The Common Core State Standards and the Role of Instructional Materials: a Case Study on EdReports.org

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Abstract

The purpose of this study was to review research studies investigating the role of instructional materials in relation to the Common Core State Standards and to evaluate whether a new organisation, EdReports.org, founded to evaluate the alignment of instructional materials to the Common Core State Standards, has achieved its intended objectives. Content analysis was used to analyse the subject matter of reports on the research studies. A decision-oriented evaluation model was used to analyse the decision process, decision-making setting, decision model and types of decisions in the change process within EdReports.org. The results showed that the research studies have produced important findings concerning the role of instructional materials in relation to the Common Core State Standards and EdReports.org has attained its objectives in successfully developing and diffusing a program to evaluate the alignment of instructional materials to the Common Core State Standards. The conclusion recommends that policymakers in other educational settings should consider whether its operating system provides a valid model for creating a program to evaluate the alignment of instructional materials to academic standards.

Biographical note

Michael Watt taught in several secondary schools in Tasmania, and worked as an education officer in the Tasmania Department of Education. He holds masters' degrees in educational studies and education from the University of Tasmania, and a doctorate in education from the University of Canberra. He currently works as an education consultant.

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Introduction

In October 2008, the Council of Australian Governments established the Australian Curriculum, Assessment and Reporting Authority to develop the Australian Curriculum, and manage assessment and reporting of student performance. Completed over three phases in September 2015, the Australian Curriculum is organised into eight discipline-based learning areas, general capabilities that can be developed across the curriculum, and cross-curriculum priorities. With the approval of the Ministerial Council for Education, Early Childhood Development and Youth Affairs in December 2010, the eight states and territories are implementing the Australian Curriculum in accordance with their requirements for curriculum review.

In 2015, the author conducted a study to investigate what key actors in Australia's materials marketplace are doing to align instructional materials to the Australian Curriculum. In the report, Watt (2016) found that publishing companies are using various techniques to align their materials to the Australian Curriculum and the Australian Government has developed several repositories of digital materials aligned to the Australian Curriculum. In spite of these initiatives, there is no comprehensive and effective means of providing evaluative information about the alignment of these materials to the Australian Curriculum to help teachers make informed decisions, when selecting materials.

The purpose of this article is to examine the role that aligned materials play in the American education system within the context of the Common Core State Standards (CCSS). Efforts undertaken by the states to implement the CCSS has led researchers to investigate the critical role of materials in the implementation process and reformers to launch several initiatives to evaluate the alignment of lessons and units, print-based materials and open educational resources to the standards. The findings of these research studies are reviewed and the activities in these initiatives are outlined to provide a contextual base to evaluate one of these initiatives, EdReports.org. Initially, the background, current status and interactions between actors in EdReports.org are described. Then, a decision-oriented evaluation model is used to analyse these data to determine whether the program, established by EdReports.org, is meeting its objectives. The significance of this evaluation lies in providing policymakers in Australia and other countries with a potential model for establishing a program to evaluate the alignment of materials to academic standards.

Method

The research design comprised a review of research studies investigating the relationship between instructional materials and the CCSS followed by an evaluation of a program initiated by EdReports.org to support recommendations arising from the research studies. The Context Input Process Product model,

proposed by Stufflebeam et al. (1971), was used to evaluate decision-making by program managers in EdReports.org to assist decision-makers in other educational settings judge the program's worth and utility. The design is expected to demonstrate the critical role that materials play in implementing the CCSS by confirming that the identification and provision of aligned materials represent a significant variable affecting the quality of education.

The procedures for collecting information for the study involved following a sequence of steps. First, relevant articles about research studies on materials and EdReports.org were identified by searching the website of *Education Week*, the newspaper on education published by Editorial Projects in Education. Separate articles on the studies conducted by the RAND Corporation and the Center for Education Policy Research were identified from this source. A search on the website of EdReports.org identified the reports published by the Brookings Institution and the Center for American Progress. The reports of these four studies were selected for review, because they investigated the role of materials in relation to the CCSS. Seven articles about EdReports.org, published between 2014 and 2016, were identified from this source. Various articles about EdReports.org, published in journals and newspapers or broadcast by radio stations, were identified in e-Alerts released on the website of EdReports.org. News articles about EdReports.org were also identified on the websites of the Annenberg Foundation Trust at Sunnylands and Education First. In addition, a 50-minute video, *Connected Learning in the Digital Age*, was viewed. The second step involved identifying the rubrics developed by lead writers of the CCSS on Student Achievement Partners' website, and the key activities undertaken by Educators Evaluating the Quality of Instructional Products (EQuIP) on Achieve's website, the K-12 OER Collective and UnboundEd on their respective websites.

The procedure for analysing information, collected during the study, used content analysis method to summarise the subject matter focusing on interpretation of the relevant documents. The reports of the relevant research studies and various articles were read and summaries prepared. Reporting the results involved organising the summaries chronologically, and incorporating them into the appropriate section of the article. During the course of the study, the first draft was sent to the director of partnerships and strategy at EdReports.org, who was invited to review it and offer comments. Comments received from this person were used to revise the section on EdReports.org. At the completion of the final draft, it was sent for review and comment to an associate professor of education with expertise in curriculum alignment as well as the director of partnerships and strategy at EdReports.org. Feedback received from the associate professor of education led to revision of the draft involving development of a new introduction and reorganisation of the other sections of the article.

Historical Background

Excellence Debate

National reports on American education, published during the excellence debate, gave prominence to the findings of research studies concerning

problems with instructional materials. The National Commission on Excellence in Education (1983) found that the quality of textbooks had declined, basing this conclusion on the following research studies and testimony. An historical study by Chall, Conard and Harris (1977) about the quality and difficulty of textbooks and Scholastic Aptitude Test scores provided evidence to substantiate the view that many textbooks are written down to ever-lower reading levels. A two-year longitudinal study conducted by the Educational Products Information Exchange Institute (1980) showed that most students were able to master the subject matter of their textbooks before actually using them. In January 1982, the Association of American Publishers presented testimony to the effect that expenditures on materials had declined by half over the previous 17 years. Evidence of decline in the substantive quality of textbooks was gathered at public hearings held at Stanford University in March 1982 and at Georgia State University in May 1982.

