Who’s Afraid of the Big Bad Library?

Martina Nicholas, Catherine Rudowsky, and Jesus Valencia

Library anxiety in college students, particularly freshmen, is often a barrier to research and learning. Library anxiety leads to the procrastination of homework assignments as well as incomplete or inaccurate research.\(^1\) Bailey Library at Slippery Rock University of Pennsylvania has always made efforts to take a proactive role in easing library anxiety, through instruction sessions, online tutorials, and one-on-one assistance. Furthermore, the library has always had a desire to determine the best method(s) of easing anxiety so that resources can be focused on the appropriate efforts.

On one hand, it is often assumed that group library instruction is the best means for easing library anxiety among undergraduate students. On the other hand, there is often discussion that self-directed computer-assisted instruction is the best means for teaching today’s students. Our study set out to determine to what extent these two methods are successful and to compare them against one-on-one instruction, which is not necessarily practical, but which may raise the bar. The study also compared the various treatment methods against a control group to determine if anxiety is eased simply as a result of completing a semester of college. Discussion of the study methodology and research results follows a review of the literature concerning library anxiety and library instruction.

**Literature Review**

The notion of library anxiety was first introduced by Constance Mellon in 1986.\(^2\) Mellon conducted a two-year qualitative study at a southern university in an attempt to identify students’ feelings about using the library for research. She found that many of the students were reporting feelings of dread, fear, and outright phobia. In fact, 75 to 85 percent of the students described their initial feelings about the library in terms of fear or anxiety.\(^3\) Mellon reported that these feelings stemmed from four causes: 1) the size of the library; 2) a lack of knowledge about where things were located; 3) how to begin; and 4) what to do.\(^4\) An analysis of the students’ feelings lead Mellon to the formulation of the grounded theory that “when confronted with the need to gather information in the library for their first research paper many students become so anxious that they are unable to approach the problem logically or effectively.”\(^5\) Mellon further reported that a primary barrier lies in the
fact that students feel embarrassed by their anxiety, because they believe themselves to be the only ones lacking knowledge about conducting research in the library.\textsuperscript{6} Sharon Bostick furthered library anxiety research by developing the Library Anxiety Scale, an instrument used to quantify library anxiety.\textsuperscript{7} Bostick identified five facets of library anxiety: 1) barriers with staff; 2) affective barriers; 3) comfort with the library; 4) knowledge of the library; and 5) mechanical barriers.\textsuperscript{8} The Library Anxiety Scale presents questions addressing each of these facets. Qun G. Jiao, Anthony J. Onwuegbuzie, and Art A. Lichtenstein used the Library Anxiety Scale to conduct research identifying eight variables that serve as predictors of library anxiety: age, sex, year of study, native language, grade point average, employment status, frequency of library visits, and reason for using the library.\textsuperscript{9} Regarding the variable year of study, the authors found that freshmen report the highest levels of library anxiety.\textsuperscript{10} Jiao, Onwuegbuzie, and Lichtenstein reported that based on their findings, “both librarians and teaching faculty should be aware of the characteristics of high-anxious students, and increase the availability of anxiety-reducing interventions for students.”\textsuperscript{11}

According to Bostick, the Library Anxiety Scale can be used to measure pre- and post-treatment levels of library anxiety with intervening instruction methods.\textsuperscript{12} Anna M. Van Scoyoc used the scale for this very purpose while conducting research to determine if computer-assisted instruction and traditional bibliographic instruction reduce library anxiety in first-year college students.\textsuperscript{13} Van Scoyoc randomly placed study participants into one of three groups (control group, traditional bibliographic instruction group, and computer-based tutorial group); she then administered the pre- and post-tests approximately one week apart with the applicable instruction method occurring between tests.\textsuperscript{14} Van Scoyoc found that students participating in bibliographic instruction experienced significantly less overall library anxiety than the control group; however, the same could not be said for the students completing the computer-based tutorial.\textsuperscript{15}

The results reported by Van Scoyoc are intriguing and important. As librarians and teachers, we often hear that students are technological learners and that they do best at their own pace.Reasons such as this, as well as increasingly large class sizes leading to impersonal and ineffective lectures along with smaller classes leading to higher demand and inevitable inconsistency between instruction sessions, have lead to libraries considering the use of computer-based tutorials as an alternative to traditional classroom instruction.\textsuperscript{16} While computer-assisted instruction may eliminate some of the problems and costs associated with traditional classroom instruction and may be adequate to teach tasks such as using the online catalog, an important question lies in whether or not it eases library anxiety and allows students to feel more comfortable with the library. There is evidence that this goal is often best achieved through the student-librarian interaction available during traditional bibliographic instruction.\textsuperscript{17}

\section*{Method}

The objective of this study was to compare various methods of easing library anxiety in freshmen, along with a control group, to determine which methods prove to offer the greatest decrease in anxiety and how the various methods compare against each other. The study was conducted during the fall 2005 and 2006 semesters. The fall 2005 study served as a pilot study and enabled us to work out various kinks in our research methods. While the fall 2005 study will be briefly reported, the bulk of our statistical analysis will discuss the fall 2006 study.

