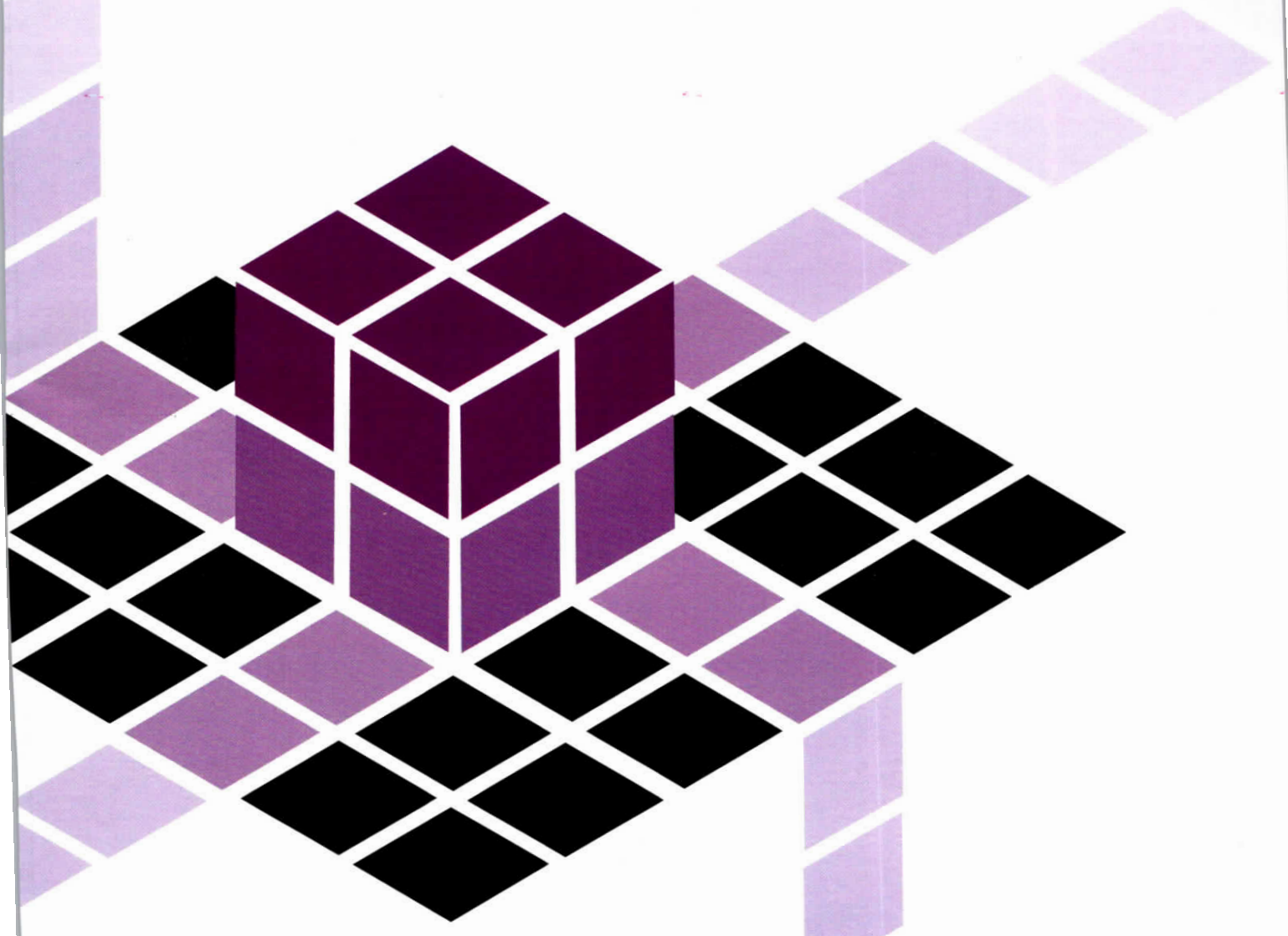
Addendum

Understanding in the Library

Treasure Mt. research retreat #12



Hi Willow Research and Publishing

Addendum to

Understanding in the Library

Treasure Mt. Research Retreat #12

2005

Hi Willow Research & Publishing

Contents:

Notes on Ross Todd's Update of Research

Teacher Training for Diversified Instruction and Assessment: Overview of a Program for Elementary School 4th Grade Classrooms

Linda Jarvin
Yale University

What's the idea behind this program?

Suppose it were the case that many children had the ability to achieve at higher levels in school, but were failing to do so for a reason that could easily be corrected?

This program rests on the notion that this supposition is, in fact, true. Its aim was to implement three different methods of instruction and assessment at the 4th grade level. Because we believe that a change in students' learning must start with changes in teaching, we focused our efforts on working with teachers. Our goal was to show that implementing any one of three kinds of teaching in 3 subject-matter areas (language-arts, mathematics, science) would result in improved teaching and student outcomes. The three kinds of teaching that we compared were:

- *Enhanced comprehension and memory instruction*
- *Critical thinking instruction*
- *Analytical, creative, and practical thinking instruction*

How do the three instructional methods differ?

All three instructional conditions covered the same basic skills (e.g., using pronouns at appropriate levels in writing, or fractions at appropriate levels in mathematics). Where the conditions differed was in the methods teachers were given for teaching these skills:

- *Mnemonic-theory based instruction*

Some students fail to learn adequately because they do not adequately comprehend the material they are supposed to be learning or because they do not remember it. This condition emphasized comprehension and memory skills. It consisted of regular instruction with enhanced coverage of mnemonic techniques and learning aids based on recent cognitive research on working memory. Students learned how to understand, encode, store, and retrieve information effectively. These skills are essential to high performance on standardized tests.

- *Critical-thinking instruction*

Some students fail to learn adequately because they are unable to reason and think adequately. They can recall material, but they cannot use it. The result is that when they are tested on the material, they often fail to show what they know because they do not know when and how to use the material. On standardized tests, their scores may be disappointing because they cannot answer questions even on material they know about but cannot use. Students in this condition learned how to analyze, evaluate, compare and contrast, judge, critique, and explain material.

