Adaptive and Technical Problems in Curriculum Alignment Reform

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Adaptive and Technical Problems in Curriculum Alignment Reform

Christopher S. Winters

University of Connecticut, 2013

This study explored the match between (a) strategies suggested in the research as necessary for a well-honed curriculum alignment reform focused on the instructional core and (b) the strategies actually used by one district, Middlerock, in its implementation of a curriculum alignment reform. The study used interpretive qualitative methods (Caelli, Ray, & Mill, 2003) in order to describe the complex inter-relationships involved among the data sources (e.g., district documents, interview data, and an equity audit). The unit of analysis for this study was the set of strategies identified in the research that were used to address technical problems and adaptive problems by Middlerock personnel during the planning and implementation of the math curriculum alignment reform. Analysis revealed a high match with 87% of the strategies identified as addressing technical problems and only 8% of the strategies identified as addressing adaptive problems. Results revealed that over the six-year period following the reform, scores remained mostly flat, the district failed to keep pace with gains in math made by comparable districts, wide gaps persisted between student subgroups, and wide gaps persisted between schools in the district. Recommendations include specific steps districts can take to address both the technical and adaptive problems related to curriculum alignment reform focused on the instructional core.
Adaptive and Technical Problems in Curriculum Alignment Reform

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Adaptive and Technical Problems in Curriculum Alignment Reform

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Adaptive and Technical Problems in Curriculum Alignment Reform

A vast body of research describes waves of reform of educational institutions (Marzano, 2000; Elmore, 2000). A number of reform initiatives have shown short-term success in changing technical aspects of education (e.g., the structure and content of professional development, the standardization of instructional techniques, the alignment of curriculum to standards). For example, Hightower and McLaughlin (2006) described the highly effective centralized approach to educational reform employed by the San Diego school district (e.g., common professional development for the entire district, uniform reading instruction for all schools) that began in 1998. The results showed that (a) teachers reported changes in teaching practices related to the reform, (b) principals observed that 82% of teachers who participated actively in professional learning realized positive changes in instruction in the direction of the reform effort, and (c) test scores increased in several of the reform’s early years (e.g., 2005 scores of reading achievement showed that 10% of participating elementary school students and 4% of middle school students shifted out of the bottom decile and into higher levels) (Public Policy Institute of California, 2005). Follow up research in the San Diego district, however, showed that the lasting impact of reforms was limited (Sparks, 2010; O’Day & Quick, 2009). Related research also suggests that such reforms—those that addressed the technical aspects of education—have only a limited impact on (a) long-term changes of educators’ beliefs, culture and practice (Agullard & Goughnour, 2006; Elmore, 2000, 2002) and (b) student achievement (National Center for Education Statistics, 2010).

Description of Problem

Academic achievement of U.S. K-12 students lags that of many countries within the Organization for Economic Cooperation and Development (OECD). The 2006 Programme for
International Assessment (PISA) reported that U.S. 15-year olds dropped from 6th to 9th place in reading relative to students in other OECD countries and from 18th to 24th in ability to apply mathematical knowledge and skills to real-world tasks (Provasnik, Gonzales & Miller, 2009). In science literacy, U.S. 15-year-olds placed in the bottom 50% of the OECD sample (Baldi, Jin, Skemer, Green & Herget, 2007).

Analysis of trends in the achievement of U.S. students reveals mostly flat performance and persistent large gaps between groups of students. Results of National Assessment of Educational Progress (NAEP) indicated that the overall average reading score for 12th graders was four points lower in 2009 than in 1992. There has been about a 5% difference in the achievement scores in reading and math of Whites, Blacks and Hispanics that has persisted since 1992, despite wide-ranging reform efforts to reduce the gap (National Center for Education Statistics, 2010).

Similar problems of flat student achievement and variation between schools and between groups of students are evident in local districts. Middlerock, a large suburban town in Southwest Connecticut, is an example of a district that despite several attempts at reform has been minimally successful in raising student achievement. A review of data on the Connecticut Mastery Testing (CMT\(^1\)) from 2003 to 2010 revealed flat scores, persistent gaps between groups of students, and variation in student achievement among the district’s eleven elementary schools. During this period, for example, the overall percentage of students in Middlerock reaching the Goal level in reading and math, as defined by the State, ranged narrowly within a ten percentage point band on the CMT over the eight year period with little observable upward trend. The gap between White and Hispanic students at Goal in reading and math averaged 24 percentage

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\(^1\) The discussion of CMT and CAPT results throughout this paper recognizes the limitations involved in comparing the many different generations of the tests across years.
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points. The gap between full price and free/reduced price students at Goal in reading and math averaged 34 percentage points. Finally, gaps at Goal in reading and math achievement were persistent between the highest performing elementary school and the lowest performing elementary school in the district averaging 40 percentage points between 2003 and 2010. For a comprehensive view of the data, see Table 3, page 28 in the Methods and Procedures section.

This study addressed the problems related to student achievement by focusing on one district, Middlerock, that suffers from many of the issues that characterize failed reform efforts throughout the country (e.g., flat test scores, disparities of achievement between schools, and achievement gaps between various subgroups of students). As a step in addressing these problems of student achievement, this study explored factors that may have contributed to the limited success of a reform effort in Middlerock to increase student achievement via curriculum alignment. The results of this exploration may help other districts in their efforts to implement curriculum alignment that addresses the problem of student achievement successfully.

