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# Questioning the Strategic Vision, LLC, Civics Studies

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Abstract: Polling organization Strategic Vision, LLC, has recently been placed under suspicion due to a refusal to release summary information and an unusual distribution of results. Previous justification has come from statistically sifting through hundreds of poll results. This paper takes a different, more particular approach. It carefully examines the reports of two surveys attributed to Strategic Vision, LLC – civics quizzes purportedly administered to high school students in Arizona and Oklahoma. These reports do not contain enough methodological information to confirm proper procedures. Published results are statistically significantly worse than those from similar studies, even considering differences between multiple-choice and free response. Furthermore, the results are significantly worse than those from a classroom group of undergraduates, even after adjusting for ability differences. Reported incorrect answers show a stunted distribution and lack an "Other" category. The combination of factors strongly suggests improper results.

Over the past few weeks, the Georgia-based polling company Strategic Vision, LLC has become entangled in controversy. The American Association for Public Opinion Research (AAPOR), a voluntary association of polling professionals not including Strategic Vision, LLC, raised objections to the lack of detail provided in their results. They gave a rare public objection (AAPOR 2009). This led others to become concerned about potential fraud. Nate Silver of the website www.fivethirtyeight.com attempted (2009) to look at published results from a quantitative simulation perspective, but his initial attempt made many debatable distributional assumptions. A later guest post, by Michael Weissman (2009), provided a better mathematical examination of poll trailing digits. Looking at the variation in multiple polls through Fourier analysis, Dr. Weissman presented a statistically significant p-value of 0.00019, evidence of doubt.

On October 7, 2009, Carl Bialik of the Wall Street Journal published an article summarizing the situation, noting that "the conflict has shed light on an inconvenient truth about widely reported political polls: Verifying their numbers is nearly impossible." This validation needs to be done on a poll-by-poll basis. This paper performs that microanalysis for two reports, studies of civics knowledge among high school students in Arizona and Oklahoma.

Matthew Ladner described the Oklahoma results in the September 2009 issue of Perspective, the magazine of the Oklahoma Council of Public Affairs (2009b). Much of the introductory text also appears in an earlier publication by Dr. Ladner, a June policy report from the Goldwater Institute entitled "Freedom from Responsibility" (2009a). Both reports are available online. The executive summary of the Arizona report states its purpose. "To determine students' level of basic civic knowledge, we surveyed Arizona high school students with questions drawn from the United States Citizenship and Immigration Services (USCIS) item bank, which consists of 100 questions given to candidates for United States citizenship." Citizenship candidates pass by correctly answering 6 out of 10 questions selected from the item bank. "The service recently reported a first-try passing rate of 92.4 percent."

Compared to citizenship candidates, the high school students were extremely ill informed. The results indicated that only 3.5% of the surveyed public Arizona high school students would pass the citizenship test. No public school student scored more than 7 out of 10. Arizona private school students passed 13.8% of the time. The Oklahoma results were worse; of 1,000 questioned, only 2.8% scored six or more. As in Arizona, no public school student gave more than 7 correct responses.

After taking the quiz, I felt the stated results were suspect. I was stumped by only one question, on the Constitution as the supreme law of the land. It is difficult to believe that my score of 9 bested every one of over 2,000 public school students. I decided to investigate more thoroughly. In this paper, the first section examines how the poll was ostensibly administered and comments on challenges in methodology. The second section focuses on how the results compare to similar studies. The third section provides the results from a quick poll of my college students and an evaluation of reported incorrect answers. Overall, in both methods and results, there are profound concerns about the quality of this data.

Methodology

Page 4 of the Arizona report contains two paragraphs about the design.

    We designed a survey instrument containing 10 of the USCIS questions (chosen at random) and administered the survey to Arizona high school students. We have information from

three groups of Arizona high school students. The first sample consists of high school students at public schools, the second of Arizona charter school students, and finally a cohort of Arizona private school students.

Strategic Vision, LLC conducted the poll of 1,350 Arizona public high school students on November 21-23, 2008. A separate sample of private school students was taken during the same period. The polls were conducted via telephone with live callers. They have a margin of error of +/- 3 percent. The telephone surveyor called a sample of Arizona high school students and read the following statement: "On the next 10 questions, I will be asking you questions about American government and history. Give me your best answer, and it is permissible to respond "I don't know.""