- *Analytical, creative, and practical instruction*

Not all students are primarily "memory" learners. Some students learn in different ways. For example, some may learn best when given an opportunity to think analytically, whereas others may learn best when given an opportunity to learn creatively and/or practically. These students may have excellent learning skills, but not be able to apply them in many classroom settings because their preferred mode of learning does not match

the conventional mode of teaching. Students in this condition learned to process material in three ways. The first is analytical or critical (as described above). The second is creative: Students were taught to create, invent, discover, explore, and suppose. The third is practical: Students were brought to apply, use, utilize, and implement what they know.

Who participated?

Overall, 196 teachers and 7702 students participated in the study. They spanned four years, 9 states, 14 school districts, and 110 schools. The geographical and socio-economic status of participating districts was diversified, and, although the sample included primarily classrooms of fourth-graders, there were also some third- and fifth-graders who were taught by teachers participating in the study with their fourth-graders. A total of 33,525 tests, consisting of 1,231,243 items, were coded and analyzed to evaluate the impact of the three instructional approaches. Due to the large number of data points, data analysis is still being finalized.

What are the preliminary findings?

Hierarchical linear modeling was used to compare the gain from pre-test to post-test across the three instructional conditions for each unit. A three-level model was used to predict post-test scores, with the first level corresponding to individual growth from time one (pre-test) to time two (post-test), the second level corresponding to students, and the third level corresponding to teachers. Experimental condition was modeled at the teacher level. Estimated gain for an individual was considered to be the value of the slope when predicting the post-test from the pre-test.

First, all three instructional modes resulted in substantial gain from pre-test to post-test. Furthermore, the results indicate that the analytical/.practical/creative students overall tended to have consistently higher gain scores than students in the control conditions. Final analyses will be completed during the academic year 2005/2006.

For further information, please visit our website at www.yale.edu/pace

Ed. Note: One of the three methods used was the Big6 by Eisenberg and Berkowitz.

A Summary of Underlying Theory and Research Base for Understanding by Design

by
Jay McTighe and Elliot Seif

Overview

Understanding by Design (UbD) is a framework for improving student achievement through standards-driven curriculum development, instructional design, assessment, and professional development. Developed by nationally recognized educators Grant Wiggins and Jay McTighe and produced by the Association for Supervision and Curriculum Development (ASCD), Understanding by Design is based on the following key tenets:

1. A primary goal of education is the development and deepening of student understanding.
2. Evidence of student understanding is revealed when students apply knowledge and skills within authentic contexts.
3. Effective curriculum development reflects a three-stage design process called "backward design." This process helps to avoid the twin problems of "textbook coverage" and "activity-oriented" teaching in which no clear priorities and purposes are apparent.
4. Regular reviews of curriculum and assessment designs, based on design standards, are needed for quality control, to avoid the most common design mistakes and disappointing results. A key part of a teacher's job is ongoing action research for continuous improvement. Student and school performance gains are achieved through regular reviews of results (achievement data *and* student work) followed by targeted adjustments to curriculum and instruction.
5. Teachers provide opportunities for students to explain, interpret, apply, shift perspective, empathize, and self-assess. These "six facets" provide conceptual lenses through which students reveal their understanding.
6. Teachers, schools, and districts benefit by "working smarter"—using technology and other approaches to collaboratively design, share, and critique units of study.

In practice, Understanding by Design offers a three-stage "backward planning" curriculum design process, a set of design standards with attendant rubrics, and a comprehensive training package to help teachers design, edit, critique, peer- review, share, and improve their lessons and assessments. Support materials include the original *Understanding by Design* book (Wiggins & McTighe, 1998), which provides an in-depth

process and explains how skill and understanding in key subjects are most effectively acquired. Insights from the research are clustered into five areas: (1) memory and structure of knowledge, (2) analysis of problem solving and reasoning, (3) early foundations, (4) metacognitive processes and self-regulatory capabilities, and (5) cultural experience and community participation.

Key findings relevant to Understanding by Design include the following:

- Views on effective learning have shifted from a focus on the benefits of diligent drill and practice to a focus on students' understanding and application of knowledge.

- Learning must be guided by generalized principles in order to be widely applicable. Knowledge learned at the level of rote memory rarely transfers; transfer most likely occurs when the learner knows and understands underlying concepts and principles that can be applied to problems in new contexts. Learning with understanding is more likely to promote transfer than simply memorizing information from a text or a lecture.

- Experts first seek to develop an understanding of problems, and this often involves thinking in terms of core concepts or big ideas. Novices' knowledge is much less likely to be organized around big ideas; novices are more likely to approach problems by searching for correct formulas and pat answers that fit their everyday intuitions.

- Research on expertise suggests that superficial coverage of many topics in the domain may be a poor way to help students develop the competencies that will prepare them for future learning and work. Curricula that emphasize breadth of knowledge may prevent effective organization of knowledge because there is not enough time to learn anything in depth. Curricula that are "a mile wide and an inch deep" run the risk of developing disconnected rather than connected knowledge.

- Feedback is fundamental to learning, but feedback opportunities are often scarce in classrooms. Students may receive grades on tests and essays, but these are summative assessments that occur at the end of projects. What is needed are formative assessments, which provide students with opportunities to revise and improve the quality of their thinking and understanding.

- Many assessments measure only propositional (factual) knowledge and never ask whether students know *when, where,* and *why* to use that knowledge. . . . Given the goal of learning with understanding, assessments and feedback must focus on understanding, and not only on memory for procedures or facts.

students in grades 2–8 and surveys from more than 5,000 teachers in 384 Chicago elementary schools were examined. The results provide strong empirical support that the nature of the instructional approach teachers use influences how much students learn in reading and mathematics. More specifically, the study found clear and consistent evidence that interactive teaching methods were associated with more learning in both subjects.

