

Helpdesk Report: Evidence of the value of textbooks

Date: 8 August 2013

Query: What is the evidence of the value of primary and secondary students having access to a range of quality textbooks in low-resource, low-capacity situations? For example, is there evidence that textbooks can help to improve student and teacher attendance and student learning outcomes? What are the complementary actions that can help to maximise the value of providing textbooks where none or few exist at present?

Enquirer: DFID Ghana

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1. Overview

Evidence for this report was found spanning many years. The following section of this helpdesk report includes the more recent evidence which is less positive than earlier research. Study findings include:

- No average impact of textbooks on student scores, although a positive impact for students at the top of the socioeconomic distribution is found. (Kuecken & Valfort, 2013).
- Textbooks increase the scores of students with high pre-test scores but had little effect on other students. (Glewwe et al., 2009)
- Textbook availability and school resources appear to be capable of countering socio-economic disadvantage, particularly in low-income settings. (UNESCO, 2005)

Glewwe et al. (2011) review the literature from 1990 to 2010. Including all studies they find the evidence strongly suggests that textbooks and similar materials (workbooks, exercise books) increase student learning. When the review is restricted to higher quality studies only the evidence that textbooks and similar materials increase student learning is quite weak.

Results from earlier studies, in section four of this report, include:

- Text book supply was found to be the most one of the most effective ways to improve test scores in Ghana. (World Bank, 2004)

- It is possible to double the rate of reading acquisition of primary school pupils with a "Book Flood" of about 100 high-interest books, per class, and short teacher training sessions. (Elley, 2000)
- No difference on average between schools which had received textbooks and comparison schools except for students who were already high achievers. (Glewwe, 1998)
- An unstable relationship between textbook availability and test scores in the Philippines but availability of workbooks consistently increasing achievements. (Tan et al. 1997)
- Evaluation of a textbook project in Lesotho in 1981 found school attendance was more regular and exam results improved. (Heyneman & Farrell, 1989)
- Improvement in test scores for members of the 1977-78 World Bank textbook project in the Philippines. (Heyneman & Jamison, 1984)
- Availability of textbooks increased student test scores in Nicaragua. (Jamison et al., 1981)

Section five provides some notes on making textbooks effective and a textbook rental scheme for making the most of textbooks where none or few exist. Evidence elsewhere in this report suggests there are benefits to textbook sharing.

2. Evidence since 2005

When do textbooks matter for achievement? Evidence from African primary schools

Kuecken, M. & Valfort, M. 2013. *Economics Letters*, 119, 311–315

<http://mariakuecken.files.wordpress.com/2012/05/kueckenvalfort2013.pdf>

This study analyses the impact of textbook ownership in addition to sharing in 11 sub-Saharan African countries. The study finds no average impact of textbooks on student test scores, although a positive impact for students at the top of the socioeconomic distribution is found. Moreover, this impact arises solely from textbook sharing. This result is consistent with the fact that sharing is associated with positive externalities via knowledge transfers, an effect that simple textbook ownership does not produce.

Many Children Left Behind? Textbooks and Test Scores in Kenya

Glewwe, P., Kremer, M. & Moulin, S. 2009. *American Economic Journal: Applied Economics*, 1 (1), 112–135.

<http://www.povertyactionlab.org/publication/many-children-left-behind-textbooks-and-test-scores-kenya>

A randomised evaluation in rural Kenya finds, contrary to the previous literature, that providing textbooks did not raise average test scores. Textbooks did increase the scores of the best students (those with high pre-test scores) but had little effect on other students. Textbooks are written in English, most students' third language, and many students could not use them effectively. More generally, the curriculum in Kenya, and in many other developing countries, tends to be oriented toward academically strong students, leaving many students behind in societies that combine a centralised educational system; the heterogeneity in student preparation associated with rapid educational expansion; and disproportionate elite power.

