irrelevant secondary tasks performed significantly worse than those in control conditions. Their findings suggest that simultaneous task demands create attentional interference, reducing learning outcomes. Similarly, Xiao et al. (2024) found that task switching generates learning costs because individuals must activate new task sets, consuming attentional resources and reducing accuracy. Although both studies confirm that divided attention impairs performance, they differ in focus. Onur and Yavuz emphasize task timing and relevance, while Xiao et al. highlight switching costs and memory processes. Despite these differences, both studies converge on a central conclusion: dividing attention reduces task effectiveness. However, both investigations were conducted in learning or memory-based contexts, leaving a gap in understanding how divided attention affects simple, accuracy-based performance tasks.

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Cognitive Processes and Memory

Multitasking not only divides attention but also strains memory systems. Working memory has limited capacity, and when multiple tasks compete for processing resources, cognitive overload may occur. Xiao et al. (2024) showed that task switching impaired memory performance due to increased executive control demands. Similarly, Yuan and Zhong (2024) found that multitasking and interruptions significantly increased cognitive load and reaction time while decreasing correctness. While these studies consistently report negative effects of multitasking, they also suggest moderating factors. Xiao et al. observed that retrieval practice improved memory performance despite switching costs, and Yuan and Zhong identified resilience as a factor that reduced cognitive load effects. These findings indicate that multitasking does not uniformly impair performance; rather, its impact depends on task structure and individual differences. This highlights the need for controlled designs that isolate task demand as the primary variable.

Cognitive Load in Multitasking

Cognitive load theory explains that performance declines when mental demands exceed working memory capacity. Yuan and Zhong (2024) directly measured cognitive load and found that multitasking significantly increased mental effort while reducing accuracy. Similarly, Tugtekin and Odabasi (2023) reported performance differences across multitasking and monotasking conditions in virtual learning environments, suggesting that task complexity and environmental context influence cognitive demand. Although these studies agree that multitasking increases cognitive load, they primarily examine complex learning or simulated operational environments. Such contexts involve multiple interacting variables, including prior knowledge, digital interfaces, and task difficulty. Consequently, it remains unclear whether multitasking alone—without complex content or immersive environments—affects basic task accuracy.

Task Performance and Behavioral Outcomes

Some researchers argue that the efficiency of multitasking can be impacted by the capacity to plan tasks, as demonstrated by both internal self-regulation and external regulations (Poplawska et al, 2021). However, empirical evidence often contradicts this perception. Clinton-Lisell (2021) reported that on-screen multitasking negatively affects comprehension and task focus. Other studies (Diemand-Yauman et al., 2011; Halin, 2016) suggest that increased difficulty can sometimes promote deeper processing, indicating that not all performance disruptions are purely negative. This creates a subtle contradiction in literature: while multitasking generally reduces accuracy, certain forms of increased cognitive effort may enhance processing under specific conditions. Therefore, distinguishing between productive cognitive effort and harmful cognitive overload becomes important.

Methodology

Research Design

This study utilized an experimental quantitative research design with a between-subjects approach, specifically randomized post-test only control group design. Experimental quantitative research serves as the cornerstone of evidence-based decision-making (Lim, 2025). A between-subjects design is useful where there is a danger of running into so-called “range effects”.

Sampling Design

Participants were recruited through simple random sampling, wherein individuals were selected randomly using Google Forms and were asked whether they were willing to participate in the experiment. Those who agreed to participate were then randomly assigned to one of two groups. A total of thirty participants was divided into two groups: a control group that performed a single-task condition and an experimental group that performed a multitask condition, resulting in approximately fifteen participants per group. This design allowed the researchers to examine whether multitasking affected task performance, as the comparison between groups enabled the determination of its impact. The study also acknowledged the limitation of a relatively small sample size (n = 30), as small sample sizes often produce wide confidence intervals, leading to less precise parameter estimates and limiting the reliability and generalizability of findings (Hamad & Ahmed, 2025).