For the purposes of the study, Smith, Lee, and Newmann characterized interactive instruction as follows:

> The teacher's role is primarily one of guide or coach. Teachers using this form of instruction create situations in which students . . . ask questions, develop strategies for solving problems, and communicate with one another. . . . Students are often expected to explain their answers and discuss how they arrived at their conclusions. These teachers usually assess students' mastery of knowledge through discussions, projects, or tests that demand explanation and extended writing. Besides content mastery, the process of developing the answer is also viewed as important in assessing the quality of the students' work.
>
> In classrooms that emphasize interactive instruction, students discuss ideas and answers by talking, and sometimes arguing, with each other and with the teacher. Students work on applications or interpretations of the material to develop new or deeper understandings of a given topic. Such assignments may take several days to complete. Students in interactive classrooms are often encouraged to choose the questions or topics they wish to study within an instructional unit designed by the teacher. Different students may be working on different tasks during the same class period. (p. 12)

The type of instruction found to enhance student achievement parallels methods advocated by Understanding by Design for developing and assessing student understanding.

Smith, Lee, and Newmann summarize their results as follows:

> The positive effects of interactive teaching should allay fears that it is detrimental to student achievement of basic skills in reading and mathematics. Conversely, the findings call into serious question the assumption that low-achieving, economically disadvantaged students are best served by emphasizing didactic methods and review. Our results suggest precisely the opposite: to elevate mastery of basic skills, interactive instruction should be increased and the use of didactic instruction and review moderated. (p. 33)

Third International Mathematics and Science Study

The Third International Mathematics and Science Study (TIMSS), conducted in 1995, tested mathematics and science achievement of students in 42 countries at three grade levels (4, 8, and 12) and was the largest and most comprehensive and rigorous assessment of its kind ever undertaken. While the outcomes of TIMSS are well known—American students are outperformed by students in most other industrialized countries (Martin, Mullis, Gregory, Hoyle, & Shen, 2000)—the results of the less publicized companion TIMSS teaching study offer explanatory insights. In an exhaustive analysis of classroom teaching in the U.S., Japan, and Germany using videotapes, surveys, and test data, researchers present striking evidence of the benefits of teaching for understanding in optimizing performance. For example, data from the TIMSS tests and instructional studies clearly show that, although the Japanese teach fewer topics in mathematics, their students achieve better results. Rather than "covering" many discrete skills, Japanese teachers state that their primary aim is to develop conceptual understanding in their students. They emphasize depth vs. superficial coverage; that is, although they cover less ground in terms of discrete topics or pages in a textbook, they emphasize problem-based learning, in which rules and theorems are derived and explained by the students, thus leading to deeper understanding (Stigler & Hiebert, 1999). This approach reflects what UbD describes as "uncovering" the curriculum.

In addition to instructional differences between teachers in Japan and the U.S., the researchers noted another important difference between the two countries' educational approaches. The Japanese utilize a process known as Lesson Study, whereby teachers regularly work in small teams to develop, teach, and refine lessons to improve student performance. They share the results of their action research and concomitant lesson designs in regional "lesson fairs" so that other teachers will benefit from their insights into effective teaching and learning. The process of collaborative unit and lesson design, refinement, and regional sharing parallels the UbD peer review process based on UbD Design Standards.

In summary, nations with higher test scores use teaching and learning strategies that promote understanding rather than "coverage" and rote learning. One nation, Japan, also uses a collaborative design and review process that continually improves teacher performance. Additional information about this significant research may be found on the TIMSS Web site (http://nces.ed.gov/timss/).

High Schools That Work (HSTW)

High Schools That Work (Southern Regional Education Board, 1992), a nationally recognized program for integrating academic and vocational education, grounds its practices in the very principles underlying Understanding by Design:

six years, and research studies are just beginning to demonstrate the effectiveness of this approach.

Senk and Thompson (2003) summarized the results of 13 studies of "understanding-based" mathematics curricula that follow the NCTM approach. While much of this research is still in the preliminary stages, the results are very promising. For example, studies of children who used a program called *Investigations* in the elementary school "performed better than their counterparts from other curricula with respect to word problems, more complex calculations embedded in word problems, and problems that involved explaining how an operation worked" (p. 127).

Middle school data show the following results:

> The longitudinal data of student performance are rather impressive. In the CMP chapter (Connected Mathematics Curriculum), the authors report significant cumulative gains on the BA test by CMP students over non-CMP students in School R, a school using the CMP materials at grades 6–8. Similarly, data displayed in the MiC (Mathematics in Context) chapter show superior performance by the eighth grade students in Ames, Iowa, who had studied from the MiC curriculum for four years in comparison to a national eighth grade sample on the New Standards Reference Exam. Their achievement is recognized not only in non-routine problem solving but also in the area of mathematical skills. (Senk & Thompson, 2003, p. 288-289)

Finally, a series of studies using high school mathematics reform programs—Core-Plus Mathematics Project, Math Connections, the Interactive Mathematics Program, SIMMS Integrated Mathematics, and the University of Chicago School Mathematics Project (UCSMP)—"offer overwhelming evidence that the reform curriculum can have a positive impact on high school mathematics achievement. It is not that students in these curricula learn traditional content better but that they develop other skills and understandings while not falling behind on traditional content. These evaluations present more solid scientific evidence than has ever before been available about the impact of curriculum materials" (Senk & Thompson, 2003, p. 468).

These studies at the elementary, middle, and high school levels support the movement toward an understanding- and performance-based curriculum. In addition, they demonstrate that students who learn from such a curriculum not only achieve as well on traditional assessments but significantly outperform students who do not use this type of curriculum in areas such as application to new and novel situations, problem-solving skills, and basic understanding of core concepts and principles.

Research on Technology

larger body of content. The intent of advance organizers is to present students with context, not content, and conceptual frameworks, not specific detail. Advance organizers have been described as bridges from students' previous knowledge to whatever is to be learned. They can call forth general organizational patterns and relationships already in mind that students may not necessarily think to use in assimilating the new material.

An advance organizer is always specific to the content and learners with which it is used. Advance organizers may be presented as written text, take a graphic form, utilize audiovisual supports, or be presented orally (e.g., summaries or questions). Research (Weil & Murphy, 1982) has shown all to be effective. For example, Stone (1983) examined 112 studies using a meta-analysis technique. Overall, advance organizers were shown to be associated with increased learning and retention of material at all grade and ability levels, but lower-ability students tended to profit the most. This is not surprising, for these students are usually the most in need of organizational cues and the least able to generate them on their own.