Other national reports published during the excellence debate also cited similar problems. From a Study of Schooling, an eight-year project conducted in a representative sample of 38 schools in 13 communities from seven states, Goodlad (1983) found that a wide range of materials was used in English language arts and social studies programs. Textbooks, however, dominated mathematics, science, foreign languages, and career and vocational education programs. Materials were not used extensively in only the arts and physical education programs. Cheney (1987) contended that most basal readers contain little literature, most elementary social studies textbooks contain little history, and textbooks for history lack compelling narrative about human aspirations. Bennett (1988) asserted that there is a need to improve existing textbook selection and adoption procedures, because excessive state regulation is a contributing factor for inappropriate practices by selection committees. Cheney (1990) described how well-intentioned measures to improve textbooks, such as the use of readability formulas, the fair representation of ethnic minorities and historical events, the avoidance of controversial issues, and the use of selection criteria, have tended to reduce their quality.

Prompting policymakers to realise that materials form an important element in any attempt to improve the quality of education, the excellence debate led to a series of national initiatives. As part of Florida's Raising Achievement in Secondary Education Act passed in June 1983, Governor Robert Graham and the Florida Senate Education Committee hosted 140 publishers, editors, state textbook administrators and leaders of national professional associations at the Interstate Consortium on Instructional Materials held in March 1984. After rejecting a motion from California to form a consortium to promote more challenging materials, the delegates gave the Council of Chief State School Officers (CCSSO) and the National Association of State Boards of Education (NASBE) the responsibility for establishing an agenda for future discussions on reforming materials. In April 1984, representatives from CCSSO, NASBE and the Association of American Publishers agreed on a three-step plan to improve the quality of materials. This plan involved examining current state and local selection criteria, developing model guidelines for the selection process, and assisting states to adapt their existing guidelines to the proposed models. In June 1985, CCSSO and NASBE co-sponsored a second meeting, called Textbook Reform: A Cooperative Agenda, at the Library of Congress in

Washington, DC, with the aim of forming a coalition of states to determine the criteria which should be met by materials of good quality. Although a coalition of states was not formed, CCSSO and NASBE co-sponsored a third meeting in September 1985. Maxwell (1985) reported that the same participants expressed a deeper perception at this meeting about the complexity of problems associated with the production, selection and use of materials, but found considerable difficulty in determining solutions.

In a speech presented to the American Association of School Administrators at Las Vegas, Nevada, in February 1984, Secretary of Education, Terrel Bell, suggested establishing several, large-scale regional centres to evaluate textbooks. In July 1984, Secretary Bell called together a group of 35 textbook publishers, members of state and local boards of education, chief state school officers and teacher representatives to set an agenda for improving materials by changing the system of production, selection and use.

Following an invitation from Secretary Bell in March 1984, the United States Department of Education funded CCSSO and NASBE to conduct a textbook improvement project, intended to inform state policymakers about issues concerning quality in textbooks, and to encourage action from the states to change the prevailing system. Released at the annual convention of the Education Writers Association in April 1988, the report of the textbook improvement project became the most influential critique during the excellence debate on the prospect for reforming the existing system. The report's author, Tyson-Bernstein (1988) argued in the first part that prevailing policies and procedures are based on outmoded models. The second part presented a fictional account, caricaturing the process of developing, selecting and adopting textbooks. The third part discussed specific reforms to improve the selection process, presented as sets of recommendations for stakeholders. In the fourth part, Tyson-Bernstein conceptualised a model representing an ideal process for selecting materials at the local level.

Tyson-Bernstein participated in several state education policy seminars sponsored by the Institute for Educational Leadership (IEL), at which key policymakers debated the issues presented in the report. Subsequently, IEL asked Tyson-Bernstein to write an occasional paper examining recent policy changes in selection procedures in three key state-level adoption states to assist state and local policymakers understand more fully the complexity of these policies, and their relationship to the broader processes of educational reform. In the occasional paper, Tyson (1990) reported on changes to the state-level adoption policies in North Carolina, Texas and California arising from legislation related to each state's educational reform agenda. Tyson concluded that the educational reform movement increased confrontation between the advocates of state-level adoption and local responsibility for materials' selection. Although each of the three states retained its state-level adoption procedure, state legislatures required decision-making authority to be devolved to the local level.

Standards-Based Reform

Lobbied by the National Governors Association (NGA) to invite the governors to an education summit, President George H. W. Bush convened the Charlottesville Education Summit in September 1989 to consider ways of bringing about changes in the education system that would make the USA internationally competitive by the year 2000. The president and governors reached agreement to establish a process for setting national education goals, seeking greater flexibility and accountability in using federal resources to meet the goals, undertaking a state-by-state effort to restructure the education system, and reporting annually on progress in achieving the goals. Appointed in July 1990 to monitor progress towards reaching the six National Education Goals, the National Education Goals Panel (NEGP) created the National Council on Education Standards and Testing, which recommended developing voluntary national standards and sample assessments. In response, the United States Department of Education funded national subject associations to develop national standards in the sciences, history, the arts, civics and government, geography, English language arts and foreign languages. The Goals 2000, Educate America Act, signed by President Clinton in March 1994, specified that states should use the national standards to develop and implement state standards.