Research Participants

The study involved 30 undergraduate students enrolled at the University of Perpetual Help System DALTA. Participants were recruited through convenience sampling based on their accessibility and willingness to participate during the data collection period. Following recruitment, participants were

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randomly assigned to one of two experimental conditions: a control group (single-task condition; n = 15) and an experimental group (multitasking condition; n = 15). Eligibility for participation required that respondents be currently enrolled college students, possess normal or corrected-to-normal vision, and have no color vision deficiencies, as the experimental task involved the identification of colored visual stimuli. Additionally, all participants were required to provide informed consent prior to participation. To minimize potential confounding factors and enhance the validity of the findings, individuals with a diagnosed Attention-Deficit/Hyperactivity Disorder (ADHD), neurological disorders, cognitive impairments, or color blindness were excluded from the study. These inclusion and exclusion criteria were established to ensure a relatively homogeneous sample with comparable cognitive and visual capabilities necessary for the accurate assessment of visual attention and task performance under single-task and multitasking conditions.

Research Instrument

The researchers prepared all the required and necessary materials and documents employed in the experiment, including informed consent forms, visual materials, and assessment tools. Specifically, the score sheet, which was validated by two qualified professionals, one is a licensed psychometrician and the other is a registered guidance counselor. The study used a researcher designed visual aid as the performance measure instrument. The visual aid consists of a PowerPoint presentation prepared by the researchers and flashed to the participants during the experiment. Each slide contains a specific number of colored boxes arranged in random order, while the difficulty increases with each slide. Participants are required to carefully observe each slide and count the number of boxes according to color. The control and experimental conditions, participants recorded their answers in written form while performing the required task. The Experimental Group tallied the colors presented on the screen while subtracting by 3s from 1000. Performance was measured based on the number of correct answers in counting the colored boxes. An increase in accuracy will indicate higher task quality and better performance, while fewer right answers will indicate lower task accuracy. This visual aid was designed to systematically increase task demand through added quantity and color variation. By comparing the number of correct answers across conditions, the instrument allows the researchers to determine whether multitasking affects attention, accuracy, and overall task performance. The reliability analysis of the instrument yielded a Cronbach's alpha coefficient of 0.86, indicating a high level of internal consistency among the measured variables. This suggests that the items used to assess both the controlled group scores (single-task condition) and experimental group scores (multitasking condition) are consistently measuring the same underlying construct, which is quality task performance. The item-rest correlation values of 0.43 for both variables further indicate an acceptable degree of correlation between each item and the overall scale, showing that each contributes meaningfully to the measurement of the construct. Additionally, the Cronbach's alpha remaining unchanged at 0.86 if either item is deleted suggests that no single item negatively affects the overall reliability of the scale. Overall, these results demonstrate that the instrument used in the study is reliable and suitable for further statistical analysis and interpretation.

Data Gathering Procedure

The data gathering procedure employed a structured experimental quantitative design using a between-subjects approach to examine the effect of multitasking on task performance. Thirty college students from the University of Perpetual Help System DALTA were recruited through convenience sampling and randomly assigned into two groups, namely the control group (single-task condition) and the experimental group (multitasking condition), with fifteen participants in each group. Prior to data collection, inclusion and exclusion criteria were implemented to ensure that participants had normal or corrected vision and no neurological or attention-related conditions that could influence performance outcomes. All research materials, including informed consent forms, PowerPoint-based visual stimuli, and a scoring sheet validated by two psychometricians, were prepared, and ethical approval was obtained from the Institutional Review Board, with full observance of confidentiality, voluntary participation, and data privacy protocols. During data collection, participants completed a visual counting task presented through a PowerPoint slideshow consisting of 10 slides with randomly arranged colored boxes of increasing difficulty, each displayed for 10 seconds. The control group performed a single-task condition by counting the number of colored boxes and recording their responses, while the experimental group performed a dual-task condition by simultaneously counting colored boxes and performing serial subtraction from 1,000 by threes before recording their answers. All responses were documented and evaluated based on accuracy and errors. In the final phase, responses were scored by assigning one point for each correct answer, and total performance scores were computed per participant. Descriptive statistics such as mean and standard deviation were used to summarize group performance, while assumptions of normality and homogeneity of variance were tested using the Shapiro–Wilk and Levene's tests. An independent samples t-test was then conducted at a 0.05 level of significance to determine group

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differences, and Cohen's d was computed to assess effect size, with all findings interpreted in relation to the research objectives.

