

Open the Book: Making the Switch to a Free Online Text for Introductory Psychology

David Allbritton
Associate Professor of Psychology

Tatem Burns
Graduate Research Assistant

Department of Psychology
DePaul University

College textbook cost and accessibility can be problematic, particularly for online courses . Textbook prices rose at almost 3 times the rate of inflation from 2002 to 2012 (GAO-13-368, 2013), and many students choose not to buy their required texts at all (Hilton, 2016) . For students in online courses, obtaining a printed textbook can also be inconvenient, requiring a special trip to campus to visit the bookstore or a long wait for delivery by mail . The recent emergence of open educational resource (OER) textbooks provides a potential solution to both of these problems.

We report here our initial positive experience with the adoption of a freely available OER textbook for online Introductory Psychology courses at DePaul University . Student satisfaction was assessed through anonymous surveys, and student learning was measured by pre- and post-tests . Both compared favorably to other sections of the same courses that used traditional textbooks . Cost savings for students ranged from \$50 to \$130 each (based on campus bookstore prices) . We conclude that OER textbooks are a good option for online Intro Psych courses, and probably for other introductory level courses when a suitable OER text is available.

Choosing an OER Textbook

After deciding to switch from a traditional printed textbook, we considered several free or low-cost options for online texts, including Boundless, Flat World Knowledge, OpenStax, and Noba Psychology . Ultimately, we selected Noba on the basis of the quality and accuracy of the materials, the availability of instructor support materials (such as test banks), the use of Creative Commons licensing, and the likelihood of future updating and customer assistance due to support from its nonprofit foundation.

Implementation

The instructor (David Allbritton) selected from available Noba modules to create a custom textbook for each of the two courses in the Intro Psych sequence . The textbook was made available to students as a free pdf download using a link on the course web site or as a low-cost printed version which students could optionally order directly from Noba . Test bank items from Noba were used for weekly online quizzes, and for a course pre-test and post-test . The amount of work involved for the instructor was no more than that for changing from one traditional textbook to another , or to a new edition.

Evaluation

The introduction of the free Noba textbook was evaluated based on multiple sources of evidence of student learning and student opinions. Learning was measured by pre- and post-tests. Student opinion was measured by end-of-term course evaluation surveys that all classes received, and by an optional survey specifically targeting issues related to textbooks that students could complete as part of a research requirement for Introductory Psychology. Classes using the Noba textbook were compared to others that used traditional textbooks.

Introductory Psychology at DePaul is taught across two courses, with all sections of both courses using the same committee-chosen textbook. For the past several years the Myers textbook was used, sold as traditional books in the campus bookstore. In January 2017 a new traditional textbook (King) was adopted. The change in textbooks offered a good opportunity to pilot test a different kind of textbook in our online sections of Intro Psych, a customized version of the free online Noba Psychology textbook. Both online sections (Intro I and Intro II) were taught by the first author during the Winter 2017 quarter using the Noba textbook, while ten in-person sections were taught by various other instructors using the King textbook. Thus, students using the King textbook during the same quarter that the Noba textbook was used provided one comparison group.

In the previous quarter (Fall 2016) and the previous academic year (2015-2016) all sections of Intro Psych used the Myers text including the eight online sections taught by the first author, five of which also had course evaluation data available. The only substantial change made to the online Intro Psych courses during that period was the adoption of the Noba textbook in the winter quarter of 2017. Thus, the online courses taught by the first author from fall 2015 to fall 2016 which used the Myers text provided another useful comparison group.

Learning: Pre/Post Gain Scores

Students in Introductory Psychology I and II completed as course assignments a pretest during the first week of class and a posttest during final exam week. Both were presented as tools for formative evaluation only, and full credit was awarded for completing them regardless of score.

Questions for the tests were selected randomly (a new random selection of questions for each student both at pretest and posttest) from publisher-provided test banks. Courses prior to 2017 used the Myers Intro Psych textbook and a pre/post test consisting of 60 items from the Myers test banks (Myers Test). Beginning in the winter of 2017, courses used a customized version of the Noba Psychology free online textbook. Students in the 2017 courses completed both a 60-question pre/post test using Noba-provided question banks (Noba Test) and the Myers Test from previous classes. Thus, all students in the online classes took the Myers Test, and students in the online classes using the Noba text also took the Noba Test.

A total of 2 courses with 63 students (31 in Intro Psych I and 32 in Intro Psych II) used the Noba textbook. Of these, 46 (23 and 23) completed both the pretest and posttest. For comparison, 8 classes of the same Intro Psych courses which used the Myers textbook prior to 2017 were included, with 274 total students, of whom 211 completed both the pretest and posttest. Data for students whose course grade was less than 50% were excluded because they had not successfully completed the course, leaving 45 observations from courses using the Noba textbook (22 from Intro Psych I and 23 from Intro Psych II) and 205 from courses using the Myers textbook.

