

Appendix J: Analysis of Textbook References

The textbooks examined in this report contain a tremendous amount of advice on how to teach: a typical text includes 100-300 pages on the subject of instruction alone. Similarly, almost every text's recommendations are supported by copious citations, usually filling dozens of pages in the reference list at the back of the book. Examining *which* references textbook authors choose to cite provides a window into why some information is included in each text, while other information, including fundamental instructional strategies, is so often absent.

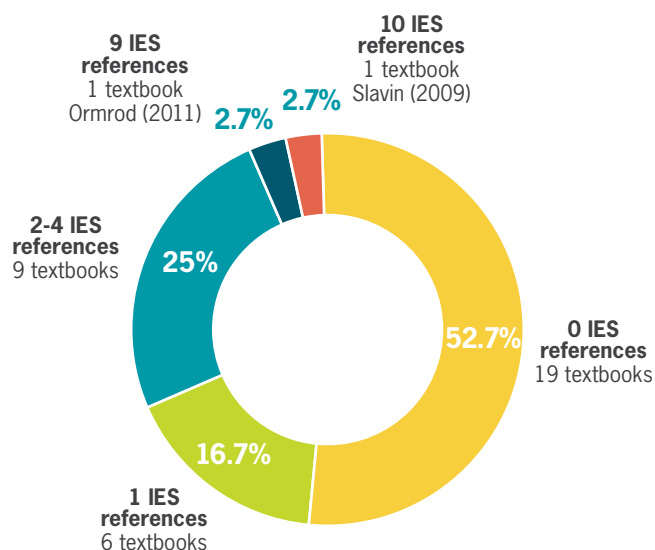
In general, the analysis described in this appendix clearly indicates that the panel of experts that wrote the IES practice guide and textbook authors are drawing on different sources to undergird their discussions of instructional practices. Examination of a sample of the studies which are cited by multiple textbooks indicates that only a small minority have the potential to meet IES research design standards.⁷

To what extent do the IES practice guide *Organizing Instruction and Study to Improve Student Learning* (Pashler et al., 2007) and the assigned textbooks in the sample for this report share a research base?

The IES guide cites 114 journal articles, books, and book chapters (referred to here as “IES references”) that provide the research foundation supporting the six fundamental instructional strategies featured in this report. We examined the reference lists of 36 of the 48⁸ instructional methods and educational psychology textbooks in our sample to see how many of these 114 publications they likewise cited.⁹ We find minimal overlap between the IES references and those cited in the textbooks.

On average each required textbook cites 1.5 of the 114 IES references, or 1.3 percent. Across the 36 textbooks, there are a total of 54 citations to IES references; any individual textbook has between zero and 10 citations of the IES references. Specifically:

Figure J1.



Most of the texts did not cite any of the references in the IES guide.

- 7 More information on the IES's standards is provided in Seftor, N., et al. (2014). What works clearinghouse: Procedures and standards handbook 3.0. Washington, DC: Institute of Education Sciences, US Department of Education.
- 8 Most of the single-subject methods texts were not included in this group because they were not added to the sample pool until after this analysis was conducted.
- 9 The analyses described in this appendix took into account that an investigator or group of investigators may author several different articles describing the results of substantially similar research.

The 54 cites by the textbooks to IES references refer to 26 different publications; in other words, 22.8 percent of the IES references were cited at least once, while 88 (77.2 percent) were never cited. The most commonly cited sources — all related to the strategy of **posing probing questions** — are:

- Palincsar, A. S., & Brown, A. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction*, 1, 117-175. **[Cited in 10 textbooks]**
- Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of Educational Research*, 66, 181-221. **[Cited in 5 textbooks]**
- King, A. (1994). Guiding knowledge construction in the classroom: Effects of teaching children how to question and how to explain. *American Educational Research Journal*, 31, 338-368. **[Cited in 4 textbooks]**
- Dillon, T. J. (1988). *Questioning and teaching: A manual of practice*. New York, NY: Teachers College Press. **[Cited in 4 textbooks]**

One possible explanation for these differences could be that textbook authors may have an incentive to use the newest citations possible. For example, their publishers may pressure them to update citations in each subsequent edition of a book. This practice would compel authors to substitute secondary sources for primary sources (such as the primary sources cited in the IES guide) in the process. While we did not comprehensively evaluate this possibility, we found evidence suggesting that it is not the case: We examined the publication dates of the references in five textbooks in the sample and compared them to publication dates of references in the IES guide. We found that the references cited in the IES guide were slightly newer than those cited in the textbooks, not older, making the IES guide references *more* likely to meet with a publisher's approval should the publisher care about keeping a textbook looking current: Almost half (49 percent) of references in the IES guide were published in the last 15 years, compared to 40 percent of textbook references. We also checked to see if texts in our sample that were published after the IES guide were more likely to reference sources mentioned in the guide, but they were not.

