

Comments on "Comic-Con: Can Comics of the Constitution Enable Meaningful Learning in Political Science?"

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Abstract

Owens et al. 2020 claimed that evidence from an experiment indicated that, among a group of 18-to-20-year-old Americans, more learning resulted from a comic description of the constitutional powers of the U.S. Congress than from a text description of the constitutional powers of the U.S. Congress. However, the data reported in Owens et al. 2020 do not support this claim at conventional levels of statistical significance.

Keywords

constitution; learning; comics; visual; experiment

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Declarations of Conflicting Interests

None

Data Statement

Code to reproduce the reported analyses will be uploaded to the author's Dataverse.

Note: I communicated concerns about the Owens et al. 2020 "Comic-Con" article to the first two authors in November 2019. I did not hear of an attempt to publish a correction, and I did not receive a response to my most recent message, so I submitted this manuscript¹ to PS: Political Science & Politics on Feb 4, 2020. PS published a [correction](#) to "Comic-Con" on May 11, 2020. PS then rejected my manuscript on May 18, 2020 "after an internal review". The Owens et al. 2020 correction claimed that "our error in language does not impact the conclusions we drew from the analyses performed in our research and described in this article". But it's not clear to me what important conclusions remain. The conclusion that youth learned something from reading a comic does not seem to warrant much attention.

¹ Some formatting has been changed, such as the spacing and converting endnotes to footnotes.

The Owens et al. 2020 *PS: Political Science & Politics* article "Comic-Con: Can Comics of the Constitution Enable Meaningful Learning in Political Science?" discussed results from a randomized experiment that permitted assessment of whether the learning of participants exposed to a text description of the powers of Congress from the U.S. Constitution differed from the learning of participants exposed to a visual comic description of the powers of Congress. Results were described as follows: "This analysis of 71 American 18- to 22-year-olds indicates that youth gain more knowledge when they view a comic panel of the Constitution than they do from reading the text of the document" (p. 164). The ability to increase student learning about the U.S. Constitution through a comic version of the text of the U.S. Constitution would be an important finding for teachers and has plausible extensions to other subject matter. However, my analysis indicated that the Owens et al. 2020 data do not provide sufficient evidence for the claimed inference of more learning from a comic than from the text of the U.S. Constitution.

Owens et al. 2020 Research Design and Results

The reported Owens et al. 2020 research design involved participants responding to five multiple-choice items about the U.S. Constitution, then receiving a randomly assigned treatment, and then responding to the same five multiple-choice items. The treatment was randomly assigned to be either an instruction to read a provided text or an instruction to view a provided comic. The text and the comic described only the powers of Congress, but the subject matter of the multiple-choice items concerned the original jurisdiction of the Supreme Court (item 1), the powers of Congress (items 2, 3, and 4), and the powers of the President (item 5).

Results reported in Owens et al. 2020 Table 4 for the five items indicated sufficient evidence that the mean of the pretest-to-posttest change in the number correct was above zero for participants in the comic condition (0.43 units, one-tailed p-value of 0.0136) but did not indicate sufficient evidence that the mean of the pretest-to-posttest change in the number correct was above zero for participants in the text condition (0.14 units, one-tailed p-value of 0.2512). Results reported in Owens et al. 2020 Table 5 for the three items about congressional powers indicated marginally sufficient evidence that the mean of the pretest-to-posttest change in the number correct was above zero for participants in the comic condition (0.31 units, one-tailed p-value of 0.034) but did not indicate sufficient evidence that the mean of the pretest-to-posttest change in the number correct was above zero for participants in the text condition (0.13 units, one-tailed p-value of 0.237).

Owens et al. 2020 indicated an intent "...to fill the gap on the comparative benefits of visual versus textual content" (p. 163) and that "...we expected the scores of participants who viewed the comic to improve more than those who viewed the text" (p. 163). However, Owens et al. 2020 did not report results for a statistical test that compared the pretest-to-posttest score change among participants presented visual content to the pretest-to-posttest score change among participants presented text content. The section below reports results for such a test.

Reanalysis of the Owens et al. 2020 Data

My analysis used the Owens et al. 2020 research design choices to replicate in Stata (StataCorp 2017) the results for the five-item test and for the test limited to the three items about congressional powers. I then conducted a t-test to test the null hypothesis that the mean of the pretest-to-posttest score change among participants in the comic condition equaled the mean of the pretest-to-posttest score change among participants in the text condition; respective p-values were $p=0.30$ (five-item test) and $p=0.50$ (three-item test). Thus, based on conventional levels of statistical significance in political science, the data do not provide sufficient evidence that the mean of the pretest-to-posttest score change among participants in the comic condition differed from the mean of the pretest-to-posttest score change among participants in the text condition, and thus do not support the inference that "youth gain more knowledge when they view a comic panel of the Constitution than they do from reading the text of the document" (p. 164).