Results and Discussions

Research Question 1: What is the mean task error of students in the single-task condition?

Table 1. Descriptive Statistics for Single-Task (Controlled Group) Performance

Variable	Mean	SD	Min	Max	Verbal Interpretation
Controlled Group Scores	7.60	2.95	0	10	High

Table 1 presents the descriptive statistics of students' quality task performance under the single-task condition. The results show that the controlled group obtained a mean score of 7.60 (SD = 2.95), which is interpreted as a high level of performance. The median score of 9.00 further indicates that at least half of the participants achieved very strong task performance, suggesting that the single-task condition generally supports effective output quality among students. The scores ranged widely from 0 to 10, indicating substantial variation in individual performance outcomes. Despite the high overall mean, the relatively large standard deviation suggests inconsistency in how students performed under this condition. Some participants achieved near-perfect scores, while others performed very poorly, pulling down the overall variability consistency. This pattern implies that while single tasking can support high-quality performance, it may also depend heavily on individual differences such as focus, prior knowledge, or task familiarity. Tugtekin and Odabasi (2023) reported performance differences across multitasking and monotasking conditions in virtual learning environments, suggesting that task complexity and environmental context influence cognitive demand.

Table 2. Descriptive Statistics for Multitasking (Experimental Group) Performance

Variable	Mean	SD	Min	Max	Verbal Interpretation
Experimental Group Scores	8.40	1.72	5	10	High

Table 2 presents the descriptive statistics of students' quality task performance under the multitasking condition. The experimental group obtained a mean score of 8.40 (SD = 1.72), which also falls under the high-performance level. The median score of 9.00 indicates that most students performed at a similarly high level, suggesting that multitasking did not substantially reduce the quality of task output. The score distribution ranged from 5 to 10, showing that all participants maintained at least moderate to high performance. Compared to the single-task condition, the multitasking group demonstrated a slightly higher mean and a notably lower standard deviation, indicating more consistent performance across participants. This suggests that students' task performance under multitasking conditions was not only strong but also more uniform. The findings imply that multitasking, in this context, did not impair task quality and may have supported more stable performance outcomes among students. According to Diemand-Yauman et al., (2011); Halin,(2016) increased difficulty can sometimes promote deeper processing, indicating that not all performance disruptions are purely negative.

Research Question 2: What is the mean task error of students in the multitasking condition?

Table 3: Normality Test Results for Controlled and Experimental Group Scores

Variable	Test	Statistic	p-value	Interpretation
Controlled Group Scores	Shapiro-Wilk	0.81	.005	Not Normal
Experimental Group Scores	Shapiro-Wilk	0.84	.011	Not Normal

Table 3 presents the results of the Shapiro-Wilk test for normality on the controlled and experimental group scores. The results indicate that both the single-task condition (p = .005) and the multitasking condition (p = .011) significantly deviate from normal distribution. This suggests that the distribution of scores for both groups is not normal, indicating potential violations of parametric test

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assumptions. Given these findings, it is evident that the data for both conditions are not suitable for parametric testing based on individual group distributions. This supports the use of non-parametric statistical analysis in comparing the two conditions. The non-normal distribution may also reflect variability in how students performed under both task conditions. These findings support when Amez et al (2021) stated that teaching young individuals how to multitask can help them become more adept at moving between tasks and sifting through irrelevant information.

Research Question 3: Is there a significant difference in task quality between students in single-task and multitasking conditions?