One possible reason why students with high initial achievement may benefit more from textbooks is that those books are too difficult for other students to use effectively. Indeed, the median students in lower grades seem to have difficulty even reading the textbooks. Differences in whether students took textbooks home may explain part, but not most, of the differential impact of textbooks across weak and strong students. Students in grades 6–8

were allowed to take textbooks home, but younger students were not. Grades 6–8 students in textbook schools who took the textbooks home had higher average pre-test scores (0.21) than those who did not (-0.03), a difference significant at the 1 percent level.

Evidence from another source, the grant program conducted in the 25 schools, further supports the hypothesis that textbooks were best suited for the strongest students. One possible reason for the absence of an effect of textbooks on average scores is crowding out, i.e. other efforts to improve schools may have declined in response to textbook provision. Another possibility is that the tests were too hard for most students. This would explain both little or no impact on most students and the significant impact on the best students (for whom the tests may have been appropriate).

EFA Global Monitoring Report, Chapter 2: The impact of education quality on development goals

UNESCO, 2005.

http://www.unesco.org/education/gmr_download/chapter2.pdf

The International Association for the Evaluation of Educational Achievement (IEA) surveys suggest that although socio-economic status is influential in determining achievement in all contexts, textbook availability and school resources appear to be capable of countering socio-economic disadvantage, particularly in low-income settings. IEA surveys show a strong impact of increased textbook use on student learning in less developed countries.

Peer effects and textbooks in African primary education

Frölich, M. & Michaelowa, K. 2011. 18 (4), 474–486.

<http://www.sciencedirect.com/science/article/pii/S0927537110001296>

Textbooks could be a cheap and efficient input to primary school education in Africa. In this paper, the authors examine the effects of textbooks on student outcomes and separate between direct effects and externalities. Using the rich data set provided by the 'Program on the Analysis of Education Systems' (PASEC) for five Francophone, sub-Saharan African countries, this paper goes beyond the estimation of direct effects of textbooks on students' learning and focuses on peer effects resulting from textbooks owned by students' classmates. Using nonparametric estimation methods, we separate the direct effect of textbooks from their peer effect. The latter clearly dominates but depends upon the initial level of textbook availability.

Research Highlights:

- This study estimates non-parametrically the effects of textbooks in Francophone African primary education.
- Textbooks turn out to have a large externality on other classmates.
- Externality on classmates is much larger than the own effect, but only because classes are so large.
- Effects of textbooks are larger for French than for Math.
- The externalities of textbooks are mildly nonlinear.

CSU/USAID Textbooks (Teaching) and Learning Materials Program (TLMP) Ghana: Program Assessment Report. (2011).

Gahungu, A. et al. 2011. USAID

<http://www.csu.edu/TLMP/documents/TLMPAssessmentReportfinalweb.pdf>

On assessment of the TLMP for Kindergartens parents, teachers and administrators had observed improvement in pupils' achievement. Thanks to the attractive layout and the culturally sensitive contents, children's learning appeared to be improving. The children related to the materials learned, and could retain the information better. The majority of respondents reported that the TLMP materials were better than other materials used in the Basic Education curriculum, and they wanted the TLMP programme to be expanded to the upper elementary grades (P4-P6) and the rest of the country.

3. Independent review of the literature from 1990 to 2010

School Resources and Educational Outcomes in Developing Countries: A Review of the Literature from 1990 to 2010

Glewwe, P. et al. 2011. NBER working paper 17554.

<http://faculty.apec.umn.edu/pglewwe/documents/Edinput7.pdf>

This paper examines studies published between 1990 and 2010, in both the education literature and the economics literature, to investigate which specific school and teacher characteristics, if any, appear to have strong positive impacts on learning and time in school.

The authors identify there are 60 estimates from 21 different studies on the impact of textbooks and workbooks. Although these studies are not unanimous in their estimates, most of them (36) find positive effects, and most of these (26) are significantly positive. This is what almost anyone would expect, and the number of estimates that are negative and significant is quite small (four estimates from three studies). Thus this evidence strongly suggests that textbooks and similar materials (workbooks, exercise books) increase student learning.