Understanding by Design incorporates advance organizers in several ways. In Stage 1, teachers frame the "big ideas" of the content through the use of "essential questions." These are presented to students at the start of a unit or course and guide learning throughout the unit. In Stage 3, teachers tell students about the required performances that will be used to assess their understanding. Knowledge of the expected performances and the concomitant evaluative criteria serve as advance organizers, provide a purpose for learning, and focus instruction on relevant knowledge and skills.

- **Higher-Order Questioning**

Higher-order questions may be broadly defined as those that require students to go beyond simple recall and engage in more sophisticated thinking. A meta-analysis of 18 experiments by Redfield and Rousseau (1981) concluded that the predominant use of higher-level questions during instruction yielded positive gains on tests of factual recall and application of thinking skills. In a separate study (Andre,1979), researchers investigated the effects of having students respond to higher-order questions that were inserted every few paragraphs in a text; they concluded that such a procedure facilitates better textbook learning than do fact question inserts. Pressley and colleagues (1992) showed that asking students for explanatory responses to higher-level questions *prior* to instruction activates prior knowledge and focuses attention, resulting in better learning. However, despite the demonstrated effectiveness of higher cognitive-level questioning, researchers have shown that the majority of classroom questions are factual in nature. In a review of the research on teacher questioning, Gall (1984) discovered that only about 20 percent of classroom questions required more than simple factual recall.

according to specified criteria (E), so that they will know how to improve their work, rather than waiting for the teacher to tell them how they're doing.

- **Related Strategies**

  Marzano, Pickering, and Pollock (2001) summarized and analyzed multiple research studies in order to show that a number of types of instructional strategies significantly affect student achievement. Several of these strategies explicitly assist students in making connections, conceptualizing knowledge, and explaining and applying knowledge and ideas to new situations.

  The following strategies, all recommended by UbD, enhance students' understanding of, and ability to use, knowledge:

  1. Identifying similarities and differences;
  2. Using "nonlinguistic representations"—primarily graphic organizers, models, mental pictures, artistic expression, and kinesthetic activity;
  3. Generating and testing hypotheses through systems analysis, problem solving, historical investigation, invention, and experimental inquiry; and
  4. Asking students to explain their thinking.

Higher Education

Similar findings emerge from studies in higher education. The National Survey of Student Engagement (NSSE) annually collects information directly from undergraduate students that colleges and universities can use to improve student learning. NSSE (2001) has identified five categories of effective educational practices that research studies show are linked to desired outcomes in college. Three of these five NSSE "benchmarks" align with the principles of Understanding by Design:

Level of Academic Challenge. Challenging intellectual and creative work is central to student learning and collegiate quality. Colleges and universities promote high levels of student achievement by emphasizing the importance of academic effort and setting high expectations for student performance.

Active and Collaborative Learning. Students learn more when they are intensely involved in their education and are asked to think about and apply what they are learning in different settings. Collaborating with others in solving problems or mastering difficult material prepares students to deal with the messy, unscripted problems they will encounter daily during and after college.

Enriching Educational Experiences. Complementary learning opportunities inside and outside classrooms augment academic programs, such as

Understanding by Design in Action

Numerous schools, districts, regional service agencies, universities, and other educational organizations have recognized the efficacy of the Understanding by Design framework and utilize it in their work. Examples of various uses of UbD are briefly described below.

Programs and Projects

- The Peace Corps has adopted UbD as a framework to guide both its international curriculum development (e.g., Worldwide Schools) and its general training for Peace Corps volunteers.
- The John F. Kennedy Center for the Performing Arts CETA program (Changing Education Through the Arts) coordinates a multi-school and district curriculum project for designing interdisciplinary units featuring infusion of the arts. The resulting products are based on the UbD framework and shared through the UbD Web site (http://www.ubdexchange.org).
- With funding from the Bill and Melinda Gates Foundation, the State of Washington is using the Understanding by Design framework as a cornerstone in its training for teacher leaders on curriculum and assessment design. Over the past three years, more than 3,000 teachers have participated in this systematic statewide training.
- The International Baccalaureate program employed the UbD framework to redesign the template for its Primary Years Program (PYP), a curriculum used worldwide.
- National Science Foundation-funded middle school science and mathematics curriculum projects selected Understanding by Design as the design format.
- The Virginia Department of Education has adopted the Stage 1 format of UbD to define the Standards of Learning Curriculum Framework for Social Studies, K–12. This resource document defines the understandings, essential questions, and knowledge and skills related to the social studies standards. This K–12 sequence is available online at http://www.pen.k12.va.us/VDOE/Instruction/sol.
- The California State Leadership Academy (CSLA) used UbD as the framework for revising its comprehensive statewide leadership-training curriculum.
- The Corporation for Public Broadcasting, in partnership with the Annenberg Foundation, has produced an eight-volume videotape series, *The Arts in Every Classroom*. Programs 5 and 6, "Designing Multi-Arts Curriculum" and "The Role of Assessment in Curriculum Design," illustrate the use of UbD for curriculum and assessment development in the arts.
- Intel's Teach for the Future Program incorporates UbD in its national teacher training program

Essential Knowledge and Skills (TEKS) testing program is being implemented, Laredo is using UbD to train staff in (1) "unpacking" state standards to teach for deep understanding, including incorporation of enduring understandings and essential questions in all TEKS-related content areas; (2) developing representative lessons and units that reflect high standards for all students, particularly English as a second language learners; and (3) observing for student behaviors associated with the six facets of understanding.

- Nanuet, New York, a small suburban district, is mapping its K–12 curriculum around the three stages of UbD to ensure a coherent alignment with state and local standards, a focus on "big ideas," and clearly articulated local assessments for gauging student performance. The maps guide the development of teacher units and courses, promote connections across subject areas and grade levels, and sharpen the scope and sequence to eliminate gaps and repetition.

