Colour Theory & Association

Exploring the Role of Colour Associations in Creating Visual Identities for Academic Subjects

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Abstract:

Colour significantly influences human perception, emotion, and memory, making it a powerful tool in educational contexts. This study explores the role of colour associations in creating visual identities for academic subjects to enhance student engagement, focus, and comprehension. By investigating common colour-to-subject associations among high school and university students, the research aims to determine if standardized colour schemes can improve the design of study materials and faculty communications. Using 11 participants, surveys, an interactive folder-labelling activity, and in-depth interviews, the findings indicate some consistent preferences, such as green for science and red for mathematics. These associations are shaped by early educational experiences, cultural connotations, and personal preferences. A mixed-methods approach, including surveys, interviews, and literature reviews, provides insights into the role of environmental factors and individual experiences in shaping these associations. The study concludes that creating standardized color-coded systems for academic subjects could significantly improve the organization and appeal of educational tools, ultimately benefiting student learning outcomes. Results suggest that integrating these colour associations into educational designs could make materials more intuitive, engaging, and effective for learners.

Introduction

Colour significantly influences human perception, emotion, and memory, making it a powerful tool in educational contexts. This study explores the role of colour associations in creating visual identities for academic subjects to enhance student engagement, focus, and comprehension. By investigating common colour-to-subject associations among high school and university students, the research aims to determine if standardized colour schemes can improve the design of study materials and faculty communications. Using 11 participants, surveys, an interactive folder-labelling activity, and in-depth interviews, the findings indicate some consistent preferences, such as green for science and red for mathematics. These associations are shaped by early educational experiences, cultural connotations, and personal preferences. A mixed-methods approach, including surveys, interviews, and literature reviews, provides insights into the role of environmental factors and individual experiences in shaping these associations. The study concludes that creating standardized color-coded systems for academic subjects could significantly improve the organization and appeal of educational tools, ultimately benefiting student learning outcomes. Results suggest that integrating these colour associations into educational designs could make materials more intuitive, engaging, and effective for learners.

Framework

The psychology of colour demonstrates its significant impact on cognition and emotion. Blue, for example, is associated with calmness and focus, while red evokes urgency and attention (Adams & Osgood, 1973). In academic contexts, colour-coded materials have been linked to enhanced memory retention, reduced cognitive load, and increased engagement (Day, 2019). However, literature on specific colour-to-subject associations remains limited. Studies suggest that early exposure to colour-coded classrooms and personal experiences heavily influence these associations. This research addresses the gap by exploring how students relate colours to academic subjects and how this can inform better design practices.

This study seeks to explore the role of color associations in creating visual identities for academic subjects. This hopes to address the research question: How might we incorporate students' colour associations with academic subjects to evoke positive associations, enhance focus, and improve comprehension in studying materials? Drawing on prior studies and qualitative insights, the research aims to provide actionable strategies for using colour theory in educational design.

Research Methods

This study used a mixed-methods approach, using quantitative and qualitative data collection.

Data Collection

1. Literature Review:
Research on colour psychology and its impact on perception, memory, and emotion provides a theoretical framework for understanding the findings.

2. Surveys:
Students were surveyed to determine their emotional and academic associations with specific colours. Participants may match colours (e.g., blue, green, yellow) with feelings like calm or anger and assign those colours to academic subjects.

3. Folder-Labelling Activity:
Eleven participants were asked to label five coloured folders (red, blue, yellow, green, and purple) with subjects including mathematics, science, history, english, and art. While similar to questions during the survey, some participants may respond to the same questions differently when presented with the physical materials.

4. Interviews:
Interviews explores participants' reasons for their colour choices and the environmental or personal factors influencing their decisions.

Data Analysis

Survey responses were quantitatively analyzed to identify trends, while qualitative data from interviews and the labelling activity underwent thematic analysis to discover key themes, such as cultural connotations and emotional connections.