When the authors restricted review to higher quality studies the estimated effects are far from unanimous: slightly less than half of the estimates (9 out of 21) find positive effects, but only three of these are significantly positive (and one is significantly negative). Thus, after dropping less rigorous studies, the evidence that textbooks and similar materials (workbooks, exercise books) increase student learning is quite weak. The review also finds that textbooks do not have a strong effect on students' time in school. Two out of seven studies yielded significant results of textbooks/workbooks increasing time in school

4. Evidence from 1978-2004

Books, Buildings, and Learning Outcomes: An Impact Evaluation of World Bank Support To Basic Education in Ghana

World Bank, 2004.

http://ieq.worldbankgroup.org/Data/reports/report_28779_basic_education.pdf

The World Bank provided resources to Ghana for school building and rehabilitation, and text book supply. Evaluation found Bank-financed textbook provision accounts for around one quarter of the observed improvement in test scores. Text book supply was found to be the most one of the most effective ways to improve test scores.

Test score analysis finds it is always the case that schooling is positively and significantly related with higher test scores — and this remains so even if just one or two years of

schooling are included in the model. However, interacting school quality variables with years of schooling does not yield good results. A few of the school qualities have a “shift effect” on test score outcomes, notably math textbook availability is significant in some, but by no means all, model specifications. Textbook availability has the right sign in all four study cases for Junior Secondary Schools and is always significant. This is the case only for math books at primary level (English books are negative but insignificant).

The Potential of Book Floods for Raising Literacy Levels

Elley, W.B. 2000. *International Review of Education*, 46 (3-4), 233-255
<http://link.springer.com/content/pdf/10.1023/A:1004086618679.pdf#page-1>

The problem of raising literacy levels in developing countries is particularly challenging when pupils have their schooling in a non-native language. One promising strategy which has been tried and evaluated in the schools of several developing countries is the Book Flood approach. This article summarises the findings of Book Flood studies in Niue, Fiji, Singapore, Sri Lanka, South Africa, Solomon Islands, and several other countries.

The evidence is now strong that it is possible to double the rate of reading acquisition of Third World primary school pupils with a "Book Flood" of about 100 high-interest books, per class, and short teacher training sessions. The benefits for reading skill and enthusiasm are consistent across diverse cultures, mother tongues and age levels, and they appear to generate corresponding improvements in children's writing, listening comprehension, and related language skills. Such skills are typically found to develop very slowly under traditional textbook styles of teaching.

The problems of cost per school and cultural suitability of imported books are addressed. Several countries have adopted Book Flood programmes on a national scale, and others are currently planning to do so.

Textbooks and Test Scores: Evidence from a Prospective Evaluation in Kenya. Work-in-Progress

Glewwe, P., Kremer, M. & Moulin, S. 1998. *Natural Field Experiments* 00255.
http://www.econ.yale.edu/~egcenter/infoconf/kremer_paper.pdf

This paper evaluates a programme through which a Dutch non-profit organisation provided textbooks to 25 rural Kenyan primary schools that were chosen randomly from a group of 100 candidate schools. After one school year, average test scores did not differ substantially between programme and comparison schools. However, for those students in the top quintile of the distribution of initial academic achievement, the program raised test scores by at least 0.2 standard deviations.

Putting Inputs to Work in Elementary Schools: What Can Be Done in the Philippines?

Tan, J., Lane, J. & Coustere, P. 1997. *Economic Development and Cultural Change*, 45(4): 857-879
<http://www.jstor.org/discover/10.1086/452310?uid=3738032&uid=2&uid=4&sid=21102524625377>

This article examines the influences on student achievement in elementary education in the Philippines. The coefficients for textbook availability and test scores identified are highly unstable and conclusions on influence cannot be ascertained. In contrast, the availability of workbooks consistently increases achievements.

Textbooks in the Developing World. Economic and Educational Choices

Heyneman, S.P. & Farrell, J.P. 1989. The Economic Development Institute of the World Bank.

<http://www.vanderbilt.edu/peabody/heynean/PUBLICATIONS/198904.pdf>

This report includes a case study of Lesotho where a text book project implemented by the World Bank in 1981. An evaluator found school attendance was more regular and exam results improved.