The fall 2005 research included a small sample size of 18 students and relied on voluntary participation, which may have influenced the findings, as we determined that those willing to participate already had low anxiety. One hundred randomly selected incoming freshmen entering the university with a declared major in the College of Business, Information, and Social Sciences were sent letters over the summer explaining the study and asking for participant volunteers. Of the 100 students, 38 responded. Twelve declined to participate in the study and 26 agreed to participate. Of the 26 students who agreed to participate, only 18 actually did so once the semester began.

Student participants were divided evenly among four groups 1) Online Tutorial; 2) Group Library Instruction; 3) One-on-One Instruction; and 4) Control Group. The Control Group was instructed not to complete the online tutorial and to report any classroom scheduled library instruction session to us immediately. We intervened at this point and explained our research project to the classroom faculty and requesting that the student be excused from class the day of library instruction. In all cases, we provided individual instruction as soon as the research project concluded so that the student without library instruction did not fall behind the other students.

The Library Anxiety Scale, an existing and validated instrument, was used to test students’ library anxi-
The scale was first administered to participants during the first week of October, one month after school began in order to allow students time to formulate opinions regarding the library. The exact same scale was administered to participants during the last week of scheduled classes, one week before final examinations to allow students time to formulate new opinions regarding the library. Between the pre- and post-test, each participant had to meet the requirements of their assigned group.

- Group 1: Complete the online tutorial found on the library web page. This tutorial takes approximately 45 to 50 minutes to complete.
- Group 2: Serve as the control group and avoid library instruction of any kind, in person or online.
- Group 3: Complete a one-on-one library instruction session lasting approximately 45 to 50 minutes. Each session was conducted by either Martina Nicholas or Catherine Rudowsky.
- Group 4: Complete a group library instruction session lasting approximately 45 to 50 minutes. The sessions were conducted by one of nine librarians on staff.

Both the pre- and post-test were administered in the library classroom, and the group library instruction sessions also took place in this classroom. One-on-one library instruction sessions took place in either Ms. Nicholas’ or Ms. Rudowsky’s office within the library. Students completing the online tutorial were instructed to do so from a computer and location of their choosing.

In order of effectiveness, one-on-one instruction was most effective, followed by group instruction, then the control group, and last the online tutorial. All treatments with the exception of the online tutorial were shown to effectively reduce library anxiety. One-on-one and group instruction were so effective that according to our sample, they can on average literally turn a library-averse student into a library-seeking student. According to the computed coefficients, we can be 95 percent confident that one-on-one instruction can reduce library anxiety on average by no less than 42 percent and possibly by 200 percent (on average 123 percent). Group instruction can do so by at least 32 percent and possibly by 170 percent (on average 104 percent), whereas the control group can experience lower library anxiety by no less than 7.8 percent and possibly by 160 percent (on average 89 percent).

While these results are very intriguing and warrant further research, several flaws in the study design were noted while completing the fall 2005 research. First, the fact that we asked for volunteers limited us to students already experiencing some comfort level with the library, otherwise they would not have volunteered to participate. Second, asking for volunteers presented us with a rather small sample size. Third, there was no way to ensure that students in Group 1 completed the online tutorial. We had to assume that they did, which is a rather large assumption. Lastly, it was difficult and time-consuming to track each individual student, since there was no logical grouping of these volunteers. They all had different class schedules and no relationship to each other.

Phase 2 of our study occurred during the fall 2006. Much of the study remained unchanged; however, modifications were made based on the noted flaws from phase 1. The main difference was in the study participants. While participants remained freshmen students in their first semester of college, participants were now students in one of four FYRST seminar classes. FYRST seminar is a one-credit course designed to orient freshmen students to the university and college life. FYRST classes typically have between 15 to 25 students. As a result our sample size increased from 18 in fall 2005 to 74 in fall 2006.