Overall, students in the courses using the Noba textbook had higher post-test than pre-test scores on the

Noba tests, $t(44) = 3.15$, $p = 0.003$. The gain from pre- to post-test was, however, smaller with the Noba textbook compared to gains in previous quarters with the Myers textbook, and did not reach statistical significance for one of the classes using the Noba text when analyzed separately: Psy 105, $t(21) = 2.72$, $p = 0.013$; Psy 106, $t(22) = 1.78$, $p = 0.089$.

It is not clear whether these attenuated gain scores reflect less learning from the Noba textbook compared to the previous book, differences in the sensitivity of the test bank items between the two texts, or some other factor such as differences in the testing context. Because the classes using the Noba text completed two post-tests (one with items from the Noba test bank and one with items from the Myers test bank) and the Noba test was presented second, fatigue (or exasperation) may have contributed to attenuated scores.

While the gain scores on the Noba tests were relatively modest, no gain whatsoever was evident on the Myers tests for the classes using the Noba text. At one level this is utterly unsurprising, given that they did not read the Myers textbook. But it could also indicate a lack of overlap in content between the two texts.

Gain scores were not correlated with grades for either the courses using Myers ($r(203) = -0.005$, $p = 0.947$) nor the courses using the Noba text ($r(43) = -0.16$, $p = 0.29$)

Student Course Evaluation Surveys

How did student course evaluation ratings for Intro Psych classes using the Noba textbook compare to those of other sections of Intro Psych? Course evaluation data was available from the 17 Intro Psych classes described above (2 using Noba, 5 using Myers, 10 using King), with responses from a total of 328 students (31 using Noba, 77 using Myers, 220 using King).

Course Evaluation Surveys: Overall (Composite) Ratings

We created a composite overall course rating from the 15 course evaluation survey questions that pertained to student satisfaction or to student perceptions of course quality. Questions asked about the quality of the course compared to other classes and about various specific instructor or course-related features using a 5-point response scale (1 = *worst*, 5 = *best*). Because some questions tended to have higher overall means than others, averaging across questions could introduce bias if data were missing for some questions. To prevent such bias in the composite rating scores, we first centered the scores for each question on the grand mean of all questions before calculating each student's composite score for each class.

Composite rating scores were analyzed in a linear mixed model (R function `lmer`) with textbook (Myers, Noba, King) as the fixed factor and with random intercepts for the random effect of classroom. There was no overall difference among the mean ratings associated with the three textbooks, $F(2, 15.1) = 0.854$, $p = 0.445$.

Course Evaluation Surveys: Textbook-related Question

One of the 15 course evaluation questions was: "The textbook, assigned readings, and/or class activities for this course improved my knowledge." The responses for this textbook-related question were also examined separately.

Although a mixed model analysis of these ratings (with textbook as the fixed effect and random intercepts for classroom) did reveal a significant main effect of textbook ($F(2, 17.8) = 6.71, p = 0.007$), paired comparisons (using the R lmerTest package) showed that the ratings by students using the Noba text did not differ significantly from those using either Myers ($t(19.3) = 0.56, p = 0.842$) or King [$t(18.2) = 1.81, p = 0.193$]. Therefore, the classes that used the Noba textbook were about as highly rated by students as those that used a traditional textbook, in terms of both the overall average composite course rating and the ratings from the question that specifically mentioned textbooks.

Course Evaluation Surveys: Open-ended Comments

The student course evaluation surveys included two open-ended questions asking what students most enjoyed about the course and what suggestions they had for improving the course. A total of 265 students answered one or both open-ended questions (26 students using Noba, 55 using Myers, 184 using King). Searching for comments that included at least one of the strings "text," "book," or "reading" identified 47 students potentially mentioning the textbook. An examination of these comments revealed that only 12 students actually discussed their perceptions of the textbook. All 12 made positive comments (5 for Noba, 3 for Myers, 4 for King). Two students who used the Noba textbook specifically mentioned that they liked the online format, as did two who used King (although one student who used the online version of King specifically stated a preference for the printed version).

The Noba textbook is organized as an edited volume, with individual chapters contributed by experts in various subfields of psychology. Some students appeared to appreciate this difference from most traditional textbooks, with one commenting, "I also liked reading articles rather than a textbook," and another saying, "The book was a good one to read not to [sic] boring or structured and I liked I can download the chapters and read them off line!"