Results from this reanalysis are presented in Figure 1, with the left panel reporting results for the five items and the right panel reporting results for the three items about congressional powers.² In each panel, the top point estimate represents the mean of the pretest-to-posttest score change in the comic condition, and the corresponding 95% confidence interval not crossing zero indicates sufficient evidence to conclude that this mean change differed from zero; the middle point estimate represents the mean of the pretest-to-posttest score change in the text condition, and the corresponding 95% confidence interval crossing zero indicates a lack of sufficient evidence to conclude that this mean change differed from zero; and the bottom point estimate represents the difference between the mean score change in the comic condition and the mean score change in the text condition, and the corresponding 95% confidence interval crossing zero indicates a lack of sufficient evidence to conclude that these mean changes differ from each other.³

[Figure 1 about here]

Discussion

Testing methods to improve student learning about political topics is an important task, and it is reasonable to expect that, at least on average, students learn better from information presented in visual and text form than from information presented in only text form. Results from Owens et al. 2020 indicated that there was sufficient evidence that the mean of the score increase from a comic presentation of information differed from zero and indicated that there was insufficient evidence that the mean score increase from a text presentation of information differed from zero. However, as indicated in Gelman and Stern (2006), a difference in statistical significance is not sufficient to conclude that the difference is statistically significant. Reanalysis of the Owens et al. 2020 data indicated

² Data are available here: <https://www.researchgate.net/project/Comic-Con-Can-Comics-of-the-Constitution-Enable-Meaningful-Learning-in-Political-Science>.

³ Comparing posttest scores between experimental groups in an unpaired t-test without assuming equal variances, respective p-values are $p=0.26$ and $p=0.55$ for the five-item test and the three-item test.

insufficient evidence to conclude that the data indicate that "youth gain more knowledge when they view a comic panel of the Constitution than they do from reading the text of the document" (p. 164).

Future work can assess the benefits of a comic presentation of political information relative to a purely text presentation of political information, but—to assess the comparative benefit of the comic nature of the presentation of information—it is important that the comic/text difference be the only difference in treatment. The Owens et al. 2020 test was not an unbiased test of benefits of a comic presentation of information compared to a text presentation of information, because the treatment text covered more information than the treatment comic did, and no test item asked about the extra information in the treatment text. For example, the treatment text, but not the treatment comic, indicated the power of Congress to constitute inferior tribunals to the U.S. Supreme Court and the requirement regarding uniform duties, imposts, and excises. Regarding Congress and D.C., the information provided for the treatment comic was an image and a 17-word passage, but the treatment text was a 74-word passage.

Participants in the text condition were thus given more information than participants in the comic condition were, so—even if there was sufficient evidence that scores for participants in the comic condition improved more than scores for participants in the text condition did—this difference could not be properly assigned to only the comic/text difference between the treatments, because the treatments also substantially differed in the amount of information that participants were provided. Future research should ensure that the information provided in the text treatment equals the information provided in the comic treatment.

References

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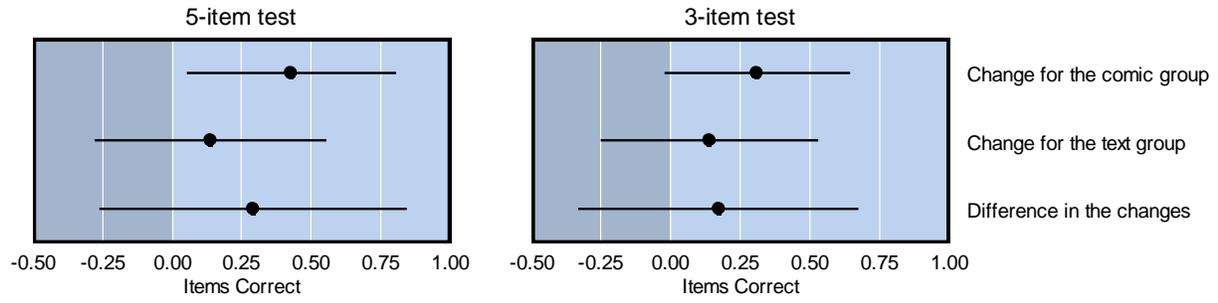


Figure 1. Results from a reanalysis of data from Owens et al. 2020

Note: The figure reports point estimates and 95% confidence intervals. The figure was produced in R (R Core Team 2018) using ggplot2 (Wickham 2016).