The Effect of Interface Color Schemes on User Task Completion Time Among Students

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ABSTRACT

This quantitative study examined the effects of different color schemes on task completion and visual search processes among 50 subjects. Using Google Forms, subjects conducted visual searches and answered questions about reading ease, accuracy, comfort, and color preferences. It was found that 100% were able to find the search button, while 88% completed the task within one to five seconds. Color Scheme #1 was chosen by 60% and considered the most efficient at 64%.

Keywords—Color Schemes, Task Completion Time, Visual Search, Learning Management Systems (LMS), User Interface (UI), Cognitive Load, Visual Ergonomics

INTRODUCTION

Digital learning systems use interfaces that allow learners to discover information and perform certain actions. One of the aspects of interface design is color, which may impact how easy it is to perceive the objects within an interface visually. There is research that confirms that color contrast, brightness, and color scheme may have an impact on visual search, readability, comfort, etc. This research aims to explore how three color schemes of interface influence task performance and visual search of students. All interfaces used were of the same LMS design but differed in colors only.

Though the literature has pointed out the influence of static color combinations in affecting the readability and comfort of users, learning management systems need to transcend their reliance on inflexible color combinations. For the future generations of learning management systems, it is necessary that they adopt flexible and dynamic interfaces that can adapt the automatic switching of the system themes based on ambient light detection. Additionally, it is vital that the interface performance be evaluated considering the neurodiversity of users who suffer from visual impairment, dyslexia, and photophobia.

LITERATURE REVIEW

Studies show that interface color combinations can affect how quickly and accurately users find information on a digital interface, with colors such as green with white text, white on black, cyan, and Transparent Gray showing good results in different tasks [1] [10] [11] [17] [19]. Beyond color, a clear layout can help users find information faster, reduce eye fatigue and mental effort, and improve reaction time and satisfaction.

Interface color schemes may not always have a strong effect on actual task performance, but they can still influence users' comfort, enjoyment, attention, and overall experience [3] [18]. Studies also found that dark mode and cooler colors may reduce eye fatigue, while light mode may make text easier to read, suggesting that color choice depends on the task and the user's environment.

The combination of text and background colors can affect how easily users read and recognize information, with green-and-black and green-and-white combinations showing better reading and recognition performance, while

background texture had less effect [8]. Font and background color combinations can also change recognition speed, since some combinations may cause longer response times and physical stress that can slow users down [23].

Color design can also affect how attractive and suitable an interface appears, as harmonious color schemes can make web interfaces more pleasing and fit different themes and user preferences [4]. At the same time, color features such as hue, lightness, contrast, and harmony can influence how users view an interface, although measuring color differences can be difficult because some color models do not fully match human color perception [6] [9].

Color effects may also depend on user type and interface purpose, as suitable color schemes can improve satisfaction, emotions, usability, and icon understanding, while unsuitable colors may lead to negative feelings, dissatisfaction, and distrust. Color properties such as hue, brightness, and saturation can also affect how quickly users respond to visual information, although these factors may not always change task accuracy [15].

In virtual and augmented reality interfaces, user differences can affect responses and performance in color-related tasks, while elements such as color schemes, button placement, and information arrangement can also affect usability and task completion [13, 20]. Other studies found that certain transparency levels and low-saturation backgrounds with rounded-square icons can improve task completion, visual search speed, usability, and the overall visual experience [21] [24].

METHODOLOGY

A. Research Design

This study will use a quantitative research design to examine how different interface color schemes affect users' task completion performance. Data will be collected through Google Forms using visual-search activities and survey questions in which participants locate specific interface elements under different color conditions; task completion time, accuracy, and perceived usability will then be compared.

To counter the weaknesses of short-term task evaluation, the experiment includes longitudinal performance measurement within several-hour sessions, with special attention to time needed for task completion in relation to the development of fatigue (asthenopia). Furthermore, to go beyond self-reporting, the data gathering strategy involves the use of physiological measures, which include time needed for task completion as well as fixation time and saccade velocity among other eye-tracking measures.

B. Participants

The study will involve 50 participants from Arellano University Jose Abad Santos Campus, including 34 college students, 4 faculty members, 9 designers/experts/gamers, and 3 senior high school students who will voluntarily take part based on the approved sampling procedure. Including participants with different educational and professional backgrounds will yield varied responses, and the participant groups and study title will be reviewed with the research adviser to ensure they match the study's scope.