- The recently chartered Two Rivers Magnet School in East Hartford, Connecticut, used the principles of UbD to develop its mission statement and the "big ideas" that will be central to its curriculum in every classroom. Curriculum will be developed using the UbD template so that curriculum units will be aligned with the state content standards as well as the magnet school mission.

- The Howard School in Atlanta, Georgia, is a progressive, independent school that serves students with a variety of learning styles. The program is grounded in the belief that children construct meaning through authentic learning experiences with the arts playing an integrative role. The Howard School curriculum, explicitly guided by Understanding by Design, includes courses and units of study developed around "enduring understandings" and "essential questions." Classroom assessments are anchored by performance tasks that call for students to apply knowledge and skills to demonstrate understanding. Teachers employ inquiry-oriented instructional methods and personalized teaching to accommodate the particular learning needs of their students.

Regional Collaborations

Regional service agencies and educational consortia have facilitated collaborative curriculum and staff development projects using UbD. For example:

- The Standards in Action project (SIA) is a collaborative project between San Diego County, California, school districts and the San Diego County Office of Education (SDCOE), which serves 42 districts, 590 public schools, and more than 470,000 students. Teacher leaders, along with SDCOE content specialists, work in teams to design and review UbD units in English/language arts, science, mathematics, and English Language Development (ELD) and share them via the

Additional Information

- More than 255,000 copies of the book *Understanding by Design* have been distributed worldwide.
- More than 55,000 copies of *The Understanding by Design Handbook* are in use.
- Tens of thousands of teachers and administrators have received UbD training.
- More than 28,000 educators have access to the UbD Web site.
- Both the *Understanding by Design* book and *The Understanding by Design Handbook* won the annual Distinguished Achievement Award for Excellence in Educational Publication from EdPress, the education publishing trade association.
- Two major philanthropic organizations (The Pew Charitable Trusts and the Geraldine R. Dodge Foundation) have supported UbD implementation.

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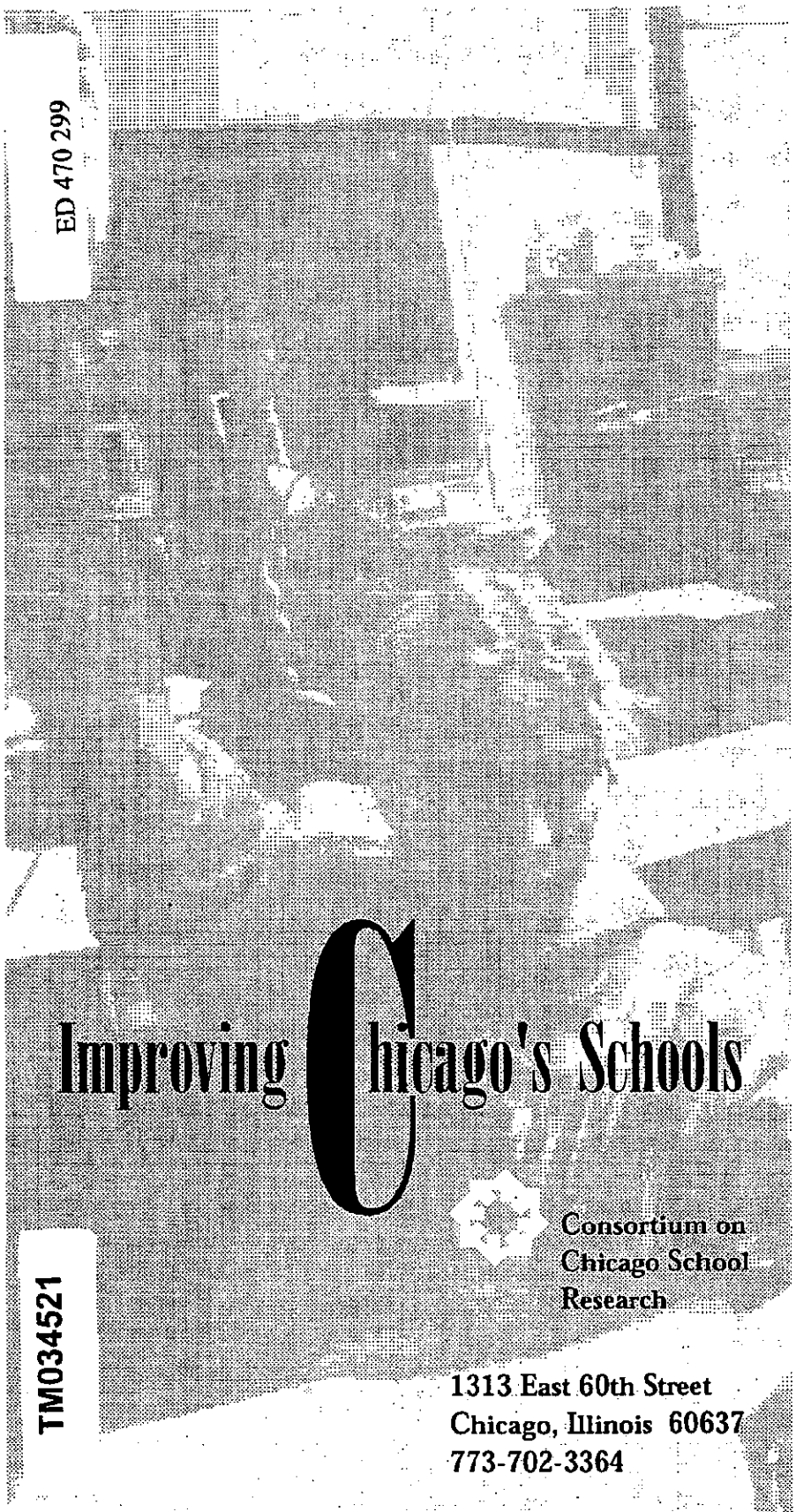

Authentic Intellectual Work and Standardized Tests: Conflict or Coexistence?