Table 4. Difference in Quality Task Performance Between Single-Task and Multitasking Conditions

Comparison	Statistic	p-value	Interpretation	Status of Alternative Hypothesis
Controlled vs Experimental	42.50	.548	Not Significant	Not Supported

Table 4 presents the results of the Wilcoxon Signed-Rank Test used to determine whether there is a significant difference in students' quality task performance between the single-task and multitasking conditions. The analysis yielded a test statistic of W = 42.50 with a p-value of .548, which is higher than the 0.05 level of significance. This indicates that there is no statistically significant difference between the two conditions in terms of students' performance quality. The findings suggest that students performed comparably under both single-task and multitasking conditions. In other words, shifting from focusing on a single task to handling multiple tasks simultaneously did not produce a meaningful change in the quality of their outputs. This may imply that the participants were able to manage cognitive demands effectively in both settings, and that the tasks used in the study did not impose sufficient complexity to produce performance differences. Given the non-significant result, the alternative hypothesis stating that there is a significant difference between the two conditions is not supported. This leads to the retention of the null hypothesis, indicating that task condition does not significantly influence students' quality task performance. Overall, the results suggest that within the context of this study, multitasking neither enhanced nor impaired performance in a statistically meaningful way. Poplawska et al (2021) argues that the efficiency of multitasking can be impacted by the capacity to plan tasks, as demonstrated by both internal self-regulation and external regulations.

Ethical Considerations

The study adheres to the approved ethical standards and has been reviewed by the Institutional Review Boards (IRB). Various possible ethical concerns were identified prior to the data collection, along with corresponding safety measures to ensure the protection of the participants and guarantee the research's integrity. To uphold the Data Privacy Act of 2012 (RA 10173), the identities of the participants will be censored to ensure anonymity, and to avoid potential harm. Before the data gathering, approval from the institutional review board will be sought from the relevant academic authority of the University of Perpetual Help System DALTA. Participants will be given an informed consent form that will explain the nature of the study, procedures, duration, and rights of the participants. Participation in the study will be voluntary, and the participants can withdraw at any time without any consequences. Confidentiality and anonymity will be maintained strictly. The participants' names and other identifying details will not be included in the data set. Instead, coded identifiers will be used. All the data gathered will be kept in a secure manner in password-protected files that can only be accessed by the researchers. The data will be kept for a limited period of one year for academic purposes and will be deleted properly after that. The study poses little risk to the participants. The task requires simple visual counting tasks that do not result in physical injury, psychological distress, or discomfort beyond the usual academic tasks. The procedures are like the usual classroom cognitive tasks.

Conclusion

This study aimed to determine whether multitasking influences students' task quality by comparing performance under single-tasking and multitasking conditions through a visual box-counting activity. Based on the results, both the controlled group and experimental group demonstrated high levels of task performance, with the multitasking group obtaining a slightly higher mean score than the single-task group. These findings suggest that multitasking did not negatively affect task quality in the context of this study. The results may indicate that the task used in the experiment was simple enough to be managed effectively even under multitasking conditions. This implies that the impact of multitasking on

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performance may depend on the complexity of the task, the level of attentional demand required, and the cognitive load imposed on participants. Therefore, multitasking does not always lead to poorer performance outcomes, particularly in tasks that involve manageable levels of difficulty. In conclusion, the findings suggest that multitasking may not significantly impair task quality in simple performance-based activities. Future researchers are encouraged to investigate multitasking using more cognitively demanding tasks, longer task durations, or additional distractions to further examine its effects on attention, cognitive load, and performance quality.

Reccomendations

The researchers recommend that future studies further investigate additional variables that may influence the impact of multitasking on task performance. These variables may include task complexity, cognitive load, attention span, and task duration. It is also recommended that future research incorporate more cognitively demanding tasks and increased levels of distraction to better simulate real-world multitasking conditions and more accurately assess its effects on task performance. Furthermore, extending the duration of experimental tasks is suggested to determine whether the effects of multitasking become more pronounced over time. Lastly, future studies should consider using a larger and more diverse sample population to enhance the generalizability of findings and to provide a more comprehensive understanding of the relationship between multitasking and task performance.

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