**Theoretical Framework**

An important step in understanding the inability of districts to affect a long-term impact on achievement is to identify factors that may have contributed to these failed reform efforts. Figure 1 (next page), illustrates the premise that guides this study: Curriculum alignment reforms that effectively address student achievement (see description of problem) use strategies that target the technical and adaptive nature of problems within the instructional core. Conversely, according to this premise, when curriculum alignment reforms do not use strategies that target both the technical and adaptive nature of problems within the instructional core, districts fail to realize gains in student achievement. Following this premise, a well-honed curriculum alignment is guided by (a) principles of professional learning in a way that uses research on how
individuals learn best to help professionals understand and implement strategies focused on the technical and adaptive nature of problems related to a curriculum alignment reform (Sheckley, Lemons, Kehrhahn, & Grenier, 2008); (b) leadership practices in way that uses research principles to align all members of the organization in the implementation of strategies focused on the technical and adaptive nature of problems related to a curriculum alignment reform (Randall & Coakley, 2007); (c) policy adoption and policy implementation in a way that employs research-based procedures that allow schools to harness external support as they set and pursue goals focused on the technical and adaptive nature of problems related to a curriculum alignment reform (Honig, 2006); and (d) social justice in a way that uses research-based principles to gain commitment throughout the organization to equal educational opportunities for all students through the implementation of strategies focused on the technical and adaptive nature of problems related to a curriculum alignment reform (Noguera, 2006).
Figure 1. Considerations Involved in Curriculum Alignment Reform that is Designed to Increase Student Achievement

**Instructional Core**

One line of research emphasizes the importance of school leaders managing the instructional core—the interaction between teachers and students around content—to advance student achievement (Elmore & Burney, 1997; Elmore, 2000). Research highlights how districts have swung from a view that the instructional core is unmanageable because its components are

---

2 As an organizational frame for the literature review, Figure 1 presents a schematic of a set of key issues involved in curriculum alignment. The intricate relationships between these factors will be discussed more fully in the sections that follow.
obscure and “loosely coupled” (Weick, 1976), to a belief that practices within the instructional core can be standardized through the use of tight bureaucratic controls (Mac Iver & Farley, 2003). At both extremes, districts have often failed to break the historic culture of teachers working as autonomous agents within their classroom (Elmore, 2000). From this perspective, reform efforts—such as curriculum alignment—often have limited impact on student achievement because these reforms have failed to reach down into the instructional core to impact what teachers do in their classrooms (Elmore, 2000, 2002).

City, Elmore, Fiarman and Teitel (2009) indicate that curriculum alignment is a critical component of a reform focused on the instructional core. These authors note: “Increases in student learning occur only as a consequence of improvements in the level of content, teachers’ knowledge and skill, and student engagement” (p. 24). Changes to all three components are necessary for an effective reform focused on the instructional core. In addition, change to any one component of the instructional core is insufficient without corresponding changes to the other components. Altering the level of content—a stated goal of a curriculum alignment strategy—requires corresponding improvements in the level of teacher knowledge and skill (e.g., a well-defined instructional framework and effective professional development of teachers) and student engagement (e.g., focus on the tasks in which students are asked to participate).

Research demonstrates that when school districts focus curriculum alignment reform efforts on the instructional core, student achievement improves. For example, Skrla, Scheurich and Johnson (2000) found that in four Texas districts, efforts between 1994 and 1999 to strengthen the instructional core by aligning curriculum with instructional frameworks and assessments led to an average increase of 5.5 percentage points above the state average on all standardized tests. In an analysis of 23 reports and articles on case studies of district
improvement strategies, Bergeson (2004) reported that in districts with sustained growth in student achievement, curriculum was aligned within the instructional core in terms of standards, assessments, and policies.³

When districts do focus reforms on the instructional core, their efforts are most successful when they address both “adaptive” and “technical” elements that exist in the instructional core (City, Elmore, Fiarman & Teitel, 2009). According to these authors—and others who have also contributed to this line of research—technical problems are those (a) with identifiable tasks that tend to be fairly straightforward, (b) which are fixable within a set period of time, and (c) for which the expertise to produce solutions exists using current problem solving processes (Heifetz & Laurie, 1997; Heifetz & Linsky, 2002; Lemons & Helsing, 2009). For example, as addressed in these research studies, technical problems related the adoption of a new curriculum that focuses on the instructional core include: (a) how to align curriculum with standards, instructional frameworks and assessments; (b) how to reorganize units of instruction; (c) how to develop pacing charts; and (d) how to expand knowledge of the resources available through program materials. In most cases, teachers and administrators find solutions to technical problems when they apply current problem solving processes (e.g., feedback from observations, workshops on new instructional techniques, “how to” guides in the literature) (Heifetz & Linsky, 2002).

In contrast, as defined in this line of research, adaptive problems are those that (a) challenge deeply held values and beliefs, (b) necessitate a long-term commitment, and (c) require communities to alter values and beliefs as they learn to work in new ways (i.e., no single expert can resolve the problems). Related to the adoption of new curriculum, adaptive problems that focus on the instructional core may include: (a) how to develop connections between and among

³ Note: No effect sizes were included in this report.
different subject areas; (b) how to contrast ways previous philosophies of teaching are compatible or incompatible with the philosophy of a new curriculum; and (c) how to adjust instruction to align with shifts in philosophy of the curriculum. In most cases solutions to adaptive problems are found when professional communities alter their values and beliefs as they learn to work in new ways (Heifetz & Laurie, 1994; Heifetz & Linsky; 2002; Lemons & Helsing, 2009).

Although the above examples provide a working definition of technical and adaptive problems, in actuality, the distinctions are far more subtle. In most cases, there exists a continuum from the technical to the adaptive aspects of a problem. The relationships between technical and adaptive problems are discussed more fully in sections that follow.