Fred M. Newmann
Anthony S. Bryk
Jenny K. Nagaoka

Improving Chicago's Schools

Consortium on Chicago School Research

1313 East 60th Street
Chicago, Illinois 60637
773-702-3364

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ABSTRACT

This study of Chicago teachers' assignments in mathematics and writing in grades 3, 6, and 8 shows that students who received assignments requiring more challenging intellectual work also achieved greater than average gains on the Iowa Tests of Basic Skills in reading and mathematics, and demonstrated higher performance in reading, mathematics, and writing on the Illinois Goals Assessment Program. Data were from assignments collected in 1997, 1998, and 1999 with these sample sizes: (1) grade 3 writing, all 3 years, 1,785 assignments; (2) grade 6 writing, all 3 years, 1,686 assignments; (3) grade 8 writing, all 3 years, 1,425 assignments; (4) grade 3 mathematics, all 3 years, 1,794 assignments; (5) grade 6 mathematics, all 3 years, 1,522 assignments; and (6) grade 8 mathematics, all 3 years, 1,278 assignments. Assignments were scored by teams of teachers and scores were equated across years. Contrary to some expectations, the study found some high quality assignments in some very disadvantaged Chicago classrooms. It was evident that all students in these classes benefited from exposure to such instruction. Results suggest that if teachers, administrators, policymakers, and the public at large place more emphasis on authentic intellectual work in classrooms, yearly gains on standardized tests in Chicago could surpass national norms. Four appendixes contain details on study methodology. (Contains 5 figures, 24 endnotes, and 39 references.) (SLD)

Executive Summary

Student success in contemporary society requires not only basic knowledge and skills but also the capacity to engage in more complex intellectual activity. Discussion of best instructional practices or forms of assessment, however, frequently poses a dichotomy between teaching approaches that enhance basic skills versus those that aim at more ambitious intellectual work, implying a trade-off between these two educational goals. The evidence presented here suggests that this debate rests on a false dichotomy.

Prior studies have documented that when teachers organize instruction around assignments that demand higher order thinking, in-depth understanding, elaborated communication and that make a connection to students' lives beyond school, students produce more intellectually complex work. This study of Chicago teachers' assignments in mathematics and writing in grades 3, 6, and 8, shows that students who received assignments requiring more challenging intellectual work also achieved greater than average gains on the Iowa Tests of Basic Skills in reading and mathematics, and demonstrated higher performance in reading, mathematics, and writing on Illinois Goals Assessment Program. Contrary to some expectations, we found high quality assignments in some very disadvantaged Chicago classrooms and that all students in these classes benefited from exposure to such instruction.

We conclude, therefore, assignments calling for more authentic intellectual work actually improve student scores on conventional tests. The results suggest that, if teachers, administrators, policymakers, and the public at-large place more emphasis on authentic intellectual work in classrooms, yearly gains on standardized tests in Chicago could surpass national norms.

Instruction and Achievement in Chicago Elementary Schools

Julia B. Smith
Valerie E. Lee
Fred M. Newmann

Improving Chicago's Schools

Consortium on Chicago School Research

1313 East 60th Street
Chicago, Illinois 60637
773-702-3364

January 2001

Executive Summary

Although there are many ways to improve student learning, improving instruction is surely near or at the top of any list of educational reforms. This study focuses on the link between the different forms of instruction and learning in Chicago elementary schools. It makes use of teachers' survey reports about their instruction in the 1996-97 school year and links these reports with student achievement gains. The study tests a common assumption: That the nature of standardized assessments requires that teachers who want to enhance their students' test scores should make extensive use of the classroom drill and practice activities associated with didactic instruction and review rather than more interactive teaching.

This study provides strong empirical support that "instruction matters." We found clear and consistent evidence that in Chicago's elementary schools the instructional approach teachers use influences how much students learn in reading and mathematics. Moreover, interactive teaching methods were associated with more learning in both subjects. Our findings call into serious question the assumption that low-achieving, economically disadvantaged students are best served by teaching that emphasizes didactic methods and review. We also found important relationships between teachers' professional preparation and the presence of key organizational supports within their schools, and their use of the more effective interactive methods. These findings support policy efforts to educate teachers on how to use interactive methods with all their students, to provide opportunities for teachers to engage in dialogues about instructional practices with colleagues in their schools, and to encourage principals to provide strong instructional leadership.

We conclude that efforts to engage all students in deeper and broader thinking about subject matter are a hallmark of "good teaching," and that Chicago students' achievement could improve further if teachers across the school system were encouraged to achieve a better balance among their use of review, interactive teaching, and didactic teaching practices.

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IDENTIFIERS *Chicago Public Schools IL

ABSTRACT

This study focused on the link between different forms of instruction and learning in Chicago, Illinois, elementary schools. It used teachers' survey reports about their instruction in the 1997-1997 school year and linked these reports with achievement gains. The study tested the common assumption that the nature of standardized assessments requires that teachers who want to enhance their students' test scores should make extensive use of the classroom drill and practice activities associated with didactic instruction and review rather than more interactive teaching. Student information was available for 110,775 students. The composite sample for teacher surveys was 5,586 from 384 schools. The study found strong empirical evidence that in Chicago's elementary schools the instructional approach teachers use influences how much students learn in reading and mathematics. Interactive teaching methods were associated with more learning in both subjects. Findings call into question the assumption that low-achieving economically disadvantaged students are best served by teaching that emphasizes didactic methods and review. The study also found important relationships between teachers' professional preparation and the presence of key organizational supports within their schools. These findings support policy efforts to education teachers on how to educate teachers to use interactive methods with all their students, to provide opportunities for teachers to engage in dialogues with their colleagues, and to encourage principals to provide strong instructional leadership. An appendix contains details on data sources and samples used. (Contains 14 figures, 16 endnotes, and 21 references.) (SLD)

TEKSLink: The Texas Effort to Link the Library with the Classroom

Walter Betts and Karen Shull

Introduction

Standards-based accountability for student achievement brings a challenge to librarians in two ways. The first challenge is to contribute through direct instruction of students. The librarian does not teach content, but uses content as a platform for teaching information literacy skills. Depending on how the assessment is structured, these skills can be critical to student achievement. In Texas, critical thinking skills are tested throughout all content areas, requiring students to be able to make inferences from text, charts and maps, and photographs, and express themselves clearly when writing from a prompt. All of these skills are honed through strong information literacy programs.