C. Research Instrument

The primary instrument will be a researcher-developed Google Forms questionnaire with visual-search tasks and survey questions in which participants identify interface elements such as search, log out, view all, and submit buttons across three color schemes. The questionnaire will also measure ease of use, visual comfort, clarity, and color preference, while the selected color conditions will be based on related studies about color, readability, visual search, and usability.

To test the color scheme while keeping the layout constant, the researchers used three layouts based on one LMS dashboard. Figure 1 shows the blue-and-white layout; Figure 2, the black-and-white layout; and Figure 3, a brighter color layout. The same layout helps participants concentrate on colors.

Fig. 1. Color Scheme #1 – Blue and White.

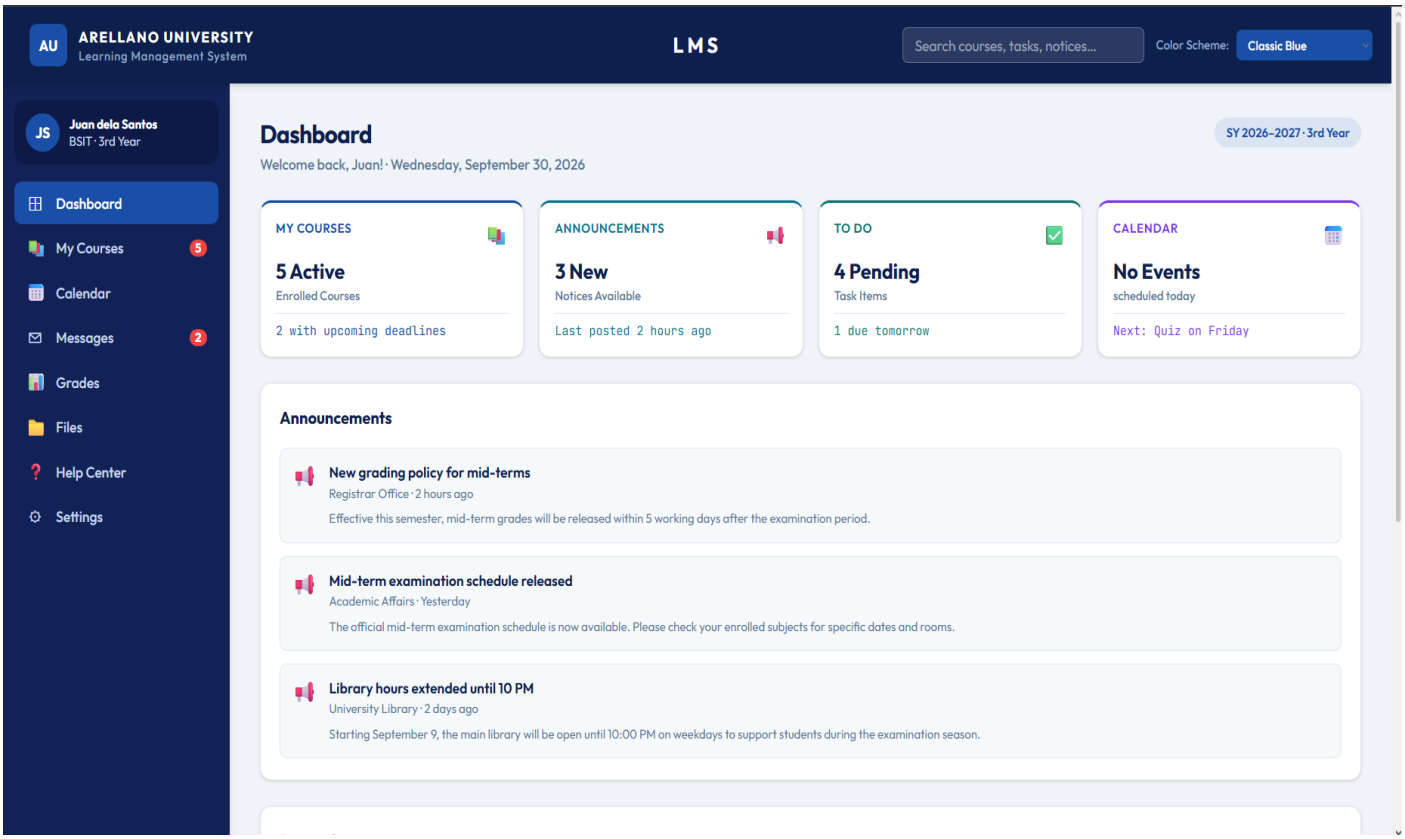


Fig. 2. Color Scheme #2 – Black and White.