How Textbooks Affect Achievement in Developing Countries: evidence from Thailand

Lockheed, M.E., Vail, S.C. & Fuller, B. 1986. Educational Evaluation and Policy Analysis, 8 (4).

<http://www.jstor.org/discover/10.2307/1164195?uid=3738032&uid=2&uid=4&sid=21102511130971>

For the past decade, researchers have documented the effects of textbooks on achievement in developing countries, but no research has explored the mechanisms that account for this contribution. This paper analyses longitudinal data from a national sample of eighth-grade mathematics classrooms in Thailand and explores the effects of textbooks and other factors on student achievement gain. The results indicate that textbooks may affect achievement by substituting for additional post-secondary mathematics education of teachers and by delivering a more comprehensive curriculum.

Textbooks in the Philippines: Evaluation of the Pedagogical Impact of a Nationwide Investment

Heyneman, S.P. & Jamison, D.T. 1984. Educational Evaluation and Policy Analysis, 6 (2), 139-150

<http://www.vanderbilt.edu/peabody/heynean/PUBLICATIONS/198402.pdf>

The Philippine government, with the assistance of the World Bank, launched the \$US37 million Textbook Project to alleviate the lack of textbooks in the nation's public schools. Prior to this investment, there was an average of 10 pupils for every book available in a given subject. During the first year of implementation, the Textbook Project produced approximately 20 million first and second grade textbooks in science, mathematics, and Pilipino. These were distributed nationwide in the 1977-78 school year at a ratio of two pupils per book. The Evaluation Section of the Textbook Project was formed primarily to investigate the effects of this sizable investment on student achievement. One year before the first sets of textbooks were distributed, an evaluation plan was designed, and instruments were developed to measure these effects. The plan was implemented during the first year of textbook distribution and has been a continuing component of the Textbook Project. The results presented in this paper were obtained from the first-year evaluation data.

All achievement test scores in science, mathematics and Pilipino were strongly influenced by membership in the Textbook Project. The evidence suggests that the intervention was more effective on children whose backgrounds were impoverished.

Improving Elementary Mathematics Education in Nicaragua: An Experimental Study of the Impact of Textbooks and Radio on Achievement

Jamison, D.T. et al. 1981. Journal of Educational Psychology, 73 (4), 556-S67

<http://www.vanderbilt.edu/peabody/heynean/PUBLICATIONS/198102.pdf>

This article reports an experimental study of the impact of textbook availability on mathematics achievement of students in Nicaraguan first-grade classes. This intervention is

compared with control classes in which textbooks are relatively rare and with a radio-based instructional programme that uses student worksheets but no other textual material. Classes were assigned at random to the three conditions. The control and two treatment groups scored similarly on a pre-test of mathematical readiness. Both the textbook and the radio treatments had significant positive effects on achievement. Availability of textbooks increased student post-test scores by about 3.5 items correct, approximately .33 of a standard deviation. Availability of the radio instructional program increased student post-test scores 14.9 items, about 1.5 standard deviations. Both interventions reduced the achievement gap between urban and rural students. However, the question remains whether either radio or textbook use is sufficiently powerful to close the substantial achievement gap that exists between the schools of high- and low-income societies.

Textbooks and Achievement: What We Know

Heyneman, S. P., 1978. World Bank Working Paper 298.

<http://www.vanderbilt.edu/peabody/heyne/man/PUBLICATIONS/197801.pdf>

This paper reviews the published evidence from less industrialised societies on the relationship between textbook availability and academic achievement. Data are available from twelve countries. Though there were differences in the way these studies were designed, and in the way the data were handled, the importance of books vis-a-vis other school investments justifies attention. From the evidence so far, the availability of books appears to be the most consistent school factor in predicting academic achievement. It is positive in 15 of the 18 statistics (83%). This is, for example, more favourable than the 13 of 24 (54%) reported recently for teacher training.

5. Further resources on textbook provision

Textbook Provision and the Quality of the School Curriculum in Developing Countries: Issues and Policy Options

Crossley, M. & Murby, M. 1994. *Comparative Education*, 30 (2), 99-114.