The second challenge is to have a collection that supports the curriculum. Collection development for school libraries has shifted from broad collections designed to meet student interests to collections focused on meeting the needs of the curriculum. This phenomenon is nationwide. In North Carolina, teachers charged with teaching the state curriculum quickly discovered that textbooks would not suffice, and decided that the schools' libraries would be needed to fill the gap. (Lowe, 2001)

How can one assess whether or not materials support the curriculum? The technique that analyzes the relationship between the materials in the library and the curriculum being taught in the classroom can be termed resource alignment or collection mapping – the methods are essentially the same. Collection mapping is an involved and time consuming process – time that campus librarians do not have. The real value offered by the process is offset by the likelihood that it will not be done.

The MARC 658 tag

Until the invention of the TEKSLink method, the only way to capture the curriculum/library materials correlation has been through the use of the 658 tag in the MARC record. Developed in Ohio in the early 1990's, the MARC 658 tag holds specific curriculum information about each item in the library: state standard alignment, correlation factor, grade level and academic area covered, and even local benchmark information. Early data from a trial in Ohio indicated that the 658 tag provided a wealth of valuable information to teachers

and librarians (Murphy, 1995). In 1996, the tag was adopted by MARBI by a unanimous vote with no discussion.

So, why aren't 658 tags ubiquitous in MARC records?

Because in practice, the 658 tag doesn't work. An elementary school library collection can easily have over 12,000 items, and the librarian may purchase another 50 – 150 items per year. Putting in the 658 tag for the existing collection could take several years. Keeping up with newly purchased items seems more likely until workflow is considered. Many librarians "wash" records through a bibliographic utility such as Marc Magician before loading them into their system, and the 658 could be added at this point – record by record. The time required to analyze each item and determine curricular applicability could be staggering, especially in light of the librarian's primary duty: to teach information literacy. Given the choice of teaching and collaborating or adding content to MARC records, it is not surprising that the 658 tag is bypassed. What is surprising is that it is employed at all.

Proponents of the MARC 658 tag also overlook the fact that in districts with a union catalog, campus librarians can be excluded from the cataloging process. Often, a district cataloger has the responsibility for overseeing the integrity of the database. The cataloger loads and cleans the records, and will generally have little or no knowledge of curriculum correlations. In these instances, the 658 is crippled, as the system of getting books into libraries is not flexible enough for it to be employed. In both models – campus loaded records and district loaded records – the weakness of the 658 tag comes back to the same element: the need to amend individual item records.

The TEKSLink method

TEKSLink uses a global correlation, based on sound classification principles. The principle behind TEKSLink is simple: the correlation between the curriculum and the materials is through subject headings in the automated catalog. Almost all records come with subject headings, and most cataloging workflows are designed to catch a lack of subject headings. Global categorization through subject headings is already in effect for both existing records and newly acquired materials. The TEKSLink method links the existing subject headings to state curriculum objectives by use of the "see" reference. Use of the "see" reference allows a user – teacher, librarian, principal, or even a parent – to use a state curriculum standard as a search term, and quickly determine what materials exist to support that standard.

The weakness in the TEKSLink method is in subject heading application. If materials do not have proper subject headings, then the material is invisible. However, most librarians who

catalog materials are sensitive to a lack of subject headings, and have some workflow in place to deal with this contingency. Addressing this concern out of concern for normal patron access also corrects the weakness of TEKSLink.

Obviously, the TEKSLink method has profound implications for collection development. When TEKSLink has been implemented, a search on a curriculum standard quickly reveals the amount of materials available, and these items can be checked for condition and age. (See 1.1 and 1.2) Librarians should be able to quickly gauge whether or not they have sufficient materials, or outdated materials, for any curriculum standard. In addition, classroom teachers and administrators will be better able to assess the quantity and quality of the materials for each curriculum standard, and participate more fully in the decision-making process in acquiring library materials.

TEKSLink history

TEKSLink started with conversations between the founders, Walter Betts (Systems Librarian, Dallas Independent School District) and Karen Shull (Director of Library Media Services, Richardson Independent School District). Both Mr. Betts and Ms. Shull were members of the Cataloging Focus Group of the Texas Library Connection's union catalog. One of the charges to the Focus Group was to correlate library materials with the state curriculum standards. Discussion inevitably revolved around the MARC 658 tag, but ideas for actual implementation were few and committee members were reluctant to engage a task so monumental. In the summer of 2002, Mr. Betts and Ms. Shull concluded that the key to any successful strategy was in getting beyond individual item records. The key was to use subject headings. Amending the authority record of a subject heading to include a "see" reference of a state curriculum standard would allow a user to search by a curriculum standard, and tie the standard to a relevant subject heading. Both Mr. Betts and Ms. Shull were certain that the authority record would provide the link they needed for a global application of state curriculum standards.

Convinced of this direction, Mr. Betts created "see" references from the Texas Essential Knowledge and Skills (TEKS) second grade Science curriculum, which is primarily concerned with the water cycle. Using obvious subject headings, such as "rain", Mr. Betts amended the authority records to include the state standard. He then demonstrated this method to Ms. Shull.

It was quickly apparent that the method succeeded. Searching on the term "TEKS" in a campus online catalog brought up the standards. Clicking on a single standard revealed a list of materials, all of which were on that particular campus. Ms. Shull knew immediately that

she and Mr. Betts had succeeded in linking materials with standards. Now they would need to figure out a way to validate which headings would be applied to which standards. Both Mr. Betts and Ms. Shull were convinced that in order for the TEKSLink correlation to be valid, it needed to be made at the field level – classroom teachers and campus librarians, working in partnership. To see if the principle was workable, they recruited districts in the Dallas area to help with a trial process.