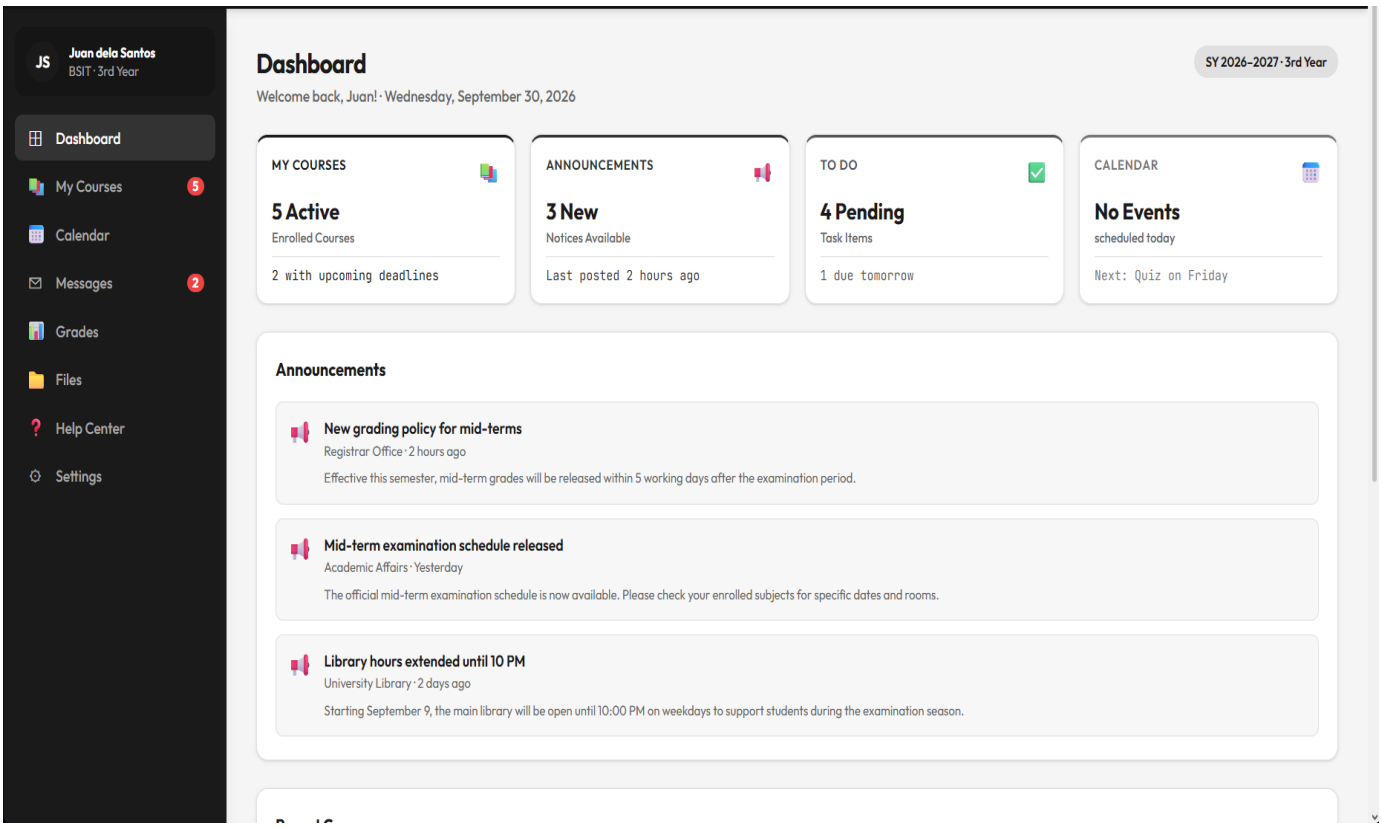
