

Effects of Textbook Imaging: Understanding Challenging Concepts

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Publishers frequently change textbooks with the goal of helping students grasp material better. Many debates linger in the research. For example, a relationship between electronic and paper textbooks has been studied, finding that 70% of students preferred learning from an electronic textbook, but their findings were not consistent across grade level and subjects (Hortin & Lovitt, 1994). Another debate stays within traditional textbook but focuses on layout. Tyree, Fiore, & Cook explored certain aspects of textbook design, such as text characteristics, text organization and audience appropriateness (1994). They concluded that improvement in design of text organization and text characteristics can help enhance comprehension in students. Given the levels of debate on this issue, this study seeks to determine if textbook images have a significant effect on a student's comprehension and ability to understand challenging concepts, particularly in those students suffering from Attention-Deficit Hyperactivity Disorder (ADHD). It is hoped that this experimental study will help us determine how to improve comprehension of challenging concepts in students, including those suffering from ADHD.

Methods

Over 100 participants from a regional public university were recruited for this experiment to complete a survey. Participants were asked to complete a consent form and were then given an excerpt from a textbook page to read that consisted of 3 forms of imaging: color, black & white, or absence of a picture. These excerpts were given out at random. Participants were given 5 minutes to read the excerpt from the textbook page. The textbook excerpt was then taken and participants completed an 8 question quiz based on what they read. After completion of the quiz, participants then completed opinion survey questions regarding the format of the textbook page they were given and questions pertaining to ADHD. At the conclusion of the survey, participants were thanked and dismissed. Average participant age was 19.53 (SD= 4.56). Gender included 67.36% female / 32.63% male. 39% of participants received the black and white page, 28.4% received the color page, and 32.6% received the page without pictures.

Results

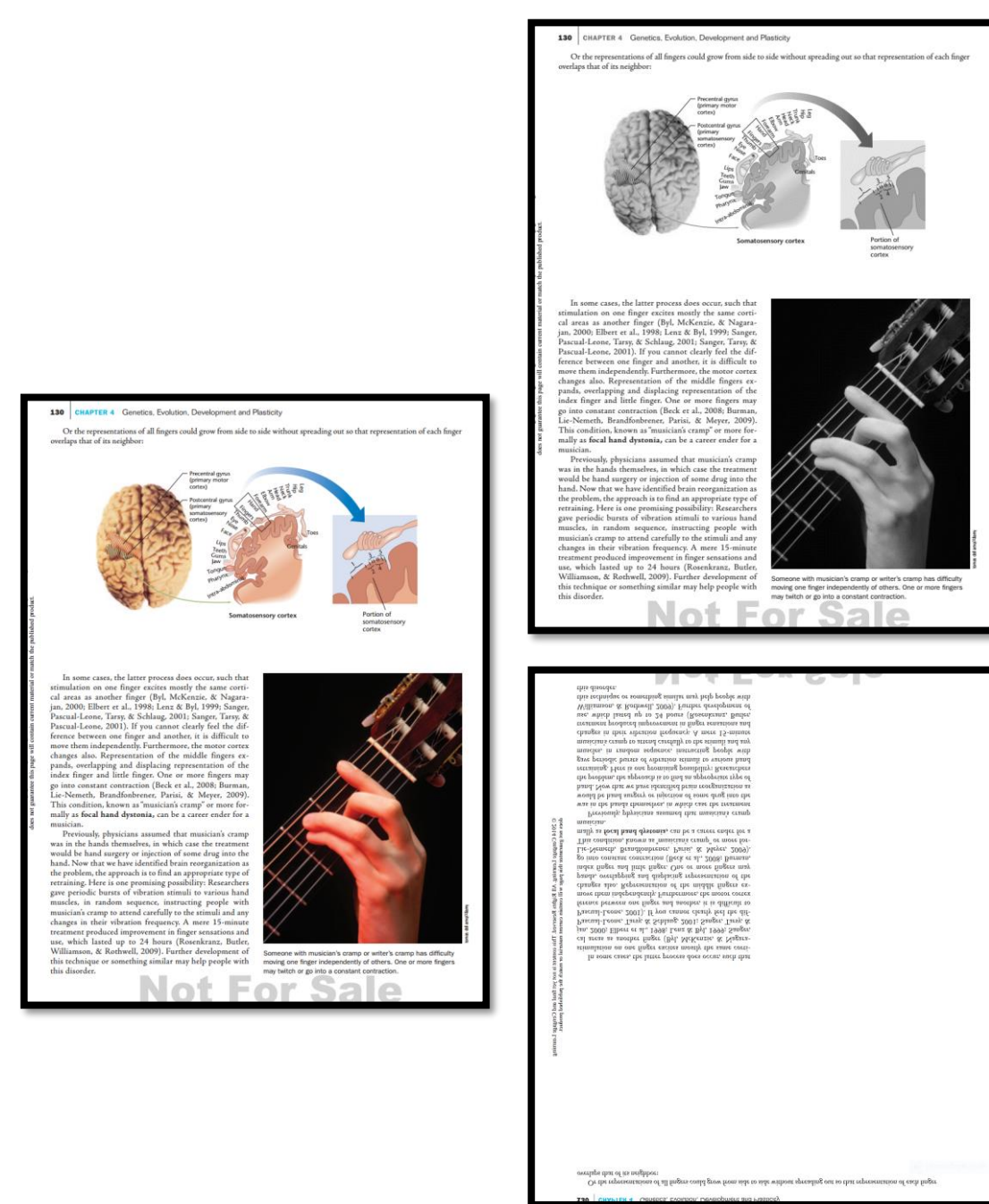
A one-way ANOVA revealed no difference on quiz score between the three textbook pages ($F(2,91) = 0.27, p > .05$). An additional analysis controlling for individuals diagnosed with ADHD also found no significant effect of ADHD or textbook page, and no interaction. Finally a model including textbook page, ADHD, gender, and age also found no significant predictor of quiz success. While no difference was found in quiz scores based upon the independent variables, a number of interesting and significant correlations were noted.