Each of the four FYRST classes served as one of the study groups, which remained unchanged: Group 1: Online Tutorial; Group 2: Control Group; Group 3: One-on-One Instruction; and Group 4: Group Instruction. The class serving as the control group was given group instruction at the completion of the study but prior to the end of the semester. The class serving as the online tutorial group had to complete the tutorial in the library classroom during a scheduled class. Those not present for that class were dropped from the study. Similarly, the class serving as the group instruction group received group instruction during a scheduled class. This class was brought to the library for instruction. Only the class serving as the

| Group | Percent diff. | Coeff. | Std. Err. | t | P>|t| | 95% Conf. Interval |
|-------|---------------|--------|-----------|---|-------|------------------|
| 1     | -.4101735     | .3380367 | -1.2      | .245 | -1.13519 | .3148431 |
| 2     | -.8891865     | .3779365 | -2.35     | .034 | -1.69978 | -.0785933 |
| 3     | -1.231692     | .3779365 | -3.26     | .006 | -2.042285 | -.4210987 |
| 4     | -1.047144     | .3380367 | -3.10     | .008 | -1.77216 | -.322127 |

Table 1: Fall 2005 Study Results
one-on-one instruction session had to use time outside of regularly scheduled classes. Therefore, the FYRST instructor presented the task as an assignment with a grade for completing the task.

The pre- and post-test also remained similar, and the Library Anxiety Scale was again used as the measurement instrument. The pre-test was administered at the end of September or beginning of October, but the post-test was administered in mid-November, about two to three weeks earlier than it was administered in the fall 2005 study.

**Statistical Results**

Of the total of 94 students that answered our 46-question pre-treatment survey, only 74 answered the post-treatment questionnaire, thus we lost 20 students in the process. The breakdown of students by groups was as follows: group 1: 14 students; group 2: 18 students; group 3: 17 students; and group 4: 25 students. Of the 46 questions asked, 3 of them were identifiers: gender, major and number of library visits per year (LibVisit). Of the 43 remaining, 2 of them were general in nature (the first two questions) and were not related to library anxiety. This left us with 41 questions that attempted to measure each student’s level of library anxiety.

Each of the 41 questions made either a definitive positive or definitive negative statement about libraries or library use. Question number 16 is a good example of a positive statement: “I feel comfortable using the library,” whereas question number 10 is a good example of a negative statement: “I get confused trying to find my way around the library.” We felt that a student agreeing with a negative statement (disagreeing with a positive statement) seemed to suffer from some degree of library anxiety. The responses available for the students on all 41 questions were: A = Strongly Disagree; B = Disagree; C = Undecided; D = Agree; E = Strongly Agree.

We decided that a student answering D (Agree) to a positive statement does not suffer from library anxiety with regards to the question asked and should receive an anxiety score of 0 (zero). A student answering B (Disagree) to a negative question should likewise receive a score of zero. We also wanted a higher score to mean greater library anxiety. This required that responses to a positive question should receive the following scores: A=3, B=2, C=1, D=0, and E=-1, which meant that a student responding “E” to a positive question actually enjoys that particular aspect of the library or its use. In the same manner, responses to a negative question should receive the following scores: A=-1, B=0, C=1, D=2, and E=3. A graphical view of how we translated the students’ responses into numerical values is shown on graph 1.

**Choice of a Dependent Variable**

For each student, a pre-treatment score (bscore) and a post-treatment score (ascore) were computed. These scores were computed as simple averages of their re-
sponses. In other words, all questions were equally important in measuring anxiety.