Literature Review

Existing studies support the role of colour in enhancing organization and memory retention. For instance, colour-coded flashcards and notes were found to aid in content recall by creating visual markers for key information. The literature on colour psychology provides a foundation for understanding how colours influence cognition, emotion, and memory, particularly in educational contexts. The following examples illustrate key findings relevant to this study's exploration of colour associations with academic subjects:

1. Blue: Calmness and Focus
Research highlights blue as a colour that promotes calmness and focus. Adams and Osgood's (1973) "A Cross-Cultural Study of the Affective Meanings of Colour" found that blue is often associated with stability and trustworthiness. In educational contexts, this can translate into enhanced focus during tasks requiring analytical thinking.

2. Green: Nature and Balance
Green is widely recognized for its connection to nature and balance, often associated with environmental studies or science. Day (2019) found that classrooms incorporating green decor improved students' attention spans and reduced mental fatigue, making it a preferred choice for subjects requiring observation and analysis.

3. Red: Urgency and Energy
Red, while energizing, is also linked to heightened stress or urgency. Wolfe (2022) noted that red is commonly used to draw attention in educational tools, such as marking incorrect answers or highlighting deadlines. This association with urgency may explain why several participants linked red to mathematics, a subject often viewed as demanding and requiring quick thinking.

4. Purple: Creativity and Imagination
Purple's connection to creativity and imagination makes it a natural fit for art and literature. According to Marshall and Stuart (2006), students exposed to purple in artistic settings reported greater inspiration and a willingness to explore unconventional ideas. This aligns with the study's finding that participants frequently chose purple for art, reflecting its cultural ties to creativity and individuality.

5. Yellow: Optimism and Attention
Yellow is associated with energy, optimism, and attentiveness. Piqueras-Fiszman and Spence (2012) noted that yellow can stimulate mental activity and is often used in educational materials to highlight important information. This could explain why participants in this study frequently associated yellow with history, a subject that often involves curiosity and discovery.

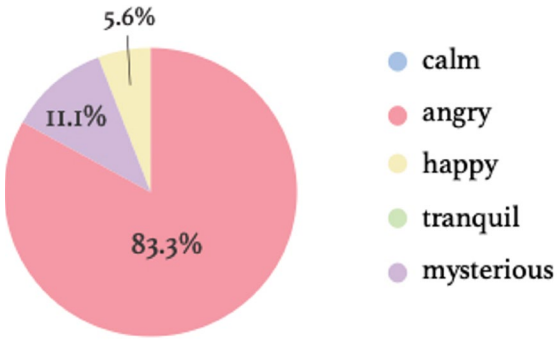
6. Personal and Environmental Influences
Environmental factors, such as early classroom experiences, also play a significant role in shaping colour associations. Kauppinen-Räisänen and Luomala (2010) found that students exposed to colour-coded organizational systems in their early education—such as green folders for science or red markers for corrections—often carry these associations into later stages of learning. Similarly, cultural and personal preferences, such as favourite colours or regional interpretations, were found to influence colour associations in unexpected ways.

Survey Results

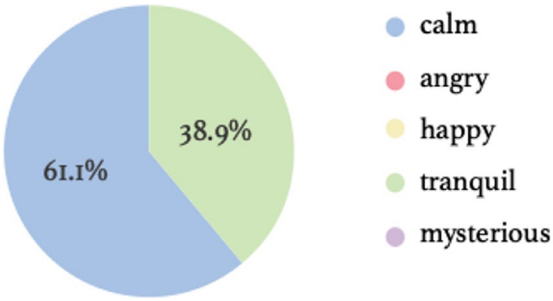
Participants were asked the following questions to determine their colour associations with emotions and academic subjects:

Colour and Emotion Association:

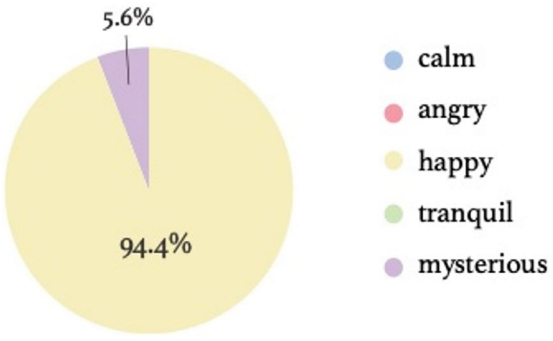
Red:
Often associated with urgency and anger, reflecting its attention-grabbing qualities.