The elementary Science TEKS were broken into grade levels, and distributed to various districts. Each district then further broke apart the grade level TEKS, and found classroom teacher – librarian teams to generate concept words for the curriculum standards. District catalogers translated the concept words into approved subject headings, and sent them back to the campus teams for approval. Approved terms were sent to one district for authority file processing. The resulting authority file was made available to each participating district, and TEKSLink was born.

In December, 2002, Mr. Betts and Ms. Shull took their project to the bi-annual Cataloging Focus Group meeting. They showed the results through a search of a participating district's OPAC, and were pleased to see the excitement TEKSLink generated. Many other districts wanted to become part of the project, and Mr. Betts and Ms. Shull presented a model of how the next phase of the project could go forward.

In the summer of 2003, six districts teamed together to create TEKSLink headings and authorities in the area of elementary social studies: Abilene ISD, Aldine ISD, Fort Bend ISD, Houston ISD, Pasadena ISD, and Spring Branch ISD. All but Abilene were in the Houston area. The inclusion of Abilene ISD was test the effect of physical distance on the collaboration effort. Mr. Betts and Ms. Shull, in conjunction with project coordinator Nancy Goralski, concluded that email rendered all distance meaningless.

Currently, Round Rock ISD is coordinating the elementary language arts TEKSLink project, and Mesquite ISD is coordinating the elementary math TEKSLink project. Secondary social studies and science are looking for project coordinators, and there is already a list of volunteer librarians for each project.

The TEKSLink Project Methodology

The TEKSLink Project starts with the matrix of TEKS for a particular content area, such as elementary science. The matrix lines up the skill progression and ensures that all grade levels in the skill have their TEKS listed. The matrix is created by either Mr. Betts or Ms. Shull, and is given to the Project Coordinator.

The second step is the selection of a Project Coordinator for the TEKS content area. The Project Coordinator will either be a professional cataloger, or have unrestricted access to a professional cataloger.

The Project Coordinator will also assign sections of the TEKS to the participating districts, schools, or individual librarians. Districts and schools will further break down their assigned section and distribute it to teacher – librarian teams. Individual librarians will find a classroom teacher as a partner.

The individual TEKS given to the teacher-librarian teams are used to generate concept words, natural language expressions which will be translated into controlled language by the cataloger. For example,

> §112.4. Science, Grade 2, (b) Knowledge and skills, (10) Science concepts. The student knows that the natural world includes rocks, soil, water, and gases of the atmosphere. The student is expected to: (A) describe and illustrate the water cycle; and (B) identify uses of natural resources.

Concept words generated by this standard included rain, evaporation, water, and clouds. Concept words are meant to be generated quickly, and usually the teacher - librarian teams are given no more than two or three standards to address. The concept word process usually takes no more than 45 minutes to an hour.

The concept words are then sent to the Project Coordinator to be translated into standardized subject headings. Because the school libraries in Texas were required to use Library of Congress subject headings when the Texas Library Connection was formed, TEKSLink uses only LC headings.

After the translation, the headings are returned to teacher – librarian team for verification. The teams check to see that the controlled language terms are acceptable, striking any that are not, then return the lists to the Project Coordinator. The Project Coordinator consults the matrix to ensure that the same terms are being applied when the skills are on a continuum, and then sends the standards and terms to the Project Directors. Creation of the actual authority file follows. When the file is completed, it is posted on the TEKSLink website for download into automation systems. Once the download is accomplished, the automation system patrons – teachers, librarians, students, and parents – have a powerful new tool for resource alignment.

Who owns TEKSLink?

TEKSLink is owned by the public school children of the State of Texas, and may be freely used by anyone. No one may charge for the use of TEKSLink correlations or the authority database. Several vendors are interested in adding TEKSLink correlations as a service to their Texas customers. Mr. Betts and Ms. Shull work with vendors – materials, bibliographic and automation – in order to explain the TEKSLink methodology and files, as well as clarify the ownership of the database.

Replicating TEKSLink

Mr. Betts and Ms. Shull feel that the TEKSLink methodology is easily replicated from state to state. Because the project is entirely pro bono, no funding is required for start-up, only the desire to correlate library materials with state curriculum standards. With enough dedicated professionals, only a few of which need to have special expertise, the task can be accomplished. Texas will have completed the core areas for both elementary and secondary by the summer of 2006, allowing our teachers and librarians to work together much more effectively, and demonstrating that the library is an essential partner in student achievement.

1.1 TEKSLink Search Result in Online Catalog (Richardson ISD, Richardson, Texas. Library Automation system by Library.Solution)

Bowie Elementary School

You Searched: Subjects for words that begin with teks
1 to 10 of 238 items.

Results filtered according to Limits.

Select an option to save result

Sort Search Results By: Alphabetical

1. TEKS 112.A.2.b.10.A -- Observe and describe properties of rocks, soil, and water. Subject
   SEE Rocks **Matches 5 items**
   SEE Soils **Matches 5 items**
   SEE Water **Matches 13 items**

2. TEKS 112.A.2.b.10.B -- Give examples of ways that rock, soil, and water are useful. Subject
   SEE Agriculture **Matches 6 items**
   SEE Natural resources **Matches 2 items**

3. TEKS 112.A.2.b.5.A -- Describes properties of objects and characteristics of organisms. Subject
   SEE Biology **Matches 1 item**
   SEE Matter -- Properties **Matches 4 items**

1.2 Search result set from term "water".

Bowie Elementary School

HOME HELP SEARCH BROWSE COMBINATION HISTORY CHANGE LIMITS

Display 1 to 10 of 11 items

Results filtered according to Limits.

Select an option to save result | **Sort Search Results By:** Publication Date

1. Raindrops / [by] Larry Dane Brimner ; ill. by David J. Brooks. Title **(1999)**

Location: BWE Reader R BRI Avail

Annotation

2. The drop in my drink : the story of water on our planet / Meredith Hooper ; illustrated by Chris Coady. Title **(1998)**

Location: BWE Nonfiction 551.48 HOO Avail

Reviews Annotation

3. A drop of water / by Walter Wick. Title **(1996)**

Location: BWE Nonfiction 546 WIC Avail

Reviews Annotation

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