The effectiveness of a treatment can be measured either as the difference in anxiety before and after treatment (diff = ascore – bscore) or as the percentage change effected by the treatment on the student’s level of anxiety. The latter could not be used simply because the numerical values chosen to correspond with the student responses (see figure 1) are completely arbitrary. The students’ responses to our questions are ordinal in nature. In the jargon of statistics, our variable measuring anxiety has only an ordinal level of measurement.19 This simply means that responses do have an order to them, for example “Agree” means more anxiety to a negative question than “Uncertain.” The problem with an ordinal level variable is that we have no way to ascertain how much more anxiety “Agree” represents when compared to “Uncertain,” nor how much more is implicit in “Strongly Agree” when compared to “Agree.” We could have chosen just as easily a value of 10 to represent “No anxiety” while letting the other numbers fall in the order sequenced by the student’s response. Choosing zero to represent no anxiety as opposed to 10 means that a 1 point reduction in anxiety for a person with a pre-treatment level of anxiety measured at zero (bscore = 0 and ascore = 1, so the student becomes a lover of the library after the treatment) represents an infinite percentage reduction in anxiety, as opposed to a 10 percent reduction in anxiety had we chosen 10, or a one percent reduction had we chosen 100. These facts force us to use the difference “diff” (diff = ascore – bscore) as our dependent variable. More will be said later of the liberties that we have chosen just as easily a value of 10 to represent “No anxiety” than 0.743. Since we divided the groups by the value of the median of bscore, we have naturally divided our sample into two groups, a low anxiety group (Anxlow) with levels below 0.743 (the median of bscore) and a high anxiety group (Anxhigh) with levels higher than 0.743. Since we divided the groups by the value of anxiety, we used the technique known as Analysis of Variance (ANOVA). This technique is appropriate in our case because we are studying the effects of a categorical variable “Group” on a continuous variable, namely “diff.” This technique can tell us whether the treatments as a whole are an effective way to reduce library anxiety. We of course were also interested in determining which of the treatments were more or less effective in reducing library anxiety. This was done by calling on the regression calculations implicit in the ANOVA results. In our first estimates, we forced the regression to omit a constant given that our dependent variable represented the change in the subject’s performance that occurred as a result of the treatment. Theoretically speaking, these changes should average to zero in cases when a treatment is ineffective, so it would be presumptuous to assume some minimum level of improvement or deterioration in any of the treatment’s effectiveness, as would be the case if we introduce a constant.

In the interest of brevity, we show only the results from the best fitting ANOVA. Suffices to say that every attempt to calculate the effects of gender and the student’s major either as stand alone factors or interactively with treatments lead to results that were not statistically significant. An interesting result was the discovery that a student’s exposure to libraries as measured by the average number of visits to a library per year (LibVisit) was statistically significant. Table 2 shows the ANOVA results when using the entire sample of 74 students.

The results show that every treatment was effective in reducing anxiety. This shows up in the significance of the variable GROUP (Prob > F = 0.0000) and by looking at each one of the treatment’s coefficients; they are all statistically significant. This result is, however, uninteresting, because it implies that even doing nothing, the control group, is effective in reducing library anxiety. We next tested whether there are statistically significant differences in the effectiveness of the treatments. According to the estimated model, the average anxiety reduction by group was as follows, in order of effectiveness.

1) Group 4 (Group Instruction): -0.499
2) Group 3 (One-on-One Instruction): -0.418
3) Group 1 (Online): -0.355
4) Group 2 (Control): -0.348

All 6 paired tests of equality showed, however, that there were no statistical differences in the effectiveness of the treatments. In other words, they were all just as good. This general result was confirmed by re-running ANOVA with a constant. As expected, the constant became the only significant coefficient thus depriving the variable GROUP of any significance.

We next decided to check on the effectiveness of treatments on students with different levels of anxiety. Our hope was that some treatments were perhaps significant but only on students with say, high levels of anxiety. To this end, we divided our sample into two groups, a low anxiety group (Anxlow) with pre-score levels of anxiety below 0.743 (the median of bscore) and a high anxiety group (Anxhigh) with levels higher than 0.743. Since we divided the groups by the value of anxiety,
of the median, each of the two groups had a total of 37 students and each had a good representation of the 4 treatment subgroups.

Table 3 shows the results of ANOVA on the high-anxiety group. The results on the low-anxiety group showed that none of the treatments was significant when used on students with already low levels of anxiety. The results on the high anxiety group showed that each treatment became more effective in reducing anxiety, but again, there didn’t seem to be a clear winner. All tests for finding significant differences between the effectiveness of the treatments were all soundly rejected as not significant - again, indicating that all treatments were just as good in reducing anxiety. This result was reconfirmed when a constant was introduced, again taking all the credit for reductions in anxiety. Table 4 shows the results of these tests.

**Average Number of Visits to a Library Does Matter**

As shown on table 3, it does matter whether the student visited a library at least five times a year or not. The variable LibVisit was reconstructed to equal one if the student visited a library fewer than five times a year and to equal two if the student visited a library five or more times a year. The difference in the effectiveness of the treatments was significant for high anxiety students at better than a 99 percent level of confidence, depending on the group to which the student belonged. Figure 2 shows the significance of the variable LibVisit. Given that this variable is significant for all four treatment groups, the interpretation of this result is not completely unexpected: Library anxiety reduction is more easily accomplished by students that are more willing to visit a library, even when it is by their own efforts.