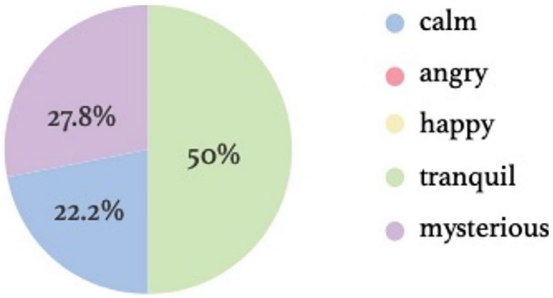
Blue:
Commonly linked to math or science, frequently associated with calmness and focus.



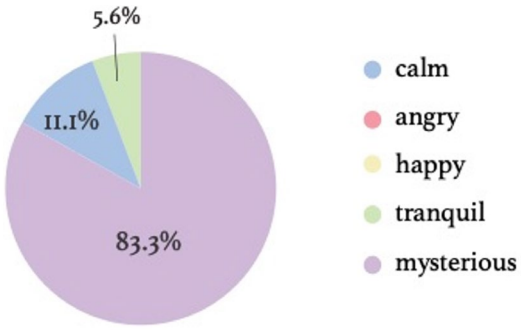
Yellow:
Occasionally tied to originality and history, symbolizing energy and happiness.



Green:
Often associated with science due to its connection to nature and tranquillity.

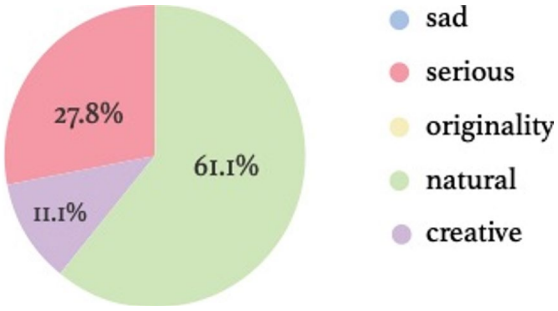


Purple:
Frequently associated with mystery, symbolizing creativity.

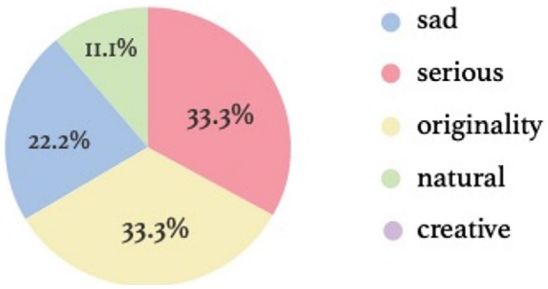


Colour and Academic Subject Association:

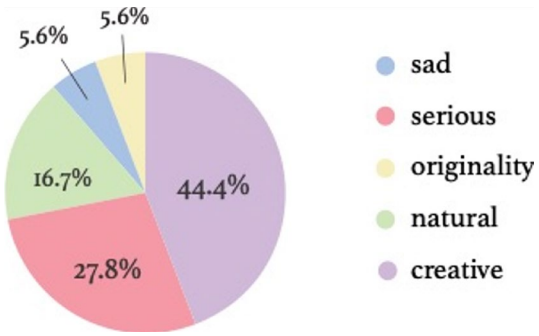
What feelings do you associate with the word "Science"