When districts focus on the instructional core, their reform efforts are most successful when they align with the type of problem—technical or adaptive—being addressed (Lemons & Helsing, 2009; Guilleux, 2011; Randall & Coakley, 2007). For example, Huffman’s (2006) research on the implementation of a new physics program highlighted the relationship between the technical and adaptive problems that are involved in implementing a new curriculum. After receiving training on a new physics program, lead teachers were only slightly more proficient \((d= .35)\) than novice teachers on the technical task of using assessments to gauge student progress. On more adaptive instructional tasks—ones that required shifts in beliefs about teaching such as leading discussions based on scientific inquiry—the lead teachers were much more proficient \((d= .98)^4\) than were the novice teachers. These results suggested that strategies that address curriculum revision as a technical problem may be effective on technical items such

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\(^4\) When information is available to calculate effect sizes they will be listed as a standard deviation difference using Cohen’s (1992) \(d\) statistic.
as assessing students and sequencing instruction, but acquisition of strategies that address
adaptive problems (e.g., leading a discussion) may be more involved.

In a second example, Lemons and Helsing (2009) found that a reform often had limited
impact when districts (a) failed to distinguish between the demands of technical and adaptive
problems involved in the reform and (b) imposed technical solutions and processes to adaptive
problems. In a narrative description of two districts (amalgams of real districts), Lemons and
Helsing described how approaches to the implementation of the same initiative, “learning
walks”—where principals conduct brief visits to classrooms to observe teachers’ practice—
resulted in very different outcomes based on how the districts perceived of and went about the
change.

In one district, the initiative followed a top-down, technical approach: The district central
office mandated the practice, taught principals how to conduct the walks, and collected data on
implementation. The walks were initially viewed positively—the technical aspects of the walks
were readily grasped and achieved—but after two years, the ultimate goals of changes in
teaching practices and increases in student achievement were not realized.

In the second district, the administration spent the first year analyzing data to better
define the problem that learning walks would help address. Lemons and Helsing reported that
this work resulted in revised schedules, altered approaches to professional learning, new
evaluation systems to meet district priorities, and collaborative teams of teachers to address some
of the adaptive aspects of the problems. This district’s approach to the initiative contributed to
modest growth in student achievement, a sharper focus on the relationship between instructional
practices and thinking skills of students, and the realization that increasing student achievement
involved a complex process.
Lemons and Helsing concluded that when a district applied technical solutions (e.g., training workshops, leadership directives with little local input, and top-down mandates without concern for existing priorities) to adaptive problems (e.g., issues related to mobilizing a school and faculty around strengthening the quality of instruction) the emphasis on technical solutions, “actually inhibit[ed] organizational and individual learning necessary to tackle the adaptive problem” (p. 482).

To extend and clarify the relationship between an instructional reform—curriculum alignment—and a focus on the technical and adaptive issues related to this reform, this study explored the relationship between curriculum alignment efforts in Middlerock and factors related to the technical and adaptive problems that existed within the instructional core.

**Professional Learning**

If professional learning initiatives are to support teachers as they struggle with adaptive problems related to curriculum alignment reform, research suggests that such initiatives would follow principles of how adults learn best (Garet, Porter, Desimone, Birman, & Yoon, 2001; Scheckley, Lemons, Kehrhahn, & Grenier, 2008). According to this research, adults learn to address adaptive problems when they discover how their mental models—their constructs on how the world works—influence their professional practice and, in turn, how their practice can be impacted by shifts or expansions of the mental models they use to guide their work (Eckert & Bell, 2005; Hofstadter, 2001; Seel, 2006; Scheckley, 2003).

Eckert and Bell (2005) conducted a qualitative study of ten operators of small farms. Their research indicated that effective professional learning begins with an exploration of learners’ mental models and how those mental models impact the acquisition of new knowledge and skills. Specifically, Eckert and Bell concluded: (a) values, beliefs, and knowledge held by
farmers prior to exposure to new learning influenced each farmer’s mental model; (b) each farmer’s mental model guided his or her actions, decisions, and the use of information and feedback; and (c) mental models were unique to each individual thus they did not necessarily conform to recognized "best practices."

In research on the structural and core components of professional learning, Garet et al. (2001) demonstrated the importance of teacher exploration of mental models as they related to new situations. Their study reported that professional learning programs with the strongest impact on teachers' knowledge and skills—and ultimately student achievement—had at their core a strong emphasis on content \((d=.33)\), active learning \((d=.14)\) and coherence within the instructional core \((d=.42)\). Overall, Garet et al. (2001) reported that activities that were “(a) linked to teachers’ other experiences; (b) aligned with other reform efforts; and, (c) encourage[ed] professional communication among teachers appear[ed] to support change in teaching practice, even after effects of enhanced knowledge and skills were taken into account” (p. 936).

Saylor and Kehrhahn (2003), in their study of the impact of professional learning on the acquisition of technology in middle school teachers reported that 54 out of 68 teachers reached or exceeded their goals following the first year of implementation. The program combined formal learning opportunities such as workshops with “activities designed to take advantage of day-to-day informal contact during team time and staff meetings” (p. 49). Additional coaching resources, administrative support, choice of activity, and the structuring of tasks from less difficult to more complex, allowed teachers to alter beliefs about technology and acquire the requisite knowledge and skills. Overall this approach to professional learning achieved outstanding results: At the end of the three-year project, 79% of the teachers in the school were
using technology on a regular basis.