**Conclusions**

The low level of measurement (ordinal level) of how anxiety was measured, poses problems that are not insignificant. The most that can be asked of an ordinal level variable is whether a certain treatment reduces
anxiety or not. Questions such as “how much it reduces anxiety” cannot be answered by an ordinal level variable. Our attempt to answer this question depended on an arbitrary mapping of student sentiments onto a numerical canvas. The linear mapping we used (see figure 1) is but one of many possible mappings we could have used. Theoretically speaking, it is possible to find at least one mapping between sentiments and numerical values, which leads to significant differences in the effectiveness of our treatments. A nonlinear mapping such as that shown in figure 3 below came close to showing significant differences in the effectiveness of our treatments. Finding a mapping between student responses and the real number system, which makes the effectiveness of treatments significantly different to each other, is, however, a sterile exercise in that it proves nothing, and it does not represent either the intent or purpose of this study.

Figure 4 shows that regardless of the mapping used in this study, students with relatively high anxiety do best with group instruction (group 4) and worst when treated with online instruction (group 1). Further visual testimony that this is true can be seen in figure 5. This graph shows that the effectiveness of treatments is prac-

Table 3: Fall 2006 High-Anxiety Students ANOVA Results

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>14.6553235</td>
<td>5</td>
<td>2.9310647</td>
<td>11.91</td>
<td>0.0000</td>
</tr>
<tr>
<td>group</td>
<td>12.1710581</td>
<td>4</td>
<td>3.04276454</td>
<td>12.36</td>
<td>0.0000</td>
</tr>
<tr>
<td>libvisit</td>
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<td>2.3549344</td>
<td>9.36</td>
<td>0.0041</td>
</tr>
<tr>
<td>Residual</td>
<td>7.87786366</td>
<td>32</td>
<td>0.246183239</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>22.5331872</td>
<td>37</td>
<td>0.609005059</td>
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<td></td>
</tr>
</tbody>
</table>

Table 4: Test of Differences in Treatment Coefficients for High Anxiety Students

<table>
<thead>
<tr>
<th>Null Hypothesis Tested</th>
<th>F-Stat(df=1,32)</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group[1]=Group[2]</td>
<td>0.7</td>
<td>0.4032</td>
</tr>
<tr>
<td>Group[1]=Group[4]</td>
<td>0.33</td>
<td>0.5712</td>
</tr>
<tr>
<td>Group[2]=Group[3]</td>
<td>0.08</td>
<td>0.7778</td>
</tr>
</tbody>
</table>
The Effect of visits to a library was significant at better than 95%.

Figure 2: Mean Predicted Anxiety Reduction For High Anxiety Students

Figure 3: A Non-Linear Mapping between Responses and Numerical Values Centered at 10.
Figure 4: Estimated Mean Anxiety Reduction by Treatment—High Anxiety Students

Figure 5: Mean Anxiety Reduction by Percentiles of Pre-treatment Anxiety Score
tically indistinguishable for students in the bottom 50 percent of students with low pre-treatment anxiety. Excluding these low anxiety students, the effectiveness of group instruction clearly improves, while that of the online instruction clearly worsens. By the time 75 percent of students with the lowest pre-treatment anxiety are excluded (i.e. only the 25 percent of students with the greatest anxiety are considered) the difference in effectiveness between the group instruction method and the online instruction method is most striking.

Any future research on the subject will have to raise the level of measurement of how library anxiety is measured. In our estimation, the best that can be accomplished would be raising it to an interval level measurement. This is possible by asking students to select a score between, say 0 and -5 if they are unhappy with a certain aspect of the library or to choose a number between 0 and 5 if they are happy with that aspect of the library. Other limits can be chosen as well. The resulting scores would make it possible to ask which treatment is more or less effective. Questions such as which treatment yields the largest percentage reduction would still not be possible, unless of course somebody invents an instrument which measures actual levels of anxiety, such as those that exist to measure cholesterol reduction or blood pressure reduction.

Notes


3. Ibid., 162.

4. Ibid., 162.

5. Ibid., 163.

6. Ibid., 163.


8. Ibid.


10. Ibid., 151.

11. Ibid., 151.


14. Ibid.

15. Ibid., 329.


18. The levels of measurement possible for any variable in order of increasing quality are: 1) Nominal, 2) Ordinal, 3) Interval, 4) Ratio. Quality in the sense that mathematical transformations of the variable yield new information that has meaningful interpretation.