In the Oklahoma article, there are two separate paragraphs in the section "Oklahoma High-School Students and the U.S. Citizenship Test."

Last month OCPA commissioned a national research firm, Strategic Vision, to determine Oklahoma public high-school students' level of basic civic knowledge. The firm's surveys have been used by Time, Newsweek, and USA Today, and National Journal's "Hotline" has cited them as some of the most accurate in the country. The margin of error for this particular survey is plus/minus three percent. …

In Oklahoma, the telephone surveyors called a sample of 1,000 public high-school students and read the following statement: "On the next 10 questions, I will be asking you questions about American government and history. Give me your best answer, and it is permissible to respond 'I don't know.'"

With more details, the Arizona report is a logical place to start. One problem is an internal contradiction. The design paragraph provides the number of public school students surveyed as 1,350. Later in the document, Table 1 on page 11 lists 1,134. Because Table 1 contains more detailed results, I will assume a typographical error and use the lower count. The survey subsequently adds 136 charter school pupils and 1,350 private school students for a total of 2,620 interviews.

According to the Arizona document, Strategic Vision, LLC used live telephone interviewers to conduct these surveys over the course of three days, during the weekend before Thanksgiving 2008. While not impossible, this would be a non-trivial task. At roughly ten minutes per completed interview, at a 100% response rate roughly 20 people would be needed over the weekend. This would cost several thousand dollars. Furthermore, a sizable proportion of attempts would not succeed, demanding more calls, callers, and cash.

The document does not list the response rate or describe the sampling frame, the list of people from which subjects were drawn. Sampling frame possibilities include random digit dialing, school cooperation, and a prescreened list. Because most households do not have teenagers, random digit dialing would require a massive number of attempts. School cooperation would be easier, but it makes little sense to ask questions over the phone instead of through a more efficient classroom written test. Dialing from a prescreened list seems most likely. This would also lead to relatively good response rates, keeping survey costs down.

Other information supports the prescreened list theory. Another 2009 Goldwater Institute report deals with teenagers and high schools, "Tough Crowd: Arizona High School Students Evaluate Their Schools." (Ladner 2009c) Page 2 of this report describes the sample and sampling frame.

In November 2008, the Goldwater Institute commissioned Strategic Vision to survey Arizona public and private high school students regarding their schools. The company conducted a

poll of 1,350 Arizona public and private high school students on November 21-23, 2008. These students were randomly selected from commercially available databases, and live polls were conducted by telephone.

This description contains information about the sampling frame, "commercially available databases." Nevertheless, this account conflicts with the civics report. The dates of the poll, November 21-23, 2008, are the same. The population is the same. It would be extremely strange to conduct two separate polls of the same population at the same time, so I infer one set of interviews. However, the total sample size is very different. Instead of 2,620 total interviews, there are now 1,350. It is extremely unlikely that over 40% of people surveyed would answer questions about citizenship, but refuse to give opinions about their school. It is a sizable gap. While there are no similar comparative reports in Oklahoma, there is insufficient information to establish trust in the methodology.

Historical Comparison

The previous section examined study inputs. At the other end of analysis are outputs, the reported results. If true, the poor performance exhibited by these students argues for fairly drastic measures. Some editorial writers, including USA Today (2009), suggested that the citizenship test be made a graduation requirement. To examine the truthfulness of the outputs, I searched for prior student surveys that would either support or question these figures.