In summary, research findings and related practices on professional learning have identified specific actions that district/school leaders can follow to address both the adaptive and technical issues involved in achieving a curriculum alignment reform focused on the instructional core and sustaining its impact. For technical problems, districts could (a) offer training programs that provide teachers with information on ways to address the technical problem (e.g., workshops, faculty meetings, written communication); (b) monitor teachers’ compliance with the ideas outlined in the training sessions (i.e., did teachers cover material as specified in curriculum documents?); (c) provide additional training as determined by policymakers or building leaders; and (d) measure progress towards addressing the problem through participation, surveys of attendees and, sometimes, student outcomes. For adaptive problems, districts could (a) work to change the mental models that guide teachers’ practice to align with the principles of the reform effort (Eckert & Bell, 2005); (b) help teachers integrate the principles underscoring the reform effort with their prior experiences (Garet et al., 2001); (c) align new learning with other reform efforts (Garet et al., 2001); (d) support change in practice by encouraging professional communication among teachers that focuses on the reform efforts (Garet et al., 2001); (e) take advantage of day-to-day informal contact during team time and staff meetings in order to effect the goals of the reform (Saylor & Kahrhan, 2003); and (f) provide coaching resources and administrative support to teachers as they grapple with ways to implement the adaptive problems related to the new curriculum (Saylor & Kahrhan, 2003). As applied to this study, the research on professional learning suggests that a curriculum alignment reform would be most successful when professional learning is structured in a way that helps teachers address both the technical and adaptive nature of the curriculum alignment issues within
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the instructional core.

**Leadership Practices**

Research indicates that districts were most successful in addressing the adaptive problems related to curriculum alignment and other reform initiatives when leaders engaged in *adaptive leadership*: A process in which educational leaders, “move[d] beyond an individualistic, role-embedded conceptualization of leadership and leadership practice to one that focus[e] more broadly on sharing of knowledge, expertise and action” (Park & Datnow, 2009, p. 478). Heifetz and Linsky (2004) explained that adaptive problems generally involve many different stakeholders each with his/her own interpretation of the issues. Heifetz, Kania and Kramer (2004) concluded that solutions to adaptive problems stemmed from the stakeholders themselves, not from one single entity, since “the problem is rooted in their attitudes, priorities, or behavior” (p. 25). According to Elmore (2000), a top-down, leadership “control” strategy might be adequate for technical problems (e.g., reordering the objectives of the curriculum, developing assessments of the material, setting compliance standards). However, when addressing adaptive problems (e.g., increasing the rigor of instruction, using assessment data to adjust instruction, ensuring that all students achieve at high levels), leaders were most effective when they engaged all stakeholders in the process since, “most of the knowledge required for improvement must inevitably reside in the people who deliver instruction, not in the people who manage them” (p. 14).

Drawing on the work of Heifetz and Laurie (1997), Randall and Coakly (2007) provided an adaptive leadership framework that establishes leadership practices for bringing about changes required to address adaptive problems. According to Randall and Coakly, leaders must (a) identify the adaptive challenge (i.e., present challenging, new, and uncommon situations), (b)
focus attention on the problem to make all stakeholders aware that change must occur, (c) frame the issues in such a way as to sustain their attention, (d) maintain stress at a productive level to ensure continued efforts toward change, (e) secure ownership of both the problem and the solution from stakeholders themselves, and (f) create a safe environment for stakeholders by providing the resources and the “right cover” so no retribution will occur (p. 328).

Research highlighted how leadership practices that did not follow the stages of this adaptive leadership framework, at times, impeded long-term reform (Louis et al., 2010; Wallace Foundation Staff, 2011). Hightower and McLaughlin (2006) detailed the systemic reform effort of San Diego in the late 1990s to impact student achievement. With new leadership in central office, leaders aligned their practice with some stages of the adaptive leadership framework. Specifically, they (a) identified the adaptive problem (e.g., “to jolt the system out of complacency and to replace it with an enterprise focused on changing instruction to improve student outcomes and to drastically reduce long-standing achievement gaps” [O’Day & Quick, 2009, p. 1]); (b) focused attention on the adaptive problem so that all stakeholders were aware of the need for change (e.g., eliminated Area Superintendents and replaced them with Instructional Leaders to train principals to implement instructional change in their buildings, and secured significant funding for coaching and other professional learning in order to change practices with teachers [Hightower, 2002]); and (c) framed the issues in such a way as to sustain attention (e.g., formed learning communities of principals, disseminated the Principles of Learning to all schools, and monitored through ‘Walk Throughs’ [Hightower, 2002]).

Research conducted a few years into the reform revealed that the San Diego reforms had some impact on both the technical and adaptive aspects that aligned with the reform’s goals. Bitter, O’Day, Gubbins and Soccias (2009) found that teachers’ use of higher-level questioning
and discussion about the meaning of text in classrooms was almost three times higher than that of teachers in similar classrooms observed in an earlier study using the same instrument. Quick, Holtzman and Chaney (2009) reported that teachers in the San Diego district who received high amounts of training were able to align to the district’s theory of professional learning—teachers building content knowledge, working in collaboration, and accessing coaching. Finally, Graczewski, Knudson and Holtzman (2009) found that principals in the district had internalized their new role as instructional leaders.

Fewer than six years into this reform, however, a “backlash” occurred among teachers and principals in the district to the top-down, tightly controlled effort (Sparks, 2010). Related to the adaptive leadership framework, San Diego leaders did not: (a) maintain stress on the desired changes at appropriate levels, (b) secure ownership of both the problem and the solution from stakeholders themselves, and (c) create a safe environment for them by providing the resources and the “right cover” so no retribution will occur (O’Day & Quick, 2009). As detailed in the research of Hightower and McLaughlin (2006), key stakeholders in the system indicated that the leadership of Alan Bersin and Anthony Alvarado effectively relegated local actors to the sidelines and that the rapid rate of mandated change failed to gain the buy-in from teachers. As a result, the attempt to address problems within the district (e.g., adapt curricula to meet the needs of linguistically diverse classrooms) with a set of top-down technical solutions, failed to have a lasting impact on the work of teachers in the classroom. Ten years after the reform, there was little evidence that the desired change permeated the culture of the San Diego schools and classrooms (Sparks, 2010).