Efforts undertaken by states to implement state standards led policymakers to examine the role of textbooks in standards-based reform. Early in 1997, NEGP formed the Goals 3-4-5 Standards Implementation Advisory Committee to facilitate implementation of state standards and commissioned several experts to provide a series of papers for consideration by the Goals 3-4-5 Standards Implementation Advisory Committee in drawing up sets of recommendations. Commissioned to write the paper on textbooks, Tyson (1997) examined the main factors affecting the materials' marketplace, and the criteria for identifying quality in materials, as well as presenting recommendations to change the dynamics within the marketplace. In response, the Goals 3-4-5 Standards Implementation Advisory Committee developed four recommendations, which were presented to NEGP in November 1997. First, educators in states and districts need in-depth decision-making processes, selection criteria that include alignment with standards, and training in their use. Second, an independent source should provide high quality reviews of materials for schools. Third, teachers should be provided with training, involving in-depth examination of materials in relation to learning goals, to select materials that will help them meet challenging standards. Fourth, schools and teachers should be allowed flexibility and discretion in selecting, using and developing materials. Following adoption of the sets of recommendations in February 1998, NEGP sent a letter to all governors and state legislators in May 1998 focusing on state policies, which link professional development to academic standards.

Common Core State Standards Initiative

The CCSS for English language arts and mathematics were developed by the NGA Center for Best Practices and CCSSO in 2009 and 2010. The release of the CCSS in June 2010 was followed by their rapid adoption by 46 states. Implementation of the CCSS was supported by various foundations and national organisations, particularly with respect to providing states with various resources to facilitate implementation. At the same time, a movement

opposing adoption of the CCSS, initiated mainly by conservative parents and then taken up by conservative policy groups and politicians, led to three states repealing the CCSS in 2014.

In April 2010, the NGA Center for Best Practices and CCSSO convened a meeting, at which chief state school officers, governors' education advisors, higher education faculty, state directors of curriculum, and representatives of education organisations discussed how states could foster the development of materials aligned to the CCSS. Discussions arising among the participants after the meeting fostered the need for research into the role of materials and uncovered possibilities for conceptualising initiatives to assist educators align materials to the CCSS.

Research Studies on Instructional Materials

Brookings Institution

In this paper, Chingos and Whitehurst (2012) argued that the lack of data on instructional materials can be remedied by states with support from the federal government, non-profit organisations and foundations. They cited evidence from research studies to support a contention that materials influence teachers' choices and student learning. Furthermore, evidence from other research studies suggested that the choice of materials can affect student learning to a greater extent than teacher quality. Whereas improving decision-making in selecting materials is relatively easy, fast and cheap, improving teacher quality through changes in the preparation and professional development of teachers is challenging, time-consuming and expensive.

They contended that most research findings about the effectiveness of materials are derived from small-scale studies conducted with systematic samples and poorly defined comparison conditions. Most materials, however, have not been subjected to any studies into their effectiveness. Data should be collected at the classroom level on materials in use by examining associations between these materials and student achievement. A major challenge to conducting such research is the failure of national education organisations and state education agencies to collect data on the materials used in schools.

They proposed three strategies for collecting data on the use of materials to overcome constraints due to the variety of types of materials and the cost of surveying every teacher. First, data can be collected from districts' purchasing departments on materials ordered in each school year. While collection of data from this source is relatively easy, such data only provide information about materials at the time of purchase. Second, districts can be surveyed about the materials used in their schools. Obtaining accurate information from districts will vary according to the locality of the adoption decision. A survey of districts on the materials they use is straight forward in states where districts select materials from a state adoption list, but particularly difficult from districts where adoption decisions are made at the school level. Third, states can periodically survey teachers on the materials they actually use in classrooms. The results of such surveys would allow states to measure the extent, to which the materials that districts intend teachers to use, are actually used in classrooms.

The federal government should support states collect these data by designing a survey template and providing an electronic tool to ensure accuracy in reporting information.

States that collect data on materials will benefit from the knowledge gained from this effort, and will be able to better support administrators and teachers. The availability of detailed data on materials will allow districts in open states to identify whether the most effective teachers are using different materials than less effective teachers. Districts can use this information in their selection decisions and provide professional development to help teachers improve their craft. Committees in state-level adoption states could use data collected from districts in the next round of adoption decisions.

Since 2005, most states have constructed longitudinal data systems that include detailed administrative data on districts, schools, teachers and students. Despite the availability of detailed administrative data, only Florida collects basic information about the use of materials in classrooms. If these data were widely available, researchers would be able to apply correlational and quasi-experimental designs to explore the differential effectiveness of competing materials. Although many states do not yet have the capacity to conduct such research, the growing use of data in education means states will need to take responsibility for encouraging research in this field.

The researchers recommended five actions to enhance information on materials in use. First, state education agencies should collect data from districts on materials used in their schools. Second, the National Center for Education Statistics should develop data collection templates for states to use, and provide guidance on how states can use and share such data. Third, NGA and CCSSO should support the effort to improve the collection of information on materials. Fourth, the Data Quality Campaign should influence states to collect information on the use of materials, and support them in these efforts to collect and use these data. Fifth, foundations should provide funds to collect data on materials and support research in analysing such data.

Center for American Progress

In 2014, researchers at the Center for American Progress conducted a study to investigate whether there is a significant variation in how much different state-level adoption states pay for the same materials. Initially, the researchers compiled all of the readily available price data from adoption lists for elementary mathematics materials. They identified 114 materials appearing on the lists of at least two states. Then, they classified 19 state-level adoption states into two types: nine ‘recommend’ states that adopt a state list of materials from which districts are required to select materials; and ten ‘suggest’ states that adopt a state list of materials, but do not require districts to select materials from the list. Case studies of the adoption process in three ‘recommend’ and two ‘suggest’ states showed that all these states use adoption cycles across subject areas varying from five to eight years. In the other 31 open states, districts are responsible for selecting materials without being provided with a state list. Case studies conducted in eight districts in five open states showed that district committees review and adopt materials or review and recommend materials for

adoption to the school board in six districts, permit schools to adopt materials in one district, and conduct pilot studies of two materials as a basis for adoption of one material in one district.