Do the textbooks within our sample show greater overlap in their research base than they do with the IES practice guide?

To address this question, we selected six research-focused, frequently assigned books from our original sample of books. The resulting subsample includes five educational psychology textbooks (Bohlin, et al, 2009; Eggen & Kauchak, 2010; Ormrod, 2011; Santrock, 2009; Woolfolk, 2010) and one general methods text (Marzano et al., 2001). The number of references in these texts ranges from 290 (Marzano et al.) to 3189 (Ormrod), with an average of 1793. We compared the reference list of each text with that of four other texts in the subsample, resulting in a total of 12 comparisons as shown in Figure J2.

Figure J2.

Text A	Text B	Number of references in Text A	Number of references in Text B	Number of shared references	Percent agreement
Bohlin et al.	Eggen & Kauchak	1959	1438	184	12.80%
Bohlin et al.	Marzano et al.	1959	290	28	9.66%
Eggen & Kauchak	Ormrod, J. E.	1438	3189	315	21.91%
Eggen & Kauchak	Santrock, J W	1438	2083	183	12.73%
Marzano et al.	Woolfolk, A. E.	290	1798	19	6.55%
Marzano et al.	Eggen & Kauchak	290	1438	15	5.17%
Ormrod, J. E.	Marzano et al.	3189	290	34	11.72%
Ormrod, J. E.	Santrock, J W	3189	2083	205	9.84%
Santrock, J W	Bohlin et al.	2083	1959	186	9.49%
Santrock, J W	Woolfolk, A. E.	2083	1798	189	10.51%
Woolfolk, A. E.	Bohlin et al.	1798	1959	277	15.41%
Woolfolk, A. E.	Ormrod, J. E.	1798	3189	324	18.02%

These texts share an average of 12 percent of their references with each other, but only cite 1.3 percent of the references found in the IES guide.

As previously reported, each textbook in the full sample cites on average only 1.3 percent of the IES references; for the subsample shown above, the proportion of IES reference cited rises to 4.0 percent. In contrast, each pair of textbooks in the subsample shows a 12 percent overlap on average.¹⁰ These statistics indicate that there is more agreement among textbooks than between the textbooks and the IES guide, but that this by no means constitutes consensus among textbooks about educational research most important for training future teachers.

What are the characteristics of the most commonly cited publications in textbooks within the sample for this report? Why were they not cited in the IES guide?

To understand what types of references are most commonly cited by the textbooks in the sample for this report, we examined references that are cited by multiple textbooks but not by the IES guide. Specifically, we examined the references cited by four texts that are among the most commonly used, research-focused texts in the full sample, including two methods texts (Marzano et al., 2001 and Orlich et al., 2010) and two educational psychology texts (Bohlin et al., 2009 and Woolfolk, 2010).¹¹ These texts were compared in pairs, with each pair including at least one methods text (as shown in Figure J3) because we wished to identify references relevant to instruction. If educational psychology texts were paired, it was likely that a large proportion of their common references would relate to topics besides instruction, such as the structure of the brain.

10 The overlapping percentage of references for each textbook pair was calculated by dividing the number of mutual references by the lower total number of references.

11 The subsample for this analysis contains more methods texts and fewer educational psychology textbooks than the previous subsample because it was necessary for each pair of texts to include a methods text.

Figure J3.

Text A	Text B	Number of shared references
Marzano et al.	Orlich et al.	10
Marzano et al.	Bohlin et al.	29
Marzano et al.	Woolfolk	21
Orlich et al.	Bohlin et al.	37
Orlich et al.	Woolfolk	38

A total of 101 references were shared between two or more of the four texts.

We identified 101 “overlapping” references within these pairs of texts, including 76 references cited by 2 texts, 24 cited by 3 texts, and 1 (Mager, 1962) cited by all 4 texts in this subsample. Just 1 of these 101 references is also cited in the IES guide: Palincsar & Brown (1984), a reference which supports the strategy of **posing probing questions**. Given that the other 100 publications were deemed critical sources on instruction by more than one textbook author, one might ask why they were *not* included in the IES guide.¹² While some may have been outside the scope of the IES practice guide, their most salient feature is that they lack the quality sufficient to meet IES standards.¹³

Of the 100 references shared by at least two textbooks but not by IES, 58 were related to instruction; that is, they concern instructional strategies or design, classroom assessment, or cognitive psychology. Of these 58 references, 38 (65.5 percent) are secondary sources including books, book chapters, and journal articles providing description and/or commentary on research on varied aspects of instruction. The remainder (34.5 percent) consists of primary sources, including reports of individual empirical studies, meta-analyses, and systematic literature reviews. In comparison, the IES reference guide cites mostly primary sources (85.1 percent); only a few secondary sources are referenced (14.9 percent).