<http://www.tandfonline.com/doi/abs/10.1080/0305006940300203#.UfuEMdl3uSo>

Increased access to textbooks that are, in the words of the World Bank, "pedagogically sound, culturally relevant and physically durable", is currently recognised as one of the most cost-effective ways of improving the quality of education in developing countries. The significance of this issue is all the more pertinent given the emergence of international concern with strategies designed to improve the quality of basic education in such contexts.

In this article the authors have drawn attention to the complexity of the textbook development process, arguing for increased attention to be given to the formulation and co-ordination of such initiatives by educational planners and policy-makers at the highest levels. The analytical framework presented is designed to assist in this process—demonstrating that there is no one right answer common to all socio-cultural contexts. The four models outlined do not cover every possibility but they do draw attention to the strengths and limitations of a range of policy options, and help to demonstrate how successful textbook development must be closely aligned to local needs and the specific characteristics of differing national contexts. Reflecting upon the Papua New Guinean case study it is clear that all four strategies may have a part to play in large scale textbook initiatives. Similarly, a mixture of state and private sector involvement may prove most effective—and some writers suggest that extensive commercial involvement may be most appropriate for books aimed at the secondary and tertiary sectors. The best policy option thus depends upon the nature of the task in hand, specific contextual factors, and the judgement of those involved in the light of a thorough situational analysis.

Textbook Formats and Visual Effects on Learning for Beginning Readers. Literature Review and Recommendations for the World Bank's Education for All Fast Track Initiative Project

Praphamontripong, P. 2010. Desk review for the World Bank's Education for All Fast Track Initiative Project.

<http://www.globalpartnership.org/media/cop%20meeting/resources/textbooks/Textbook%20Formats%20and%20Visual%20Effects%20on%20Learning%20for%20Beginning%20Readers-%20Prachayani%20Praphamontripong,%20PhD.pdf>

Textbooks vary enormously in terms of two aspects of the fonts used: font-size and font-face. Sans-serif font-faces separate one character from the next and leave more white space in between, making it easier to read. Although existing studies did not mention clearly which fonts should be used for early grade instruction, comparisons of early grade reading textbooks from many countries carried out in this report indicates that sans-serif fonts are mostly used. As to whether calligraphy improves reading fluency, there seems to be no evidence on this issue. Additionally, most first grade textbooks can be characterised by incremental densities of words and lines per page, reflecting a steep learning curve of first graders over the course of the school year. Even so, the search for empirical evidence confirming this practice in developing country context is lacking. There is no evidence of the appropriate minimum number of words and/or pages that would effectively enable first graders to learn the basic letters of their language with sufficient practice to raise reading fluency to about 25 words per minute. Nor is there evidence showing a cognitive or reading fluency advantage to a textbook with 4,500 words in contrast to another with only 2,000 words. Existing studies in industrialized countries report that in general there are approximately 4-8 words per line and about 6-8 lines per page in most first grade reading textbooks.

Illustrations and graphics are common elements of reading textbooks worldwide. It is believed that illustrations are more beneficial for children at a reading-to-learn stage (typically the initial grades of primary education) as opposed to a learning-to-read stage. Textbooks accompanied by illustrations are meant to improve children's memories of a text; they also enable young children to make one-to-one links between visual objects and words and serve as good eye-catching attractions for young readers. However, if applied ineffectively, illustrations may confuse young children especially when there are changes in scale. They may also harm children's attention to word-level features, especially when the number of difficult words being used is high.

Despite higher printing costs, colours in textbooks can impact the learning process if applied functionally and effectively. Existing studies showed that consistent use of particular coloured texts can help children to quickly memorise a pattern of words and sounds and that usage of coloured overlays and coloured paper may increase the readability on textbooks. Therefore, there is some evidence that the costs of coloured textbooks are worth the benefit.

Little evidence exists to guide textbook writers regarding the optimal ratio of graphics to text. Existing research emphasises that consistency in the positioning of illustrations and texts is crucial in textbook design because of their instructive roles. Textbook layout should support a situation where the learner's focus of attention often swings back and forth from one place to another. As such, the implication is that textbook illustrations should not be inserted just to fill up empty spaces on a page.