The researchers investigated whether there is a significant variation in what 19 state-level adoption states pay for 114 materials by matching prices across the states. They found little evidence that states pay markedly different prices for the same materials, because they require publishers to offer their products at the lowest price available nationwide. The difference between the lowest and highest prices paid by states was less than 1 percent for 30 percent of the materials, and the range was less than 10 percent for 85 percent of the materials. Then, the researchers investigated whether 'recommend' states might be able to negotiate better prices, because districts are required to buy materials from state lists. Although the prices paid in 'recommend' states are slightly less, the difference is not statistically significant.

The researchers investigated whether there is a relationship between price and quality of materials. Using data from a randomised controlled trial showing that classes randomly assigned to certain materials fared better on mathematics tests than classes assigned to other materials, the researchers compared six pairs of materials that can be compared to each other. They found there is little relationship between price and quality. Furthermore, they found that a significant improvement in students' performances could be accomplished by changing from a lower- to higher-quality product at little additional cost, because there is not much variation in prices of materials. They also compared the benefit of spending funds on changing to a higher-quality material with a range of other innovations: lower class sizes; computer-aided instruction; peer and adult cross-age tutoring; peer cross-age tutoring; adult cross-age tutoring; child care; instructional time; and success for all. The cost effectiveness of changing to a higher-quality material is much cheaper than any of the other innovations.

Boser, Chingos and Straus (2015) reported that the study had four major findings. First, higher-quality materials for elementary school mathematics are marketed at a relatively low cost. Second, change to a more rigorous elementary school mathematics material is more cost-effective than other innovations. Third, there is little relationship between the cost and quality of materials for elementary school mathematics. Fourth, policy decisions for adopting materials often do not consider rigorous measures of curriculum quality.

Four recommendations were presented in the report. First, the federal government should invest in rigorous studies on the effectiveness of materials. Second, the adoption process at the state level should be improved by shifting to a 'suggest' model. Third, selection decisions at the district level should be improved by using rubrics, conducting pilot studies and establishing networks for sharing information across districts. Fourth, foundations should implement a competitive grant program for publishing companies to develop effective materials. The researchers concluded that the CCSS have created a national marketplace for materials, and policymakers should consider these recommendations as a cost effective way to improve student learning.

RAND Corporation

In 2015, education researchers at the RAND Corporation conducted a study to investigate teachers' implementation of the CCSS focusing on their use of materials to address the standards, their perceptions about the content and instructional approaches most aligned with the standards, and the standards-aligned practices in which they engage their students. Data for the study were collected from two web-based surveys conducted in June and October of 2015 that differentiated sub-samples in 42 states, in which the CCSS were currently adopted, and eight states that had never adopted (Alaska, Nebraska, Texas and Virginia), partially adopted (Minnesota) or repealed (Indiana, Oklahoma and South Carolina) the CCSS. In the first survey, 1,705 teachers from a nationally representative sample of 2,745 teachers responded to a questionnaire focusing on their perceptions about the content and approaches aligned to standards as well as their students' engagement in classroom practices. In the second survey, 1,168 teachers from a nationally representative sample of 2,018 teachers responded to a questionnaire focusing on their use of materials, local and teacher-developed materials, and the extent to which their materials address standards-aligned practices.

Opfer, Kaufman and Thompson (2016) reported that data from the second survey were analysed to identify the most commonly used materials, factors influencing teachers' use of materials, opportunities materials provide to address standards, and curriculum-specific professional development in 42 states, in which the CCSS were currently adopted.

Almost all teachers reported using teacher-developed materials or materials they selected with 89 percent of English language arts and 82 percent of mathematics elementary teachers, and 85 percent of English language arts and 91 percent of mathematics secondary teachers using such materials at least once a week. Although most teachers used materials developed or selected by their districts, only 47 percent of English language arts and 49 percent of mathematics secondary teachers compared with 72 percent of English language arts and 72 percent of mathematics elementary teachers used such materials at least once a week. Approximately one-third of teachers used the curriculum modules available on the New York State Education Department's EngageNY.org website. In addition, most English language arts teachers used levelled readers with 80 percent of elementary teachers and 59 percent of secondary teachers using such materials at least once a week. Furthermore, a high proportion of English language arts teachers, particularly at the elementary level, used trade books. Fewer English language arts teachers used ten most commonly used materials developed by publishing companies. The use of nine of these materials, designed for elementary teachers, ranged from 19 percent to 63 percent of elementary teachers. The use of eight of these materials, designed for secondary teachers, ranged from 15 percent to 41 percent of secondary teachers. Similarly, fewer mathematics teachers used 12 most commonly used materials developed by publishing companies. The use of eight of these materials, designed for elementary teachers, ranged from 6 percent to 32 percent of elementary teachers. The use of 11 of these materials, designed for secondary teachers, ranged from 10 percent to 44 percent of secondary teachers.

Different factors influenced mathematics and English language arts teachers' use of materials. Almost two-thirds of mathematics teachers cited state standards and district curricula as playing an important role compared with less than half of English language arts teachers. Almost half of English language arts teachers cited student-specific requirements and the quality of materials as playing an important role compared with a quarter of mathematics teachers. These effects were more marked among elementary than secondary teachers. Although more than half of all teachers cited availability of materials as an important factor, other factors, such as pre-service preparation and professional development, had less influence on teachers' use of materials.

The opportunity provided by materials for teachers to address standards-aligned practices focused on the extent to which materials helped students engage in the Standards for Mathematical Practice or the anchor standards for English language arts. More than half of mathematics teachers indicated that their materials gave students opportunities to use mathematical language and symbols appropriately to a great extent. Approximately four-fifths of mathematics teachers believed their materials allowed them to teach the major mathematics topics addressed by the CCSS at their grade level to a great extent. More than half of English language arts teachers indicated that their materials gave students opportunities to use evidence from a text to make inferences or support conclusions drawn from a text to a great extent, read a fictional text of sufficient grade-level complexity with the whole class to a great extent, and read a non-fiction text of sufficient grade-level complexity with the whole class to a great extent.