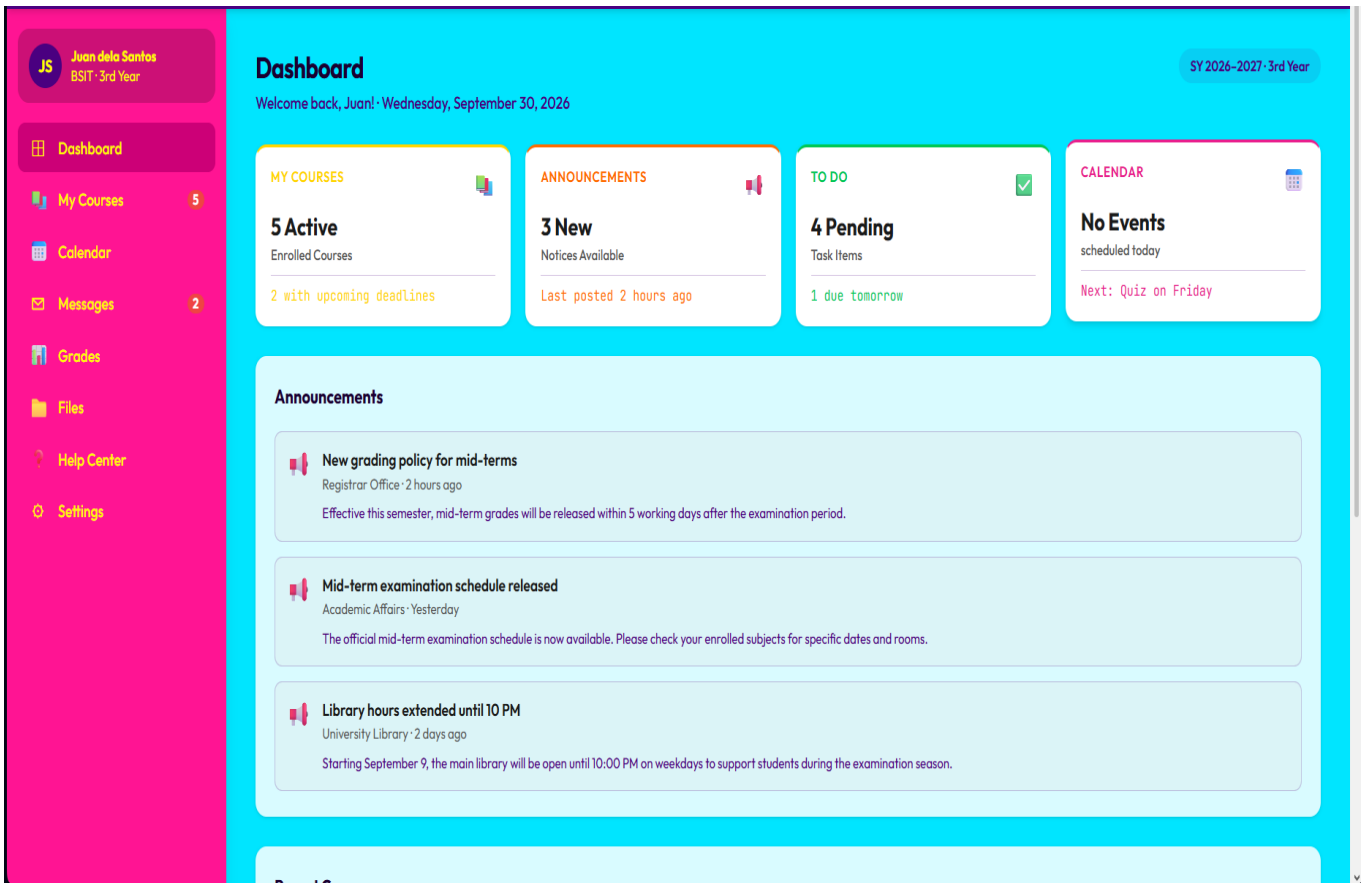