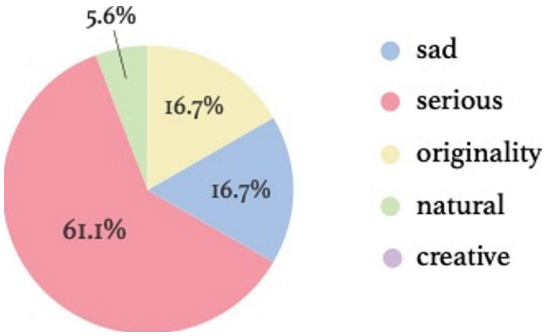
What feelings do you associate with the word "History"



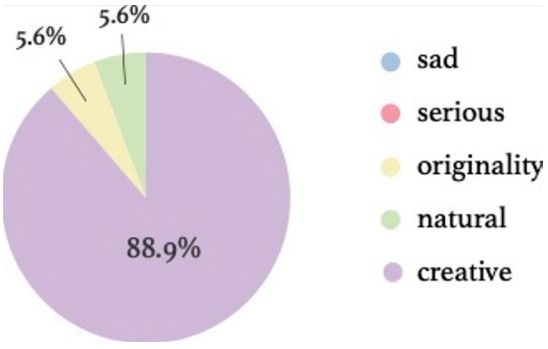
What feelings do you associate with the word "English"



What feelings do you associate with the word "Math"



What feelings do you associate with the word "Art"



Interview Insights

Interviews highlighted the role of early educational experiences and cultural influences. Several participants reported associating colours with subjects based on classroom materials or their personal organizational strategies, such as using highlighters or coloured binders. Others noted that emotionally resonant colours, like red for urgency, shaped their associations.

The interviews consisted of 8 questions, including age, education background, and their thoughts towards colours having different associations or feelings. Some examples include, 'Would you say colour benefitted your learning? Why or why not?' or 'Would you say that different colours evoke certain emotions, connotations, or enhance your interest or focus on certain things?' or 'Do you think colour coding study materials based on their emotional associations would enhance your comprehension or focus?' (See figures 1 & 2).

Interviews provided context to these patterns:

1. Participants cited early exposure to colour-coded materials as a significant influence on their associations.

2. Several noted that visually appealing

materials motivated them to engage more actively with their studies.

3. Cultural factors, such as the use of specific colours in signage, shaped emotional responses to colours.

4. While identifying specific subjects with certain colours based on their associated feelings may not be suited for everyone, colour coding materials based on importance, or having colour coded study materials seem to be more useful and have a better retaining response.

(Figure 1)

(Figure 2)

Folder-Labelling Activity Findings

The data revealed some consistent colour-to-subject associations among participants.

Math: 5 participants chose red, 3 chose blue, 2 chose yellow, and 1 chose green, reflecting a mix of calmness and urgency.

(Figure 3 - Math)

Science: Green dominated with 8 participants, 2 chose blue, and 1 chose yellow, aligning with its natural and environmental associations.

(Figure 4 - Science)

Art: Purple was the leading choice with 8 participants, and 3 participants chose red.

(Figure 5 - Art)

English: A diverse range of colours was chosen, preferences varied, with 5 choosing blue, 2 purple, 2 yellow, 1 green, and 1 red.

(Figure 6 - English)

History: 6 participants chose yellow, potentially linked to its brightness. Followed by 2 red, 1 blue, 1 green, and 1 purple.

(Figure 7 - History)

Implications for Design

The findings from these studies suggest that leveraging established psychological and emotional responses to colours can enhance the usability and appeal of educational materials. For example, using red for study guides can promote urgency or heightened

attention, while incorporating green into organization resources aligns with its association with balance and nature. By integrating these insights into visual identity design, educational institutions can create materials that are not only visually appealing but also cognitively supportive.

This expanded literature review highlights the importance of combining psychological principles with personal and environmental influences to create effective and meaningful designs for academic materials.