Approximately four-fifths of the teachers reported receiving less than eight hours professional development on the main materials they use with about one-quarter stating they received no professional development. In spite of the low level of professional development teachers received, 31 percent of mathematics and 38 percent of English language arts teachers indicated they had no need for additional professional development.

The researchers concluded that the CCSS may be playing some role in the choice of materials that mathematics teachers use, but the results of the survey did not provide clear evidence of a causal relationship between adoption of the CCSS and choice of materials. There was less evidence that the CCSS play a role in the use of materials in English language arts, where most elementary teachers use levelled readers. There were considerable differences between elementary and secondary teachers in their use of materials. Teachers in low-income schools use a higher proportion of online materials, which may not be of high quality. There was some evidence that adoption of the CCSS had increased the use of teacher-developed materials.

Center for Education Policy Research, Harvard University

In 2015, researchers at Harvard University's Center for Education Policy Research conducted a study to investigate implementation of the CCSS. Data for the study were collected from principals and teachers in a representative sample of 111 elementary and middle schools across five states: Delaware; Maryland; Massachusetts; Nevada; and New Mexico. Development of separate

questionnaires for principals and teachers was informed by conducting interviews with officials in state education agencies, district leaders, principals and teachers to learn about their experiences in implementing the CCSS. The questionnaires were piloted with 30 individuals prior to being administered between February and April of 2015. Administration of the teacher questionnaire was limited to English language arts and mathematics teachers in grades 4 to 8, because annual testing in those grades allowed for changes in student achievement to be studied. Data collected from the survey were analysed in two stages. First, the degree of teacher and principal support for the standards was measured and strategies used to implement the CCSS were catalogued. Second, the degree, to which particular aspects of implementation were associated with stronger student performances on CCSS-aligned assessments, were analysed by statistical tests. Participants from Nevada, however, were excluded from the second stage, because most schools in that state experienced technical difficulties administering the Smarter Balanced assessments.

Kane, Owens, Marinell, Thal and Staiger (2016) found the results of the survey showed that implementation of the CCSS had changed teachers' instructional practices and most teachers had altered their materials. More than three quarters of the teachers reported having changed at least half of their classroom instruction with about one-fifth reporting having changed almost all of it. Approximately 82 percent of mathematics teachers and 72 percent of English language arts teachers reported changing at least half of their materials and 33 percent of mathematics and 21 percent of English language arts teachers reported changing almost all of their materials. Most teachers reported using teacher-developed materials produced by themselves or other teachers in their schools with 80 percent of English language arts teachers and 72 percent of mathematics teachers using such materials on a weekly basis. Only about half of the teachers reported using materials developed by external organisations, such as publishing companies. Teachers used materials available from various online sources, although the proportions varied markedly from state to state. One-third of teachers used the curriculum modules available on EngageNY.org or materials developed by LearnZillion, and one-fifth of teachers used resources developed by Student Achievement Partners. Furthermore, 28 percent of teachers used materials available from their state education agency.

A correlational design was conducted by consolidating more than 30 items on the teachers' questionnaire to form 12 composite indices. Regression analyses of the teachers' responses, averaged to the school level, were undertaken to determine associations between each composite index and students' performances on standards-aligned assessments. Although there was no significant association between students' performances on mathematics assessments and the extent to which teachers aligned their materials, the researchers examined whether there was a relationship between students' performances and the particular textbooks that teachers used. Although they used many different textbooks, five mathematics textbooks were most frequently used by teachers. There was no statistically significant difference in achievement for students using three of these textbooks, but students using Houghton Mifflin's *Go Math!*, scored 0.1 standard deviation higher than students using other textbooks or no textbook at all.

Initiatives relating to Instructional Materials

The findings of these studies, which show that materials play a central role in the implementation of the CCSS, have influenced policymakers to foster several initiatives. Beginning soon after the release of the CCSS, these initiatives aim to assist publishers and educators align materials to the new standards.

David Coleman and Susan Pimental, two lead writers of the CCSS for English language arts and literacy, developed the *Revised Publishers' Criteria for the Common Core State Standards in English Language Arts and Literacy, Grades K-2* and the *Revised Publishers' Criteria for the Common Core State Standards in English Language Arts and Literacy, Grades 3-12* highlighting the key ideas of the standards and describing guidelines for materials they considered a faithful reflection of them. Jason Zimba, William McCallum and Philip Daro, lead writers of the CCSS for mathematics, developed the *K-8 Publishers' Criteria for the Common Core State Standards for Mathematics* and the *High School Publishers' Criteria for the Common Core State Standards for Mathematics* to guide publishers and selectors of materials.

In October 2010, education leaders from Massachusetts, New York and Rhode Island initiated the Tri-State Collaborative to develop criterion-based rubrics and a review process to evaluate the quality and alignment of lessons and units to the CCSS. Facilitated by Achieve, the Tri-State Collaborative developed and field-tested Tri-State Quality Review Rubrics for English language arts in kindergarten to grade 2, English language arts and literacy in grades 3 to 5, English language arts in grades 6 to 12, and mathematics. In 2012, Achieve formed EQuIP by involving teams from more than 20 states to extend the work of the Tri-State Collaborative. Meetings of the teams in May and October of 2012 focused on applying criteria to evaluate the alignment of lessons and units, and identifying nearly 100 potential models of quality lessons and units. In December 2013, Achieve selected reviewers for the EQuIP Peer Review Panel, which meets twice a year in Washington, but reviews units and lessons independently and by virtual conferences. In February 2015, Achieve invited educators to submit units and lessons to be evaluated for quality and alignment to the CCSS by the EQuIP Peer Review Panel. By July 2016, 160 exemplar CCSS-aligned lessons and units had been reviewed and made available publicly.