In summary, research findings and related leadership practices have identified specific actions that district/school leaders can follow to address both the adaptive and technical issues
involved in achieving a curriculum alignment reform focused on the instructional core and sustaining its impact. For technical aspects, leadership practices can: (a) exercise technically oriented, top-down control strategies (Hightower & McLaughlin, 2006), and (b) manage the structures and processes that support effective instruction (e.g., organizing, budgeting, and dealing with disruptions inside and outside the system) (Elmore, 2000, p. 6). For adaptive problems, leadership practices are most effective when they follow principles of adaptive leadership: (a) identify the adaptive challenge—present challenging, new, uncommon situations, (b) focus attention on the problem to make all stakeholders aware that change must occur, (c) frame the issues in such a way as to sustain their attention, (d) maintain stress at a productive level to ensure continued efforts toward change, (e) secure ownership of both the problem and the solution from stakeholders themselves, (f) and create a safe environment. As applied to this study, the research on leadership suggests that a curriculum alignment reform would be most successful when administrators throughout the district employ adaptive leadership practices in a way that impact both the technical and adaptive issues related to curriculum alignment within the instructional core.

**Policy Adoption and Policy Implementation**

Research indicates that districts confronted with adaptive problems are positioned for success when they employ a process of policy adoption and policy implementation suited to the type of problem being addressed. According to Honig (2006), the alignment of policy with the adaptive and technical problems facing educational reform requires alternate conceptions of how to develop and implement policy. Supporting this view, Hall and McGinty (1997) contrasted a conventional view of policy implementation—“a set of segmented, separated, functionally sequenced stages” (p. 439)—with a dynamic process where stakeholders with varying
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generations and beliefs participate at different points of policy adoption and implementation.

Ball (1987), focusing on the “peculiar nature of schools as organizations,” concluded that
schools are equipped to make changes for policy issues of a purely technical nature because
schools are mostly run as hierarchical top-down institutions. For adaptive problems, however,
policy implementation is successful when leaders use the confrontations and interactions
between individuals and groups in the organization to build consensus for change. According to
Ball:

many decisions taken in school organizations are value laden and cannot be reduced to
the simplicities of a procedural map. Debate, lobbying and discussion are not infrequently
conducted in terms of principles like equality, fairness and justice. Decision-making can
be invested with passion, and sometimes violent disagreements emerge over what seem at
first sight to be innocuous technical issues (p. 13).

Research reveals that a conventional view of policy adoption and implementation can
have an impact on certain technical problems. For example, in a study of 22 districts in five
states over a two year period, Massell (2000) identified four areas where districts implemented
state and federal policy to impact technical aspects of the instructional core: (a) interpreting and
using data, (b) building teacher knowledge and skills through professional development, (c)
aligning curriculum and instruction, and (d) targeting interventions on low-performing students
and/or schools. Massell and Goertz (2002) found that with the implementation of the No Child
Left Behind policy’s testing and accountability rules districts set clear expectations for student
achievement, required schools to identify school-level needs and strategies for achieving district
goals, and used data on student outcomes to inform decisions. Honig and Hatch (2004) provided
evidence that implementation of standards-based reform policies resulted in the wide-spread
acceptance of the belief that all children can learn, systems of academic performance standards,
and allocation of additional resources.
Other studies, however, concluded that a conventional approach to policy adoption and implementation failed to address the technical problems as policymakers envisioned. Hall and McGinty (1997) found that multiple factors at each site—individual backgrounds of those charged with implementation, local conditions, policy ambiguity—resulted in policy implementation that transformed the intentions of policymakers. For example, in a qualitative study of six school psychologists charged with implementing policies for the Individuals with Disabilities Education Act (IDEA), Summers and Semrud-Clikeman (2000) found that when front-line workers experienced conflict between the requirements of their job and policy intentions they often went beyond the technical demands of policy to provide services they deemed necessary or withhold services they deemed incompatible with their heavy caseload. Summers and Semrud-Clikeman explained that these front-line workers employed coping strategies—rationing services, routinizing practices, adjusting expectations of the role of a school psychologist from the ideal to the actual, and changing the implementation of the law to fit the circumstances. Summers and Semrud-Clikeman observed that the actions of the school psychologists not only transformed the intentions of policy, but, in effect, turned front-line workers into policymakers.

Coburn (2006) demonstrated how “policy framing”—the way in which key players understand the meaning and implications of the policy—altered the implementation of policy from the original policymakers’ intentions. Through sustained observations and in-depth interviewing over one year, Coburn found that teachers and administrators interpreted a state policy dictating increased phonics instruction as a need to have a more consistent and aligned approach to reading comprehension across grade levels. The faculty’s policy framing, in this case, was shaped by its preexisting beliefs and practices, patterns of interaction with colleagues,
and the social and structural conditions in the school (Coburn, 2006). As a result, the faculty of
the school voted to pursue professional development opportunities in line with their framing of
the problem and not the policy’s intent.

Regarding adaptive problems, research showed that following a conventional approach to
policy often resulted in a lack of alignment between the implementation of policy and the desired
adaptive outcomes of policymakers. Lipsky’s (1980) research on street-level bureaucracy found
that front-line workers (e.g., teachers, police officers) adapted new policy to the contextual
features of a situation—often times implementing the policy in accordance with their own belief
system and the demands of their role rather than strictly with the intentions of the policymakers.
Although Lipsky provided little empirical evidence in support of his theory (Wong, 2007), later
research supported his findings (Summers & Semrud-Clikeman, 2000).