For a design solution, I propose a flexible colour-coding system for study materials and calendars. From my research, I have not found any professionally designed study guides that use the same logic as this study. So, I propose a colour coded designed study guide that uses these findings in order to obtain the most retention from users when studying. Using insights from the article and survey data, this design solution focuses on creating a flexible and designed colour-coding system for study guides and calendars that accommodates varying individual preferences and associations with colours while also using the findings from this study to promote the best usage of colour within educational materials. (See figures 8 & 9 for potential design)

Design Goals

Use colour strategically to enhance memory retention, focus, and organization.

Design Proposal

Flexible Colour-Coding Study Materials: Create a colour-coding card or booklet with reusable labels that students can stick onto folders, books, or materials.

Red is associated with alertness and attention. Use red for critical information that requires focus and immediate recall.

Blue is known for promoting calmness and concentration, blue is ideal for enhancing memory retention. Assign it to essential concepts or information you want to remember long-term.
Yellow stimulates optimism. Use it for brainstorming sessions or notes that require innovative thinking.

Green is associated with balance and harmony; green is perfect for organizing information. Use it for structuring outlines or categorizing content.

Purple is linked to creativity; purple can be used for highlighting key insights or summarization.

Therefore, we can use green for organizing, blue for terms, red for definitions, purple for summarizing, and yellow for brainstorming.

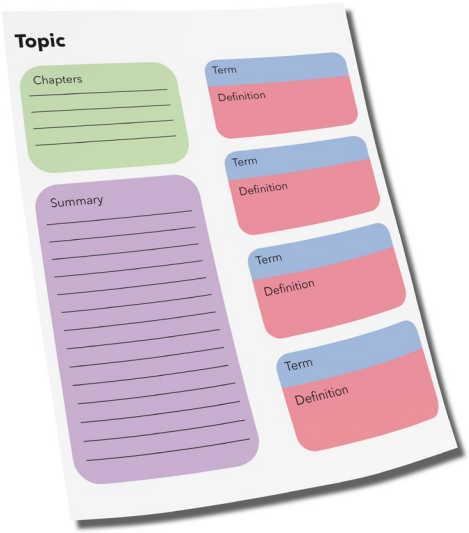
Colour-Coded Flashcards: Use multicoloured flashcards where students can choose colours based on their needs

Customizable Academic Calendar Design Task-Oriented Colour Coding

Green: Long-term projects or assignments.
Red: Immediate deadlines.
Yellow: Study sessions.
Blue: Review or self-tests.
Purple: Fun or personal activities

Rationale for the Design

1. *Enhanced Organization:* The use of colour, combined with icons and text, ensures that materials remain organized and accessible.



(Figure 8)

2. ***Cognitive Benefits:*** Colour can enhance memory and focus when used meaningfully. By allowing users to align colours with their emotional or cognitive associations, this solution maximizes learning benefits.

(Figure 9)

Discussion

The findings suggest that colour associations for academic subjects are shaped by a combination of environmental, cultural, and emotional factors. For example, the strong association of green with science reflects its connection to nature and environmental studies. Similarly, purple's popularity for Art aligns with its cultural link to creativity and imagination. When asked 'Would you say that different colours evoke certain emotions, connotations, or enhance your interest or focus on certain things?', one participant answered, 'Yes, I believe colours evoke emotions and can enhance my interest in certain things. When I see something in presentations where the colours I like are in it then I'm more inclined to focus and pay attention.' However, subjects such as Math and English had a variety of colour opinions by participants and did not have a conclusive answer. Based on the interview portion of this study, participants prefer to use colour associations to label importance of information or use colour to identify terms vs definitions, not based on specific school subjects. When asked 'Do you think colour coding study materials based on their emotional associations would enhance your comprehension or focus?', one participant answered, 'Yes, I colour code based on the importance, writing in red is a deadline, or writing in red is the most important information.' Another participant answered 'Yes, highlighters make important information easy to read and study. I write in different colours to make my notes organized. When doing flashcards for example, titles are one colour and definitions are another.' A standardized colour-coded system for academic subjects could offer several benefits, including improved organization, faster recognition of study materials, and enhanced engagement. For example, a student with a consistent green theme for science materials may find it easier to locate and engage with related resources. The challenges and limitations of this study include individual variability in colour perception and cultural differences in associations. Flexible designs that allow for personalization could address these concerns, ensuring inclusivity while leveraging common patterns.

