Will color-coding a diagram enhance students’ ability to memorize conceptual information for a test?

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Background
Students in college constantly struggle to remember all the information that is presented to them. Teachers try their best to present this information in a way that will enhance learning. Having diagrams of information on tests is one way teachers try to help students utilize their visual memory.

Hypothesis
Color-coding a diagram will enhance the student’s ability to memorize conceptual information for a test.

Independent & Dependent Variables

Independent variable: Study maps, three levels (no color, color, color coding)
Dependent variable: scores on fill-in-the-blank post-test

Previous Research
Hall’s (1994) research indicated that students in the map groups performed substantially better than the students who studied traditional text.

Learning and retention of verbal material in a classroom can be enhanced when that material is presented with a related geographic map (Diana, 1997).

Color plays an important role in recognition memory for natural scenes (Gegenfurtner, Sharpe, and Wichmann, 2002).

The effectiveness of color in picture recognition is not necessarily due to the memory for colors in the pictures themselves, but is probably due to the distinctiveness of features highlighted by the colors (Takahashi R. and Suzuki S.).

Methodology
Subjects: 16
- Recruited from Andrews University
- Between the ages of 18 and 30 currently enrolled in college.
- Participants who had enrolled in the classes Physiological Psychology or Geography within their college years were not included in this study.

The current experiment involved measuring conceptual memory when the information was presented in either black and white diagrams (no-color study condition), colored diagrams (color study condition), or in a diagram they must color-code themselves (color-coding condition).

The three diagrams used were a map of Africa, a diagram of the human brain, and a novel map constructed for the purposes of this experiment.

The experiment were divided into three sessions, each having three components:
- First component was a black and white pre-test of their particular diagram assigned at that time.
- In the second component participants had five minutes to study the answers to the diagram they were assigned using one of the three tasks listed; either study the black and white version of the diagram, a version in color, or color-coding the diagram themselves.
- Third component was an identical five minute black and white post-test given immediately following the study session.

In sessions two and three the same participants were presented with the other two diagrams and used the other two study techniques.

The order of study for each participant was based on a Latin square design.

Each test lasted about 45 minutes.

Data Analysis
We used planned comparison, paired samples t-tests to compare:
- No color condition with the color condition
- No color condition with the color-coding condition
- No color condition with the color condition

Results
There was no significant difference in the scores between the no color and color condition \[ t(15)=1.113, p<.283 \] or the no color and coloring condition \[ t(15)=1.530, p<.147 \].

Subjects did not learn more from color-coding a diagram compared to a black and white diagram or a color diagram. All subjects learned the same amount of information with no regard to what study condition they received.

Conclusions
Although the results were not significant, they pointed out some important points. These results suggest that students who are under pressure, like during a timed test, are mostly likely not to do very well on their test as compared to no limit or a longer time period. Some of the things we could control a little better are:
- Lack of subjects: we need to get a larger subject pool,
- Give more time during the study phase, especially for the color-coding session. Most subjects said they needed more time to color and study at the same time.
- Control the environment better. We need to make sure all the subjects are tested at the same place and time of day.

References