Correlations

- Individuals appeared to be well self-calibrated. Those who reported that they had trouble staying focused on textbook material in general also scored significantly lower on the quiz ($r = -0.25, r^2=0.0625, t(92) = -2.461, p = 0.016$)
- Participants who believed that colorful, vivid illustrations and images helped keep their attention actually **scored lower** than individuals who disagreed with this statement. ($r = -0.34, r^2=0.116, t(92) = -3.474, p < 0.001$)
- Similarly, participants who believed that colorful, vivid illustrations and images helped them understand challenging textbook material better also **scored lower** than those who disagreed. ($r = -0.31, r^2=0.097, t(92) = -3.09, p < 0.01$)
- Finally, individuals who agreed that colorful, vivid illustrations **distracted them** actually **scored higher** than their peers. ($r = 0.26, r^2=0.068, t(92) = 2.546, p = 0.01$)
- Three other opinion questions were asked that did not correlate with quiz performance.

Discussion

The results of this experimental study are very informative, but contradictory to what was expected. It was expected that certain forms of textbook imaging, in particular color imaging, would effect the participants comprehension and quiz results in a positive way. In actuality, the form of imaging on the textbook page does not matter in the way people think it does. An important note is the negative correlations with colorful, vivid images and their correlation to helpfulness. The popular perception is that colorful, vivid images are thought to be helpful, but in actuality those who think the colorful vivid images are helpful tended to do worse with comprehension and quiz scores, regardless if they see them or not. Those who admit that colorful, vivid images are a distraction tended to do better. It is also interesting to note that students who had been medically diagnosed with ADHD scored slightly higher than students who had not, although this was not a significant difference. There are limitations to consider in this study. These include: a small sample size from a rural regional college, a large gender skew present in our sample, and a small number of participants suffering from ADHD which may have limited us to seeing how textbook imaging really effects comprehension in their population. Further research may be able to determine if textbook imaging plays a significant role in comprehension in select groups of students, such as special needs students. Future studies can also lead to finding ways in enhancing textbooks to help various types of students. But perhaps most interesting would be to investigate further the perception of students regarding so-called "enhanced" textbooks to determine if a subset of students errantly believes that the visual aids are more powerful in comprehension (and not as distracting) as they may actually be.



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The Delta State Decision Sciences Lab provides research opportunities for undergraduate students to collaborate within and outside the institution. Topics include decision biases, consumer financial decision making, and student academic decision making. Funding made possible through the DSU Research Committee, the office of the Provost, and the division of Counselor Education and Psychology.