Fig. 3. Color Scheme #3 – Bright, less balanced color scheme.



D. Data Gathering

The researchers will create a Google Forms questionnaire and three interface pictures with the same design but different color schemes before conducting the survey among participants. Participants will perform visual search tasks, locate required interface elements, and provide perceptions of the interfaces; these answers will be collected and organized for statistical analysis, and the exact method for measuring task completion time will be determined before the experiment.

E. Data Analysis

The collected data will be analyzed using quantitative methods, with frequencies and percentages for participant characteristics and categorical responses, and means and standard deviations to summarize task performance and survey results. Task accuracy will be based on participants' correct answers, while task completion time and the appropriate statistical test will be determined after the final timing procedure, study design, and data distribution are established.

F. Ethical Considerations

Participation in the research is voluntary, and participants will be informed of the research goals and the activities involved in the Google Form. The information will be kept confidential, used for academic purposes only, and presented in summarized form, provided that parental or guardian permission and participant assent are obtained when needed.

IV. Presentation, Analysis, and Interpretation of Data

This chapter presents and analyzes the results obtained from the respondents. These results are based on the respondents' profiles, task performance, color scheme preference, comfort, and the impact of interface colors on task performance.

A. Demographic and Background Profile of Respondents

Table 1: Demographic and Background Profile of Respondents (N = 50)

Demographic Variable	Category	Frequency	Percentage
Age	20-25 Years Old	23	46%
	13-19 Years Old	17	34%
	26-39 Years Old	8	16%
	40-59 Years Old	2	4%
Gender	Male	35	70%
	Female	15	30%
Participant Group	College Students	35	70%
	Designer, Gamers and Experts	8	16%
	Faculty	4	8%
	Senior High Students	3	6%
Vision Correction	None Specified/No Correction	31	62%
	Eyeglasses/Contact Lenses	17	34%
	Blue Light Glasses	2	4%
Most Frequent Platform	LMS	19	38%
	Google Classroom	15	30%
	Google Form	15	30%
	YouTube	1	2%
Primary Device Used	PC/laptop	33	66%
	Smartphone	16	32%
	Tablet	1	2%
Digital App Usage Frequently	Very Often	32	64%
	Often	10	20%
	Sometimes	7	14%
	Rarely	1	2%
Average Daily Screen Time	More than 6 hours	24	48%
	4 to 6 hours	18	36%
	1 to 3 hours	5	10%
	Less than 1 hour	3	6%

Interpretation—This chapter presents and interprets the results gathered from the respondents. The findings focus on their profile, task performance, color scheme preferences, visual comfort, and the perceived effects of interface colors on task performance.

B. Color Scheme Preferences and Efficiency Perceptions

Table 3: Color Scheme Preferences and Task Efficiency (N = 50)

Evaluation Dimension	Category	Frequency	Percentage
Overall Preferred Color Scheme	Color Scheme #1	30	60%
	Color Scheme #2	16	32%
	Color Scheme #3	4	8%
Scheme Making Elements Easiest to Locate	Color Scheme #1	31	62%
	Color Scheme #2	15	30%
	Color Scheme #3	4	8%
Scheme Best Supporting Task Efficiency	Color Scheme #1	32	64%
	Color Scheme #2	13	26%
	Color Scheme #3	5	10%

Interpretation— According to Table 3, across all dimensions studied, Color Scheme #1 received the highest preference because 60% chose it overall, 62% found it easier to locate items, and 64% achieved higher task efficiency. It should be noted that bright colors have always caused eye strain; hence, balanced color schemes are always better.

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

Summary of the Study

In this quantitative study, we tested the impact of various color interfaces on task completion time and visual navigation among 50 participants, most of whom are college students. The data were collected using Google Forms, with visual searches and perception questions.

Key Findings

As can be seen from the results above, familiar design aided in quicker completion of the tasks, where 100% of participants located the search button while 88% of people completed their tasks in less than one to five seconds. Color Scheme #1 received a 60% approval rating for general use, while 64% approved of it for task efficiency. While 98% found the text easy to understand, 88% experienced eye strain, and 78% got headaches due to screen brightness.

Conclusions

These results show that interface colors and layouts can influence navigation speed and comfort during use. Preferred color combinations and balance may reduce visual search time and prevent eye strain, whereas cluttered designs and bright colors may cause stress and fatigue.

Recommendations

Developers should use balanced, comfortable color schemes to reduce eye strain and support faster task completion among students. Designers should also keep important buttons in familiar locations, and future studies should include more participants and use wider research methods to further examine interface ergonomics.

Moreover, future studies should employ the use of adaptive and dynamic interfaces by utilizing automatic switching of the theme based on the ambient light sensor instead of maintaining a static color scheme. Future research should have performance testing involving task completion times across multiple hour sessions so that eye strain or asthenopia is considered. This could be achieved by performing physiological testing using task completion times and eye tracking test (saccade speed and fixation) and pupillometry for measuring cognitive loads. Lastly, future studies should also take into consideration user neurodiversity by including people with visual impairment, dyslexia, and photophobia for color scheme testing.

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