The durability of textbooks depends largely on the kinds of papers used. Art paper quality is one of the highest quality papers found in textbooks while newsprint is the lowest quality. Typically the paper used in textbook printing is low white offset. In order to maintain a textbook for 3 years or more, UNESCO suggests that paper with archival characteristics (rather thick, heavy, and difficult to be torn) is most suitable (e.g., art papers). The size of textbooks is also an important element as it determines the size of the overall visual display.

The most common and economically effective size is A4. Existing research emphasises that various technical matters (such as the choice of paper, type-size and type-face, the kind of printing technology, the number of copies to be printed) affect textbook quality and price. Additionally, the importation of paper can increase costs and represents a major problem in many African countries.

While major colonial languages (English, Portuguese, Arabic, and French) have been imposed as official languages in various African countries, the use of indigenous or local languages (such as Swahili) as media of instruction has been growing. African students have difficulties in following classroom instructions and thus perform poorly in standardised tests in contexts where their understanding of the official language of instruction is poor. In schools where mother tongues are absent, students' competence to understand what the teacher says suffers, which results in greater repetition. Few studies were found that explicitly investigate effective strategies for structuring a textbook for phonics teaching in the given language and script. Existing publications simply suggest that schools should use bilingual textbooks and other instructional materials where both mother tongue and official languages are printed side by side. They also mention the application of scripts of official languages to form a word in local languages. Using a story or some literature source that students are already familiar with in their local languages in a textbook may benefit their ability to learn to read.

A Guide to Sustainable Book Provision

Askerude, P. 1993. UNESCO

http://www.unesco.org/education/blm/chap4_en.php

Many countries in Asia base important school leaving and school promotion examinations entirely on textual recall from an established and prescribed textbook. The textbook thus assumes far wider importance in poorer countries than in more developed countries where there is a wider variety and availability of alternative materials, viewpoints and sources.

How Do Teachers Use Textbooks and Other Print Materials? A Review of the Literature

Moulton, J. 1994. Improving Educational Quality Project. Institute for International Research, USAID

<http://www.pitt.edu/~ginie/ieq/pdf/textbook.pdf>

This paper reviews World Bank research which concludes that textbooks make more of an impact on student achievement than other inputs. The methodology of this research was based on the availability of textbooks in the classroom and rarely established links between availability and use. This is interesting because the two studies in which use is examined reveal a wide gap between the availability of textbooks and their use by teachers and students. This raises the issue of whether textbook availability is truly a significant input or merely a proxy for other variables that distinguish more effective schools from less effective ones. The policy implication of the World Bank research is that limited resources should go to textbooks prior to other inputs, such as teacher training.

Other findings of the review include:

- Teachers seem to develop their own patterns of using materials, which they keep from year to year and textbook to textbook.
- Teachers vary considerably in what these patterns look like and why they adopt them.
- While politicians and others outside the classroom tend to think textbooks dominate the classroom, teachers often view them as only one of several tools. Some use them effectively; others may misuse them.

- It is difficult to find out how teachers use textbooks without actually observing them do so. Likewise, it is difficult to find out what they think about their use without actually asking them.

Uzbekistan: Education

ADB, 2010.

<http://www.oecd.org/countries/uzbekistan/47178666.pdf>

Assessment of ADB's Basic Education Textbook Development Project (BETDP) found it to be highly effective and sustainable. This was because it introduced a transparent and innovative textbook rental scheme (TRS), and arranged that the proceeds of textbook rentals be deposited in bank accounts controlled by the schools. Reports concluded that significant reforms had been started and pursued sensibly; and that the TRS had shifted one set of significant costs from the budget to the students, while allowing for the very poor to borrow textbooks from schools. The TRS was found to have a solid basis for sustainable provision of affordable textbooks to students in basic education, as reflected in the high collection of rental fees. While about 15% of students are unable to pay the rental fees, they are financed by the government from its budget, amounting to approximately 0.3% of its expenditure in the education sector, with no significant budgetary impact.

6. Additional Information

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