Honig (2006) described an unsuccessful effort by policymakers to use “boundary
spanners”—liaisons between policymakers and front-line workers—to address aspects of
adaptive problems. Honig’s research detailed efforts by the City of Oakland to shift the beliefs
and practices of schools and community service providers in order to provide more
comprehensive services for youth. Honig found that the boundary spanners initially worked
collaboratively with the community to establish supportive partnerships with sites (e.g., the
boundary spanners used knowledge developed locally to assist the school–community
partnership sites in setting goals to create, implement, and continuously refine strategies for
improving youth outcomes). Without clearly defined roles and sufficient oversight by
hierarchical supervisors, however, the boundary spanners shifted to traditional “top-down,
command and control” relationships. This approach met the technical demands of the policy
(e.g., boundary spanners generated the type of data policymakers required) but failed to bring
about the intended change to adaptive problems (e.g., a shifting of beliefs about how schools and community service providers should interact). Honig concluded that under the circumstances: “boundary spanners will look for professional practice models that they associate with legitimacy or success regardless of whether following those models is actually likely to improve such outcomes” (p. 362).

The inability of a conventional policy approach to impact adaptive problems leads researchers to posit an alternative model—one that (a) considers the social context within which policy operates, and (b) focuses less on compliance to a desired outcome or change and more on the process by which change comes about (Datnow, 2006; Placier, Hall, McKendall & Cockrell, 2000; Honig & Hatch, 2004; Ball, 1997). Following this alternative view, Honig and Hatch (2004) presented a framework for establishing policy coherence—“a process of negotiation… between external policy demands and schools” (p. 19). Specifically, strategies to create policy coherence and successfully address adaptive problems involved school districts working with schools to: (a) develop school-wide goals and strategies; and (b) use external demands to advance their goals and strategies. Each of these strategies will be explored and elaborated on in later sections of this study.

In summary, research findings and related practices on policy adoption and policy implementation have identified specific actions that district/school leaders can follow to address both the technical and adaptive issues involved in achieving a curriculum alignment reform focused on the instructional core and sustaining its impact. For technical problems, districts can employ a conventional model: (a) adopt policy with little input of front-line workers; (b) build tight accountability systems into policy; and (c) monitor through bureaucratic controls. For adaptive problems, districts can follow an alternative model: (a) schools’ developing school-wide
goals and strategies; and (b) schools’ using external demands to advance their goals and strategies. As applied to this study, research in the policy frame suggested that a curriculum alignment reform can falter when related policy development and implementation treats the reform effort as a purely technical problem and in doing so ignores the adaptive features of the problem and the dynamic nature of schools.

**Social Justice**

Research indicated that districts are most successful with reform of adaptive problems when they address the reform with sensitivity to issues of social justice (Noguera & Wing, 2006; Singleton & Linton, 2006). Social justice in educational reform focuses on challenging and exposing beliefs and practices that deprive students of equal educational opportunities (Noguera, 2006). Research indicates that if districts are to achieve the ideals of social justice (e.g., students from diverse racial, ethnic, and social-class groups all experience educational equality) they would benefit from focusing their resources in two areas: (a) developing a common sense of purpose for the district that is stated in terms of social justice; and (b) developing a process for exposing and addressing inequities of the past and present (Banks, 2004).

Curriculum alignment is one area where districts confront both technical and adaptive problems related to issues of social justice. Curriculum is a structure that exists in schools that appears on the surface to be neutral but in fact can perpetuate patterns of educational inequalities (Noguera, 2006). According to Banks (1995), curriculum can present two contrasting conceptions of knowledge: Mainstream Academic Knowledge and Transformative Academic Knowledge. The former, represented in most traditional curricula, asserts “a set of objective truths that can be verified through rigorous and objective research” (Banks, 1995, p. 393), while the latter views knowledge as related to cultural experiences of individuals and groups. This
distinction challenges the Western canon—an accepted body of literature and art that has shaped and defined western European culture—and allows for multicultural curricula to reflect the history and culture of a broader swath of society. For most cultural minority groups as well as women, curriculum has been defined traditionally from a narrow Euro-centric, male perspective. Multicultural education provides an alternative (Banks, 1995; Milner, 2005).

Research has detailed approaches that districts used to address technical problems in curriculum associated with issues of social justice (Banks, 1994; 1998). At the most basic levels, districts: (a) made contributions to the curriculum—(e.g., the inclusion of heroes and holidays)—and (b) added content, concepts, themes, and perspective. According to Banks (1995), although the contributions and additions addressed the technical issue of “what” teachers teach, they did not impact the fundamental structures of curriculum and they continued to reflect mainstream academic knowledge.

In many cases, the issues of social justice related to curriculum reform pose adaptive problems because implementation of a new curriculum in a way that affords equal opportunities for all learners often requires teachers to change their beliefs and practices. Banks (1995) reported that a culturally responsive curriculum engaged students in critical reflection about issues of social justice and often contributed to higher self-awareness and achievement. He argued that to address adaptive problems, districts: (a) Shifted to a transformative approach (e.g., adopted curriculum that challenged mainstream academic knowledge and “expand[ed] the historical and literary canon” p. 394); and (b) Used curriculum alignment to advance social action (e.g., mandated learning outcomes that required students to make decisions about social issues and take action to expose and remedy inequities in their community).