Student Textbook Survey

A survey asking specifically about the textbook and related issues was conducted during the winter quarter of 2017 as an option for students to partially fulfill a course research participation requirement. Responses were collected from 195 participants enrolled in Introductory Psychology at DePaul University. There were initially 203 observations, but 7 students indicated that they had completed the survey twice, and their second completions were excluded. In addition, 1 student's data was excluded due to an invalid response (indicating they were in a "hybrid" class when there were none that quarter). One additional student reported being in a "Classroom" class although their other responses made it clear that they were actually in an online class, so their class was recoded as "Online" before analyzing the data. The resulting dataset contained responses from 42 online students using the Noba textbook and 153 classroom students using the King text.

The first question asked whether students used a physical textbook, e-text, or no textbook in the current class. The proportions differed significantly between the online vs. classroom students, $\chi^2(2) = 40.48, p < .001$:

Table 1
Type of textbook used

E-textbook	Physical textbook	I did not use a textbook
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King	0.40	0.56	0.05
Noba	0.95	0.05	0.00

Most students in the courses that used the King textbook reported buying a physical book, and most students in the courses that used the Noba text reported using the e-text version, although a few students did report buying a hard copy of the Noba text or using no textbook at all, and many used an e-text version of King.

The second question asked about previous use of e-textbooks . About half of the students reported purchasing an e-text in the previous two years, and this proportion did not differ between the online courses using Noba (57.1% yes) and the classroom-based course using King (51% yes), $\chi^2(1) = 0.29$, $p = 0.59$.

When asked which format (e-text vs. physical book) they preferred, students' answers did not differ as a function of whether they had purchased an e-text in the past, $\chi^2(2) = 1.35$, $p = 0.51$:

Table 2
Preferred book format as a function of previous e-text use

	E-textbook	No preference	Physical textbook
Not Purchased E-text	0.11	0.07	0.30
Purchased E-text	0.15	0.08	0.29

Their preferences did, however, differ as a function of which textbook they were currently using . Most of the students currently using the King text said they generally preferred a physical book, but a plurality of students using Noba preferred e-texts, $\chi^2(2) = 33.11$, $p < .001$:

Table 3
Preferred book format as a function of current textbook

	E-textbook	No preference	Physical textbook
King	0.18	0.12	0.70
Noba	0.55	0.24	0.21

The next two questions asked about satisfaction with the textbook of their current course . Students were more satisfied (on a 5-point scale) with the cost of the (free) Noba text than with the (free for only some students) King text, with mean ratings of 4.5 for the Noba text and 2.4 for the King text, $t(72.5) = -11.92$, $p < .001$. They expressed satisfaction with the quality of both texts, but significantly higher satisfaction for the Noba textbook, with mean ratings of 4.4 for the Noba text and 4 for the King text, $t(83.7) = -2.99$, $p = 0.004$.

Student Textbook Survey: Specific Ratings of the Textbook

A sequence of 14 questions asked whether students agreed or disagreed (on a 5-point scale) that their textbook had various desirable features such as being well-written, appropriate for the course, etc . The mean scores on each question for the two textbooks were compared using t-tests with Bonferroni correction for multiple comparisons.

Figure 1. Mean ratings on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree) in answer to "Do you agree or disagree that the primary textbook (physical book or E-book) for this course is: ____." Error bars are ± 1 SE. Mean differences between the two textbooks that were significant after Bonferroni correction ($p < .05 / 14$) are indicated by asterisks. Questions are ordered by mean difference between the two textbooks' ratings, from greatest to least.

For all 14 questions the mean ratings for the Noba textbook were numerically higher than those for the King textbook, and the difference was statistically significant (with Bonferroni correction) for 7 of them. The Noba textbook's greatest perceived advantages were its cost, its ease of availability, and its being bundled with useful resources. It also had a significant perceived advantage in its quality relative to other textbooks, appropriateness for the course, and quality of design and writing. Thus the student ratings indicate that the Noba textbook is at least equal to a traditional textbook in perceived quality, while being less expensive and easier to obtain.

Conclusions

- Adopting an OER textbook is not difficult for faculty
- Students appreciate the lower cost of OER textbooks
- Students appreciate the ease of obtaining OER materials
- The Noba Psychology textbook was well-received and effective (though its test bank is not as thorough as that of most traditional textbooks)
- OER textbooks are a viable option for Introductory Psychology

References

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About the presenters

David Allbritton is an associate professor of psychology at DePaul University . His research interests include language comprehension and educational technology . He has developed and taught online courses for over 8 years.

Address: Department of Psychology
2219 N. Kenmore Ave.
Chicago, IL 60614

Email: david.allbritton@depaul.edu

Phone: 773-325-4799

Tatem Burns is a PhD student in I/O Psychology at DePaul University . She has been a teaching assistant for multiple online courses in psychology .

Address: Department of Psychology
2219 N. Kenmore Ave.
Chicago, IL 60614