Conclusion

This study highlights the potential of using colour associations to create effective visual identities for academic subjects. Consistent preferences, such as green for science and purple for art, demonstrate the viability of a colour-coded system for educational materials. By aligning visual design with these associations, educators and designers can enhance focus, comprehension, and engagement among students. Future research should explore larger and more diverse samples to refine these findings and develop universally applicable design guidelines.

Works Cited

Adams, F. M., & Osgood, C. E. (1973). A cross-cultural study of the affective meanings of colour. Journal of Cross-Cultural Psychology, 4(2), 135–156.

Color Psychology. (n.d.). The ultimate guide to color psychology. Retrieved November 24, 2024, from https://www.colorpsychology.org/

Day, J. W. (2019). Colour and academic subjects: A review of psychological effects and associations. Journal of Educational Research, 33(4), 215–229.

The MacChronicle. (n.d.). The great rainbow debate: What color are the subjects? Retrieved December 2, 2024, from https://machronicle.com/the-great-rainbow-debate-what-color-are-the-subjects/#:~:text=Red%20is%20math%2C%20green%20is,English%20between%20blue%20and%20yellow

Wolfe, B. (2022). The correlation of specific colours to academic subjects: A matter of intense debate. The Science Survey.

Appendix

Appendix A: Survey Questions

Participants were asked the following questions to determine their colour associations with emotions and academic subjects:

Colour and Emotion Association:

1. Associations for Red
• Angry: 83.3%
• Creative: 11.1%
• Happy: 5.6%

2. Associations for Blue
• Calm: 61.1%
• Tranquil: 38.9%

3. Associations for Green
• Tranquil: 50%
• Mysterious: 27.8%
• Calm: 22.2%

4. Associations for Yellow
• Happy: 94.4%
• Mysterious: 5.6%

5. Associations for Purple
• Mysterious: 83.3%
• Calm: 11.1%
• Tranquil: 5.6%

Colour and Academic Subject Association:

1. Associations for Science
• Natural: 61.1%
• Serious: 27.8%
• Creative: 11.1%

2. Associations for History
• Serious: 33.3%

• Originality: 33.3%
• sad: 22.2%

3. Associations for Math
• Serious: 61.1%
• Originality: 16.7%
• Sad: 16.7%

4. Associations for Art
• Creative: 88.9%
• Natural: 5.6%
• Originality: 5.6%

5. Associations for English
• Creative: 44.4%
• Serious: 27.8%
• Natural: 16.7%

Appendix B: Folder-Labelling Activity Results

Participants labelled five coloured folders (red, blue, green, yellow, and purple) with specific academic subjects.

Results Summary:

Mathematics:
5 participants: Red
3 participants: Blue
2 participants: Yellow
1 participant: Green

Science:
8 participants: Green
2 participants: Blue
1 participant: Yellow

History:
6 participants: Yellow
2 participants: Red
1 participant each: Blue, Green, Purple

English:
5 participants: Blue
2 participants: Purple
2 participants: Yellow
1 participant each: Green, Red

Art:
8 participants: Purple
3 participants: Red

Appendix C: Interview Questions

Participants were asked the following during the in-depth interview sessions:

1. Would you say colour played a role in the early years of your learning? Why or why not?

2. Would you say that different colours evoke certain emotions, connotations, or enhance your interest or focus on certain things?

3. Do you think colour coding study materials such as flashcards, study guides, mind maps, or slide presentations based on their emotional associations would enhance your comprehension or focus?

4. Do you colour code your classes now? Whether it be in your planner, calendar, or other materials?

Appendix D: Ethics and Consent Form

Participants were informed about the study's purpose and provided consent.
"Welcome! This survey will take approximately 4 mins to complete. Your answers will be recorded for a study, but your information will be anonymous. Do you consent to take part in this study?"