People have worried about American civics education for quite a while. For example, in 1917 Anna Michener wrote a research report about civics education in New York City public schools. Despite this enduring consternation, national representative testing began only fairly recently. The National Assessment of Educational Progress (NAEP) administered the first systematic effort in 1985 and 1986. Ravitch and Finn (1987) wrote a book about the mediocre results from this multiple-choice test. Among the 7,812 students, "the average student correctly answered 54.5 percent of the questions that he/she attempted" (page 46). Students in the top quartile did somewhat better, averaging 78.3%. (p. 145) Only a few questions had high marks; one was to choose the author of the Declaration of Independence, where 87.4% of students correctly selected Thomas Jefferson. (p. 263)

After this first examination, the NAEP began fairly regular testing in history and civics. Tests on history were given in 1994, 2001, and 2006, while civics was assessed in 1988, 1998 and 2006. Given in grades 4, 8, and 12, these tests included multiple choice and free response questions. Reports about the nationally representative samples of several thousand students are available online through the National Center for Education Statistics (2009). Two of the questions on this test appear in earlier work. On the 1994 U.S. History test, 71% of eighth graders selected Thomas Jefferson as the author of the Declaration of Independence (1996:page x). The 1988 and 1998 Civics examinations asked 12th graders about the parts of the US Congress. In 1988, 77% filled the right bubble for the House of Representatives and the Senate, while 1998 students answered correctly 72% of the time (2001:17).

Beyond the NAEP tests, in January 2008, Common Core, an organization devoted to fostering "a full core curriculum," decided to re-examine a subset of questions from the 1986 NAEP test. They employed RMA Research to conduct a nationwide telephone poll of 1,200 17-year-olds, based on names purchased from a prescreened list. Hess (2008) wrote about the results. On the 22 multiple-choice history questions, the average mark was 73%. On the Declaration of Independence question, they reported 87% correct, similar to the 1986 NAEP study (p. 7).

While these percentages are much higher than current numbers, an adjustment must be made for question format. The above NAEP results and Common Core's replication used multiple-choice questions. The Arizona and Oklahoma studies asked for a free response. As Dr. Ladner notes in the Oklahoma article, "an open-answer format represents a much higher standard than a multiple-choice-format exam." To attempt to estimate the effect of question format, I searched for a comparable scenario. Anderson and Kanzler (1985) studied high school US history classes. Control students taking a multiple-choice test averaged about 72% correct. An equivalent group of students answered the same questions in multi-digit test format. On multi-digit tests, students select a code from hundreds of possible answers. Guessing is very difficult, and results are very close to free response. This experimental group scored only 52%, almost one-third less. Other papers indicate similar or smaller differences. For instance, Duchastel (1981) tested British secondary school pupils after reading a historical passage with the same questions in multiple-choice and short-answer format. On the multiple-choice test, the mean was 9.6 out of 12, 80%, while the short-answer average was 8.2 of 12, 68%. The proportional reduction was 15%. Based on this prior research, I reduced the multiple-choice percentages by one-third to estimate equivalent open-response proportions. I also considered a very cautious scenario, where the reduction was one-half. Although this seems excessive, a 50% reduction provides a large margin of error. Statistical significance after the larger adjustment will be very strong evidence. Multiple-choice results about Thomas Jefferson, the author of the Declaration of Independence, were 87% and 87% for 12th graders, and 71% for eighth graders. I take the mean of 82% and reduce it to 55% for equivalence and 41% for the cautious scenario. According to the reports, Arizona students scored 25% and Oklahoma students 14%. On the question about the parts of Congress, the two groups of 12th graders scored 77% and 72%, a multiple-choice average of 74%. The equivalent free-response proportion is 49%, and the conservative percentage is 37%. Arizona students got this question right 23% of the time and Oklahoma students 27%.

Current students in Arizona and Oklahoma appear much less knowledgeable than prior groups. To compare historical and current results, I chose a two-sample Z proportion test. All samples claim to be representative, and all groups have large sample sizes. To remain statistically conservative, I considered all groups to have a sample size of 1,000, that of the smallest group (Oklahoma students). Moreover, I compared the historical adjusted figures to the higher state's results. The null hypothesis is that the two populations have the same proportion; the alternative is that the Arizona/Oklahoma average is less.

For the question about the two parts of Congress, the adjusted equivalent 49% versus Oklahoma's 27% yields $Z = 10.13$ and a p-value of about $2 * 10^{-24}$. The number of grains of sand on the earth is approximately $7.5 * 10^{18}$ (McAllister 1997), making this roughly equivalent to finding one particular grain of sand among all the beaches in the world. With the conservative 50% reduction, 37% versus Oklahoma's 27% yields $Z = 4.74$ and a p-value of 0.000001, one in a million.