In response to several states expressing an interest in exploring the development and dissemination of open educational resources, CCSSO surveyed state education agencies to collect information on their policies and programs. In the report, the Council of Chief State School Officers (2014) identified activities states were undertaking with open educational resources, and their goals for open educational resources. Facilitated by CCSSO, state education agencies in Idaho, Utah and Washington formed a steering committee to establish a collaborative to develop open educational resources aligned with the CCSS. Coordinated and funded by the Learning Accelerator, the steering committee formed the K-12 OER Collaborative, launched a website at k12oercollaborative.org and gained support from eight other state education agencies. In November 2014, the K-12 OER Collaborative released a request for proposals for developers to create open educational resources in

mathematics and English language arts across four grade bands. In April 2015, ten developers were selected to create prototype units of content for a specified standard at each grade level. Review of the prototypes by a group of expert educators in June 2015 led the K-12 OER Collaborative to select lead developers for mathematics and English language arts. In November 2015, Illustrative Mathematics became a lead developer, and began developing a middle school mathematics unit.

With funds from the state's Race to the Top grant, the New York State Education Department launched a new website, EngageNY.org, in August 2011 to provide an evolving platform for educators to access and share resources that support the Board of Regents' education reform plan. EngageNY.org contains resources on Common Core curriculum and assessments, teacher-leader effectiveness, data-driven instruction, a video library, professional development and network teams, and parent and family resources. In May 2015, Kate Gerson, senior fellow for educator engagement with the Regents Research Fund and Laura Smith, service vice-president with Amplify Education, founded UnboundEd with the mission of extending EngageNY.org's resources to meet the needs of students from low-income communities. With funds raised from several foundations, UnboundEd employed content specialists, many from EngageNY.org, to vet these resources. In July 2015, UnboundEd began convening biennial standards institutes to extend teachers' standards-aligned practices in English language arts and mathematics, and administrators' leadership capabilities in standards implementation. In May 2016, UnboundEd launched a website at www.unbounded.org containing curriculum modules, content guides, videos and podcasts.

EdReports.org

Case Study

The difficulty that educators experience in identifying high-quality materials prompted Maria Klawe, president of Harvey Mudd College at Claremont, California, to convene a mathematics strategy group in consultation with Geoffrey Cowan, president of the Annenberg Foundation Trust at Sunnylands in Rancho Mirage, California, to examine opportunities that digital content brings to helping teachers and students become more effective in mathematics education. In 2012 and 2013, the mathematics strategy group, consisting of mathematics educators, digital content specialists, lead writers of the CCSS and education leaders, held three design meetings and a culminating retreat in the Annenberg Retreat at Sunnylands, where they discussed the need for independent reviews of materials focusing on their alignment to the CCSS and concluded that an entity should be established to pursue this work. Grants were received from the Bill and Melinda Gates Foundation, the William and Flora Hewlett Foundation, and the Leona M. and Harry B. Helmsley Charitable Trust to establish a non-profit organisation called EdReports.org. Education First, a Seattle-based consulting group, which was contracted by the funders to plan the new organisation, worked with Maria Klawe to recruit a board of directors, supported the board of directors in developing a business plan, hired an executive director, housed the organisation, provided technical support and launched a website at www.edreports.org.

Early in 2014, EdReports.org staff conducted a listening tour involving nearly 500 educators to collect information about the materials they use. While 82 percent of the educators surveyed agreed that the CCSS will better prepare their students for college and careers, only 37 percent agreed that textbooks and other materials adopted by their state or district are aligned to the CCSS. EdReports.org staff analysed 11 commonly used rubrics and observed review processes and training conducted for Achieve and the state of Tennessee to develop a process for reviewing digital and print-based materials. An Anchor Educator Working Group of expert practitioners was convened to create and refine the Quality Instructional Materials Tool to meet the needs of reviewing materials in different content areas. The review process requires materials to meet criteria set for three successive gateways: focus on the CCSS and coherence; CCSS expectations for rigour and mathematical practices; and support for high-quality instruction. Each gateway consists of a number of criteria and indicators. The criteria for gateways one and two refer to alignment, while the criteria for gateway three refer to usability.

For its first materials review, EdReports.org assembled a team of reviewers to evaluate 20 mathematics materials for kindergarten to grade 8, selected according to whether they met three criteria: they provide a year-long curriculum; they constitute at least a 10 percent share of the market; and at least two states have adopted or recommended them. In August 2014, a group of 19 educators met to participate in a calibration exercise to ensure consistency across reviewers. In October 2014, EdReports.org held a training session in New York City, at which a second group of 28 reviewers supplemented the work of the first group. The first group participated in cross-team calibration, presenting their initial ratings for the mathematics materials, while the second group learnt about the review process. Following the training session, the reviewers worked in teams of four with one individual designated as facilitator to evaluate two materials either for kindergarten to grade 5 or grades 6 to 8. Each team member spent several hours each week reviewing the materials independently, and then the team met for a weekly video conference to discuss their findings with other team members. Once the team reached a consensus rating, the facilitator from each team shared the evidence and ratings with the facilitators of other teams. The facilitators scrutinised the evidence and ratings to check that the criteria were applied consistently among the review teams.

In March 2015, EdReports.org posted the results on its website. Only one material, *Eureka* for kindergarten to grade 8, published by Great Minds, met the criteria for alignment at all grade levels. Another material, *My Math*, published by McGraw-Hill, met the criteria for alignment in grades 4 and 5. Another four materials had at least one grade that partially met the criteria for alignment: *Go Math*, published by Houghton Mifflin Harcourt, in grades 1, 2, 4, 5, 6 and 8; *Expressions*, published by Houghton Mifflin Harcourt, in kindergarten and grades 1 and 2; *Digits*, published by Pearson, in grades 6 and 8; and *Math in Focus*, published by Houghton Mifflin Harcourt, in grade 8. The evaluation for each material contains an overview presenting a summary of the evaluation and separate grade-level reports presenting evidence and ratings against each criterion's indicators for each gateway, where the material meets expectations.