This comparison suggests that textbook authors are relying on non-systematic research summaries and other writers’ opinions much more often than the IES panel did.

The 20 overlapping references identified as primary sources potentially present the strongest evidence for how teachers should use their instructional time. The references were all published prior to the IES guide, and thus they all potentially could have been included. However, all but four have clear problems in their design that limit or negate the validity of their conclusions. These problems fall into 6 main categories and Figure 4J shows how often they occurred.

- **Small sample size:** Fewer than 50 participants, based on considerations that (a) 52 participants (26/group) is minimum number needed to detect a large effect when conducting a 1-way ANOVA with 2 groups¹⁴ and (b) if a study is conducted in classrooms, with classes averaging about 25 students, then a sample of 50 means probably only 2 classes (1 treatment and 1 control group) included, which is not sufficient for ruling out whether treatment and teacher effects are confounded
- **Lack of internal validity:** Study design makes it difficult to infer causal relationships, e.g., all teachers at each participating school assigned to same condition, making it unclear whether treatment or school variables responsible for outcomes, or no evidence of pre-test equivalence for groups in a quasi-experiment
- **Lack of external validity:** Findings very limited in generalizability, e.g., focuses on a highly specific student group such as middle school students struggling with basic arithmetic. Does not show effects across grade levels or subject areas.

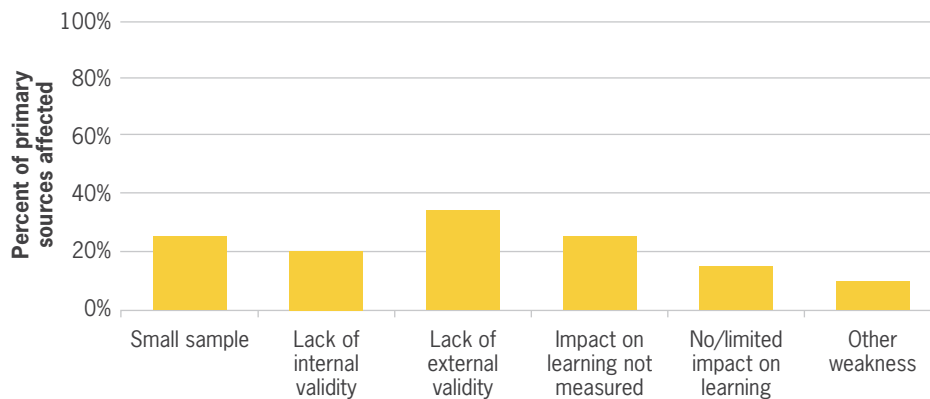
12 While some IES materials only include IES-funded studies, this is not the case for the practice guides.

13 See p. vi of Pashler et al. (2007) for information on the levels of evidence applied in the IES guide, including information on the characteristics of research suitable for use as evidence.

14 Stangor, C. (2004). *Research methods for the behavioral sciences*. Boston, MA: Houghton Mifflin.

- **Does not measure impact on learning:** Focuses on instruction but does not examine impact of strategies(s) on students' learning or achievement — critical outcomes for evaluating efficacy of instructional variables
- **No/limited impact on learning:** Focuses on instruction and includes students' learning or achievement outcome variable(s), but findings indicate little if any positive impact on them
- **Other weakness:** E.g., methodology minimally described (making it impossible to determine potential validity issues); authors make large interpretive leaps from brain research to instructional applications

Figure J4. Why do textbook sources not meet the IES's standards?
(n = 20)



The bars sum to greater than 100 percent because we identified as many as three reasons that a single reference did not meet the IES panel's standards.

One especially worrisome finding is how frequently textbooks reference studies clearly lacking internal validity, that is, 20 percent of the studies referenced showed design problems that make it impossible to determine if the focal independent variable in a study was truly a *causal agent*.

None of the above analyses explains *why* the sources cited by the IES practice guide are rarely (or never) referenced in the textbooks in our sample. Are the authors of the textbooks unaware of this research? Is the information these studies convey so far from the accepted wisdom that they are simply ignored? In any case, it is worth asking why this seminal research is not cited more often.