For the question about the Declaration of Independence, 55% against Arizona's 25% gives a larger $Z = 13.69$ and an infinitesimal p-value of $6 * 10^{-43}$. At the cautious level, 41% against Arizona's 25% gives $Z = 7.56$ and a p-value around $2 * 10^{-14}$.

There is exceptionally strong evidence against the null hypothesis of equal results. Students in the new samples are either improbably less knowledgeable, or the sample is improper.

University Comparison

In addition to searching for older results, I surveyed students in my college statistics classes at Bellarmine University, a small private school in Louisville, Kentucky. On September 30 and October 5, during class time I read the questions as provided in Figure 1 of the Arizona report. Students privately recorded their responses; I had no refusals, receiving 41 completed answer sheets. I did not tell them about potential deception before the quiz; afterwards, I explained the situation and we discussed the problem.

For multiple reasons, this is not an exact comparison. First, my classes contain college students, not high school pupils. However, talking with my students, we felt that this difference was not severe. Only 5 of the 41 respondents had taken a college political science course. Overall, they felt that they would have done about the same in high school as they did now. I do not disagree with their assessment.

More importantly, the Bellarmine student population is not the same as the high school student population. My university enrolls primarily above-average students. According to data provided to US News and World Report (2009), 55% of freshmen were in the top quartile of their high school class and 83% were in the top half. Additionally, some students come from private schools, which do somewhat better in the Arizona report.

My students also thought that a few high school kids would intentionally give false answers. Since contacted people can easily refuse the phone survey, this should be infrequent, yet still possible. To account for population differences, plus the small fake answer effect, I will assume that my students come exclusively from the top 50% of the high school population, and compare their results to the upper half of each group.

Table 1 contains question-by-question results for Bellarmine, Arizona, and Oklahoma students. It also includes a column called "Adjusted Top Half." This column conservatively adjusts for the difference in samples. It takes the higher state proportion, and then assumes all correct answers came from the better half of that sample. For example, on the Bill of Rights question, the higher state result is Oklahoma at 26%. If no lower students answered correctly, then 52% of upper students would have done so. The Adjusted Top Half is 52%. Bellarmine students were 83% correct, a substantially higher score than the comparative figure.

Table 1: Question by Question Results

| Question | Bellarmine | Adjusted Top Half | Arizona | Oklahoma |
|---|---|---|---|---|
| Constitution | 10% | 60% | 30% | 28% |
| Bill of Rights | 83% | 52% | 25% | 26% |
| Two Parts of Congress | 80% | 54% | 23% | 27% |
| Supreme Court justices | 49% | 20% | 9% | 10% |
| Declaration of Independence | 78% | 50% | 25% | 14% |
| East Coast ocean | 85% | 100% | 59% | 61% |
| Major political parties | 100% | 100% | 50% | 43% |
| US Senator term | 32% | 30% | 15% | 11% |
| First President | 95% | 54% | 27% | 23% |
| Executive branch leader | 83% | 58% | 26% | 29% |

The 100% correct rate for the political party question is not surprising. My introductory statistics course (33 of the 41 responses) has covered polling, including Democratic and Republican results. They should have done very well. For purposes of computing overall averages, I will remove this question.

Examining the other questions, on the Constitution question, Bellarmine students do much worse than pupils in the states. The results for the Atlantic Ocean and term of a US Senator are consistent with the adjusted top half. On the remaining six questions, Bellarmine students do much better than the adjusted top half.

Table 2 below provides overall results, similar to Table 2 in the Oklahoma study and Tables 1, 2, and 3 in the Arizona study. Bellarmine students had a mean of 6.95 correct out of 10. Removing the question on political parties, the mean is 5.95 out of 9, roughly 66%. While not outstanding, over 40% of students scored 8 or more.