Furthermore, the scores for each material can be compared at each grade level with other materials evaluated during the review.

Soon after the results were published, several publishing companies, whose products failed to meet the criteria set by EdReports.org, criticised the gateway process, because it eliminated materials without providing in-depth analyses. In May 2015, the National Council of Teachers of Mathematics and the National Council of Supervisors of Mathematics published an open letter to the education community about concerns regarding use of the mathematics materials reviews. The letter highlighted three features of the methodology of particular concern. First, the criteria focus on only a subset of the CCSS for mathematics for each grade. Second, the process, involving three gateways, excludes materials that fail to meet criteria for gateways one and two from a complete analysis. Third, the process allows reports to be posted with errors. The letter recommended that EdReports.org revise its current methodology, evaluation tool and review process to address these issues.

In response to these criticisms, EdReports.org staff and educators, who designed the tools and review process, considered suggestions offered by teachers, publishers and members of the mathematics community. In June 2015, EdReports.org announced four enhancements would be made to the review tool, methodology and reporting protocol. First, all materials that partially met expectations for focus and coherence at gateway one would be reviewed against the criteria for mathematical practice and rigour at gateway two. Materials that do not meet expectations for focus and coherence would still not be reviewed for mathematical practice and rigour. Second, evidence collection and scoring for the indicator determining whether students are assessed and held accountable for future grade level standards would be revised. The methodology and tool would be upgraded to show additional steps reviewers take to collect evidence of above-grade level assessments, weigh the mathematical appropriateness of their inclusion, examine the connection between the assessments and the amount of instructional time devoted to these standards, and identify the frequency of the above-grade level assessments. Third, the EdReports.org website would offer more detailed rating visuals to illustrate the relative range of possible scores within reviews, and the evidence guides would be published on-line to allow teachers to conduct independent reviews. Fourth, publishers would be invited to share more background information about their materials, supplementary services they offer, and evidence of the effectiveness of their materials.

The refined review process involves teams of four or five reviewers independently reviewing each material and providing evidence through the online system before meeting to reach consensus on the evidence and the score. Review teams are assisted by volunteer advisors with expertise in each content area. At each gateway, the reviewers provide a rating according to numerical rating options and cite concrete evidence in an evidence collection workbook. An overall rating for each criterion is determined by adding the total points earned from the criterion's indicators. At gateway one, a material is rated across three criteria: focus on grade level assessments may score 1 or 2 points; focus on major clusters of each grade may score 0 to 4 points; and coherence may score 1 to 8 points. A material meets expectations, and moves to gateway two, if no indicator receives 0 and it scores 8 to 14 points. At gateway two, the

material is rated across two criteria: rigour and balance within each grade may score from 1 to 8 points; and connections between the Standards for Mathematical Practice and Standards of Mathematical Content may score 1 to 10 points. A material meets expectations and moves to gateway three, if it scores 16 to 18 points. At gateway three, the material is rated across five criteria: use and design to facilitate student learning may score 1 to 8 points; teacher planning and learning for success with CCSS may score 1 to 8 points; assessment may score 1 to 10 points; differentiated instruction may score 1 to 12 points; and technology use, which is not rated. A material meets expectations, if it scores 31 to 38 points.

Publishers are also involved in the review process. Each publisher is invited to provide an hour-long orientation on the publisher's material to the appropriate review team. Publishers also have opportunities to post a response to the evaluation and a document providing background information and research findings about the material on the EdReports.org website.

In December 2015, EdReports.org initiated user forums for each material with an evaluation published on its website. The forums are designed for teachers, who are using particular materials, to share their experiences with other teachers as they consider selecting and using new materials.

After the Board of Directors approved these refinements, the review teams reviewed 45 materials again on focus in grade level for gateway one and 12 materials again that partially met gateway one criteria, and enhanced the evidence guides. In mid-2015, 47 educators were selected to review an additional 58 materials for kindergarten to grade 8. Following training in using the Quality Instructional Materials Tool at a professional learning session held in Chicago, the review teams began reviewing the materials in October 2015. Evaluations of the materials were published on a rolling basis with the first four released in February 2016, another six released in April 2016, and a further 22 released in May 2016.

In mid-2015, EdReports.org began working with the Orange County Department of Education in California to pilot what types of support to offer districts as they navigate the adoption process and use evaluations provided by EdReports.org. In September 2015, superintendents, coaches and teachers from three districts and one charter school met in Westminster, California, to explore the instructional shifts for focus and coherence, and discuss how to identify these shifts in materials. Two districts used the evaluations to screen materials available in the marketplace, and then piloted these materials in classrooms. The other district used the evaluations to consider district-wide modifications to pacing guides and professional development for materials that had been purchased. Then, the participants identified criteria reflecting local priorities for quality, and used evaluations provided by EdReports.org to identify which materials to pilot in classrooms.

Early in 2015, Edreports.org conducted a listening tour to collect information for developing a methodology and tool to review mathematics materials for high school. The Anchor Educator Working Group analysed the findings of the listening tour, examined other rubrics, and developed the Quality Instructional Materials Tool for High School, which shares many characteristics with the tool

used for reviewing mathematics materials for kindergarten to grade 8. Since grade levels are not a category for high school, the reviewers analysed traditional course materials for algebra I, geometry and algebra II as well as integrated course materials. Late in 2015, 31 reviewers were selected and trained in using the tool. Then, the review teams reviewed eight mathematics materials for high school. In June 2016, EdReports.org released the results for four traditional course materials and one integrated course material. Only one series, *Core Connections*, published by CPM Educational Program, met the criteria for alignment at each gateway. *Carnegie Traditional*, published by Carnegie Learning, partially met the criteria for alignment at gateways one and two. The evaluation for each series contains evidence and ratings against each criterion's indicators for each gateway, where the material meets expectations. Furthermore, the scores for each material can be compared at each grade level with other materials evaluated during the review.