Research highlighted examples of how transformative and social action curricula
impacted adaptive problems for teachers. Camangian (2008) found that spoken word poetry (e.g., the performance of poetry used as a tool to engage students in critical thinking, literacy and the discovery of voice) empowered students to examine issues of privilege, social control, and oppression in U.S. society. In another instance, the infusion of social justice themes into an existing social studies curriculum led teachers to examine biases and to look for ways to help students take action on what they were learning (White, 2008). In contrast, Brackett’s (2008) analysis of gender bias in California curricula standards found that an “inaccurate view of world history, [led] to greater social injustice” (p. 6). For example, Brackett found that the ratio of references of men to women in the California history standards was 35:1. This omission of women’s roles in history may contribute to the perpetuation of gender inequities and male dominated bias in society (p. 6).

Collectively, the studies reviewed in this section suggested that curriculum alignment efforts involve both technical problems—reordering the objectives, adding or subtracting a resource, developing assessments of student learning—and adaptive problems—challenging the beliefs and practices that perpetuate educational inequalities.

In summary, research findings and related practices on social justice identified specific actions that district/school leaders can follow to address both the technical and adaptive issues involved in achieving a curriculum alignment reform focused on the instructional core and sustaining its impact. For technical problems, districts can (a) make social justice contributions to the curriculum—(e.g., the inclusion of heroes and holidays)—and, (b) add social justice related concepts, themes, and diverse perspectives to the curriculum. For adaptive problems, districts can (a) shift to a transformative approach (e.g., challenge mainstream academic knowledge, expand on the literary canon, and break down traditional homogeneous grouping
practices that relegate students of color and low income to low-level classes); (b) use curriculum alignment to advance social action (e.g., mandate learning outcomes that require students to make decisions about social issues and take action to expose and remedy inequities in their community); and (c) provide professional development programs aligned with a social justice agenda (e.g., that “help teachers understand the complex characteristics of ethnic groups within U.S. society and the ways in which race, ethnicity, language, and social class interact to influence student behavior” [Banks et al., 2005, p. 36]). As applied to this study, social justice research suggested that developing a common sense of purpose around social justice themes and establishing a process for exposing and addressing the inequities existing in many curricula positions districts to address both the technical and adaptive problems involved in a curriculum alignment reform.

Methods and Procedures

Research Questions

According to information from multiple sources, during the time frame from the adoption of the curriculum review policy in Middlerock—roughly 2000—to the implementation of the new math curriculum in 2006,

(1) Did the Middlerock BOE frame the math curriculum alignment reform as a technical problem?

a. In instances where the implementation was framed as a technical problem, did the strategies used by the BOE to address a technical problem match or not match those identified by the literature review in the following areas: instructional core, professional learning, leadership practices, policy adoption and policy implementation, and social justice?
(2) Did the Middlerock BOE frame the math curriculum alignment reform as an adaptive problem?

a. In instances where the implementation was framed as an adaptive problem, did the strategies used by the BOE to address an adaptive problem match or not match those identified by the literature review in the following areas: instructional core, professional learning, leadership practices, policy adoption and policy implementation, and social justice?

Setting

The site selected for this study is a large suburban town in Connecticut where I have worked as an administrator for the past 12 years. Although Middlerock boasts one of the highest median family incomes in the country, it also has three federally-funded housing projects and is far from homogeneous. The town’s population of 62,000 includes a large number of corporate executives and celebrities as well as a sizeable population of working class and lower income families. During the 2011-2012 school year, 14% of the students were eligible for free or reduced lunch and 30.2% of the students were classified as minority. Additionally, 27% of the students eligible to attend the public schools in Middlerock attend private schools.

The Middlerock School District has 8,838 students attending 15 schools (11 elementary, three middle and one high school). Each school has a unique demographic profile. Table 1 (below) compares three of the 11 elementary schools and two of the three middle schools. The elementary schools in Table 1 (below) are representative of the Eastern, Central, and Western sections of town. The data reveal wide variation among the three elementary schools in the percentage of students receiving Free/Reduced lunch (from 0.8% to 53.3%), Students not Fluent in English (from 4.9% to 11.4%), Students with Disabilities (from 2.9% to 11.7%) and Total
ADAPTIVE AND TECHNICAL PROBLEMS IN CURRICULUM ALIGNMENT REFORM

Minority population (from 22.0% to 61.7%). The middle schools are located in the Eastern and Western halves of town. As with the elementary schools, the middle schools represent different demographic regions of the town. As shown in Table 1 (below), there is wide variation between the two middle schools in the percentage of students receiving Free/Reduced lunch (from 3.9% to 34.7%), Students not Fluent in English (from 2.5% to 5.5%), Students with Disabilities (from 9.8% to 15.6%) and Total Minority population (from 21.7% to 47.2%).

Table 1

Demographic Variation among Selected Middlerock Schools (2011-2012)

<table>
<thead>
<tr>
<th>Section of Town</th>
<th>Elementary A</th>
<th>Elementary B</th>
<th>Elementary C</th>
<th>Middle School A</th>
<th>Middle School B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>Western</td>
<td>Central</td>
<td>Eastern</td>
<td>Eastern</td>
<td>Western</td>
</tr>
<tr>
<td></td>
<td>360</td>
<td>388</td>
<td>520</td>
<td>774</td>
<td>475</td>
</tr>
<tr>
<td>Percent of Students Eligible for F/R lunch</td>
<td>53.3</td>
<td>9.3</td>
<td>0.8</td>
<td>3.9</td>
<td>34.7</td>
</tr>
<tr>
<td>Percent of Students not Fluent in English</td>
<td>11.4</td>
<td>4.9</td>
<td>7.1</td>
<td>2.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Percent of Students with Disabilities</td>
<td>11.7</td>
<td>3.9</td>
<td>2.9</td>
<td>9.8</td>
<td>15.6</td>
</tr>
<tr>
<td>Percent White</td>
<td>38.3</td>
<td>68.0</td>
<td>78.0</td>
<td>78.3</td>
<td>52.8</td>
</tr>
<tr>
<td>Percent Hispanic</td>
<td>44.2</td>
<td>13.1</td>
<td>12.9</td>
<td>10.7</td>
<td>30.5</td>
</tr>
<tr>
<td>Percent Asian</td>
<td>5.8</td>
<td>12.6</td>
<td>6.6</td>
<td>8.5</td>
<td>7.2</td>
</tr>
<tr>
<td>Total Minority Population (%)</td>
<td>61.7</td>
<td>32.0</td>
<td>22.0</td>
<td>21.7</td>
<td>47.2</td>
</tr>
</tbody>
</table>