Table 2: Overall Results for Bellarmine Students

| # Correct | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| # Students | 0 | 0 | 0 | 1 | 2 | 7 | 6 | 7 | 9 | 8 | 1 |
| % Students | | | | 2% | 5% | 17% | 15% | 17% | 22% | 20% | 2% |

The appropriate comparison group is the upper half of each distribution. The upper half of the Arizona public school distribution includes the top 567 out of 1,134 scores – all students at 7, 6, 5, and 4, plus 231 students at 3. Overall, the mean is 3.92 out of 10. For Arizona private school students, the upper half mean is 4.93; for Oklahoma public school students, the upper half mean is 3.85. Even after removing the political party question, the Bellarmine mean of 5.95 is a full point higher than comparable Arizona private school students and 2 points above public school students.

The number of correct answers has no probability distribution, making it difficult to perform a test on the number of correct answers. A more computable test examines pass rate. The citizenship test requires 6 correct answers. 2.8% of Oklahoma public students, 3.5% of Arizona public students, and 13.8% of Arizona private students passed. Removing the bottom half to make an equitable comparison doubles the rates to 5.6%, 7.0%, and 27.6%, respectively. Because of the question covered in class, I increased the passing score for Bellarmine students to 7 out of 10. 25 of the 41 students, 61%, made this mark.

Statistically, for a random sample of 41 people, what is the probability that 25 or more would pass? This can be found with the binomial distribution. For the Oklahoma public school pass rate of 5.6%, and the Arizona public school rate of 7.0%, the p-value is less than $10^{-10}$, less than one in a billion. The Arizona private school rate of 27.6% makes the probability slightly more likely, 0.000008, roughly 8 in a million. This is still very uncommon.

Further evidence comes from the high end of the public school distributions. Nine of my 41 scholars got at least 9 correct. Apparently, they did better than every one of over 2,000 public school students in Arizona and Oklahoma. While I will defend the intelligence of my undergraduates, it is extremely difficult to place 20% of them above thousands of high school pupils. At least an occasional public school student would have enough interest in government to get 8, 9, or 10.

Another concern arises in the reported answer graphics, which have highly irregular distributions. A few questions have strange results, such as the Monroe Doctrine, John Adams, and Michael Jackson, yet not all do. The lack of an "Other" category in open-ended response is extraordinary. Rare answers should consistently be separated from the "Don't Know" category; if separately less than 1%, they should be grouped as "Other".

Take, for instance, the question about length of US Senate terms. About the same percentage of students correctly answered 6 years, 14.5% in Arizona and 11% in Oklahoma. The wrong answers, however, are vastly different. In Arizona, Figure 9 shows that 6% of students answered 10 years and 9% said 8. In Oklahoma, Figure 8 reports that 33% answered 10 years and 0% said 8. Apparently, no student guessed an odd number of years. In my in-class sample of 41, there was a much wider range. The most common wrong result was 2 years, given by 14 students – one more than the correct answer. Four years was next most common. I also received answers of 5, 7, 8, 9, 16, "don't know", and "life".

Conclusion

No one doubts the need for fundamental knowledge about US government. As one student remarked, "these are questions that we should know." My students were not proud of their pass rate. To properly assess the situation, advocate for appropriate education, and track changes over time, reliable accurate information needs to be obtained. Unfortunately, the Arizona and Oklahoma figures provided by Strategic Vision, LLC, do not meet the reliability standard.

- Provided methodology information is insufficient. Announced Arizona sample sizes differ from those reported from a survey given at the same time to the same population.
- Reported results come nowhere near older figures, even after adjusting for differences in question type. The comparison is highly significant.
- The Bellarmine college sample passes the citizenship test significantly more often than the comparison groups, the upper half of Arizona and Oklahoma students.
- No public school student scored 8, 9, or 10 correct, out of over 2,000 polled. For comparison, nine of 41 undergraduates reached this level.
- The distribution of incorrect responses does not include an "Other" category. The number of incorrect choices is smaller over 2,000 students then my results over 41.

Admittedly, none of this evidence is direct. Nevertheless, Thoreau once wrote, "Some circumstantial evidence is very strong, as when you find a trout in the milk" (1850). At this point, between methodology, comparisons, and incorrect answers, there are several fish in sight. The evidence strongly suggests unacceptable studies. If there is direct evidence validating the truthfulness of these results, I call upon Strategic Vision, LLC, the Goldwater Institute, or the Oklahoma Council of Public Affairs to release it.

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