In mid-2015, Edreports.org conducted a listening tour to collect information for developing a methodology and tool to review English language arts materials for grades 3 to 8. The Anchor Educator Working Group analysed the feedback and reviewed various rubrics to develop the Quality Instructional Materials Tool for grades 3 to 8 English language arts. Evidence guides were developed to support reviewers' understanding of how to identify evidence using the tool. Late in 2015, 45 educators were selected and trained in using the tool. Then, the review teams reviewed seven English language arts materials for grades 3 to 8. In August 2016, EdReports.org posted the results on its website. The criteria for alignment were met by three materials: *Amplify ELA* for grades 6 to 8 published by Amplify Publishing; *Expeditionary Learning* for grades 6 to 8 published by EL Education; and *Ready GEN* for grades 3 to 5 published by Pearson. The criteria for alignment were met partially by three materials: *Bookworms* for grades 3 to 5 developed by Sharon Walpole of the University of Delaware and Michael McKenna of the University of Virginia; *Collections 2015* for grades 6 to 8 published by Houghton Mifflin Harcourt; and *Springboard* for grades 6 to 8 published by the College Board.

Evaluation of Decision-Making in EdReports.org

The decision-oriented evaluation model focuses on analysing whether the objectives associated with research, development, diffusion and adoption phases of the change process are achieved in relation to planning, structuring, implementing and recycling decisions.

Planning decisions to determine the objectives for EdReports.org originated in the conversations among participants at a series of meetings held in the Annenberg Retreat at Sunnylands. The rationale for planning the objective for EdReports.org arose from awareness that effective approaches to evaluate digital content for mathematics education were lacking in the education system. The objective of drafting a plan for constructing EdReports.org was specified in the new organisation's mission to conduct independent reviews of materials focusing on their alignment to the CCSS.

Structuring decisions to design procedures to achieve this objective were enabled by various private foundations pledging funds to establish the new

organisation and Education First working with its board of directors to draft the plan. The lack of effective approaches to evaluate materials meant that the plan needed to set out the outcomes to be achieved, work to be performed, and resources and time to be used by considering the variables of method, content, organisation, personnel, schedule, facilities and budget.

Implementing decisions to utilise, control and refine procedures involved programming procedures associated with research, development, diffusion and adoption phases. In the early stages of the change effort, EdReports.org conducted an exploratory listening tour in 2014 intended to uncover data in the field to provide a basis for formulating a new solution to this problem. This exploratory activity was followed by a rigorous effort to engineer large change intended to provide innovative activity to invent, test and diffuse new solutions to overcome this problem. The change effort was characterised by decisions to use teachers to develop rubrics, employ a competitive process to select reviewers, implement a training program for reviewers, incorporate gateways and alignment ratings within the review process, form expert advisory panels and invite participation from publishers. Once these components were integrated into an operating system, EdReports.org created widespread awareness of the review process and evaluations among teachers, education leaders and publishers by disseminating various news releases. Collaboration with the Orange County Department of Education in California to pilot types of support to offer districts represents an early effort to train local personnel to manage and use the evaluations.

Recycling decisions are used to judge and react to attainments and whether to continue, terminate, evolve or drastically modify the innovation. The need for EdReports.org to make such decisions arose in March 2015 after several publishing companies criticised the use of gateways in the review process. Recommendations made by the National Council of Teachers of Mathematics and the National Council of Supervisors of Mathematics led EdReports.org to revise its methodology, evaluation tool and review process to satisfy criticisms raised by stakeholders, as well as increase publishers' involvement in the review process and engage teachers in sharing their experiences in using materials.

Conclusion

The findings of this study show that the excellence debate in the 1980s led policymakers to realise that instructional materials form an important element in any attempt to improve education. A series of national initiatives undertaken to improve the quality of materials faltered in the 1990s, when the federal government shifted away from this issue as a priority to promote standards-based reforms. The implementation of the CCSS by most states, however, has reinstated the role of materials as a central issue in educational policy.

A renewed interest among researchers in investigating variables affecting the role of materials in teaching and learning has produced several important findings. First, collection of data on the use of materials in classrooms would improve selection decisions and stimulate research relating to materials. Second, there is little relationship between the quality and cost of materials, and

change to a higher-quality material is cost-effective. Third, implementation of the CCSS has led to a high proportion of teachers changing the materials they use in classrooms. Fourth, teachers use teacher-developed materials extensively, but their use of materials produced by publishing companies is only moderate. Fifth, there are some variations between English language arts and mathematics teachers, and between elementary and secondary teachers in their use of materials.

Implementation of the CCSS has led reformers to launch several initiatives to assist teachers align materials to the standards. The case study on EdReports.org shows that after only two years since its foundation the new organisation has successfully developed and implemented an operating system to evaluate the alignment of materials to the CCSS, created widespread awareness of the system among practitioners and conducted initial activities to train teachers to use evaluations to improve the selection and use of materials in classrooms. The evaluation of EdReports.org will provide information to assist decision-makers plan, structure and implement a program for aligning materials to academic standards involving many steps and actors over a relatively long span of time.

Policymakers in other educational settings should consider whether the operating system developed and implemented by EdReports.org provides a valid model for creating a program to evaluate the alignment of materials to academic standards. Further consideration of this recommendation could take the form of establishing a dialogue with the board of directors and staff of EdReports.org to exchange ideas about the governance for such an entity, a review process for evaluating materials, an exchange program for personnel to be trained in appropriate evaluation techniques, and a collaborative partnership to conduct research into the use of materials in relation to academic standards.

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