During the period when the curriculum alignment reform was being implemented, the population of Middlerock was becoming more diverse economically, racially, and linguistically. As shown in Table 2 (below), at Middlerock High School between 2003-2004 and 2011-2012, the percentage of students receiving Free/Reduced Lunch increased from 7.7% to 13.0%, a 40.8% increase. During the same period, the Hispanic population increased 22.5%, the total...
minority population increased 22.6% and the number of students with Non-English Home Language increased 3.1%.

Table 2

<table>
<thead>
<tr>
<th>Demographic Changes: Middlerock High School (2003 – 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Total population</td>
</tr>
<tr>
<td>Students Receiving Free or Reduced Lunch (%)</td>
</tr>
<tr>
<td>Students of Hispanic Origin (%)</td>
</tr>
<tr>
<td>Total Minority population (%)</td>
</tr>
<tr>
<td>Students with Non-English Home Language (%)</td>
</tr>
</tbody>
</table>

Academically, Middlerock is a high achieving district. Depending on the school, scores on standardized tests range from 70% to 95% of the students meeting or exceeding state-defined passing levels of proficiency. As outlined in the problem statement, however, difficulties exist within the district. For example, as detailed in Table 3 (below), from 2003 to 2010 on state standardized assessments, Middlerock experienced flat scores, persistent gaps between groups of students, and variation in student achievement among the district’s eleven elementary schools.

As shown in Table 3 (below), the overall percentage of students in Middlerock reaching the Goal level in reading ranged narrowly from the high 70’s to low 80’s on the CMT and mid 60’s to low 70’s on the CAPT over the eight-year period. There was a large and persistent gap between White and Hispanic students achieving the Goal level in reading with Whites scoring on average 24 percentage points higher on the CMT and 37 percentage points higher on the CAPT. The gap between full price and free/reduced price students in reading was even larger with full price students scoring on average 34 percentage points higher than free lunch students on the CMT.
and 44 percentage points higher on the CAPT. Table 3 (below) shows that gaps in reading achievement also persisted between the highest performing elementary school and the lowest performing elementary school in the district with the gap in reading at Goal between the two schools averaging 40 percentage points between 2003 and 2010.

Table 3
*Middlerock Standardized Test results (2003 – 2010)*

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CMT - Reading</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District (all students 3-8) - % at goal level</td>
<td>83</td>
<td>78</td>
<td>79</td>
<td>81</td>
<td>80</td>
<td>80</td>
<td>81</td>
<td>83</td>
</tr>
<tr>
<td>Percentage point gap between White and Hispanic (grades 3-8)</td>
<td>25</td>
<td>26</td>
<td>23</td>
<td>22</td>
<td>24</td>
<td>22</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>Percentage point gap between full price and free/reduced price lunch (grades 3-8)</td>
<td>38</td>
<td>38</td>
<td>37</td>
<td>31</td>
<td>33</td>
<td>34</td>
<td>33</td>
<td>31</td>
</tr>
<tr>
<td>Variation among schools (percentage point difference between the highest and lowest schools grades 3-5)</td>
<td>40</td>
<td>57</td>
<td>47</td>
<td>33</td>
<td>39</td>
<td>35</td>
<td>29</td>
<td>39</td>
</tr>
<tr>
<td><strong>CAPT – Reading</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District (all students grade 10)</td>
<td>65</td>
<td>67</td>
<td>69</td>
<td>71</td>
<td>71</td>
<td>61</td>
<td>71</td>
<td>66</td>
</tr>
<tr>
<td>Percentage point gap between White and Hispanic (grade 10)</td>
<td>39</td>
<td>40</td>
<td>30</td>
<td>44</td>
<td>35</td>
<td>37</td>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>Percentage point gap between full price and free/reduced price lunch (grade 10)</td>
<td>52</td>
<td>43</td>
<td>38</td>
<td>48</td>
<td>41</td>
<td>47</td>
<td>39</td>
<td>45</td>
</tr>
<tr>
<td><strong>CMT – Math</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District (all students 3-8)</td>
<td>81</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>80</td>
<td>78</td>
<td>81</td>
<td>82</td>
</tr>
<tr>
<td>Percentage point gap between White and Hispanic (grades 3-8)</td>
<td>29</td>
<td>31</td>
<td>28</td>
<td>29</td>
<td>26</td>
<td>29</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>Percentage point gap between full price and free/reduced price lunch (grades 3-8)</td>
<td>42</td>
<td>42</td>
<td>48</td>
<td>44</td>
<td>35</td>
<td>43</td>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>Variation among schools (percentage point difference between the highest and lowest schools grades 3-5)</td>
<td>34</td>
<td>51</td>
<td>49</td>
<td>43</td>
<td>25</td>
<td>41</td>
<td>39</td>
<td>38</td>
</tr>
<tr>
<td><strong>CAPT - Math</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District (all students grade 10)</td>
<td>72</td>
<td>67</td>
<td>69</td>
<td>65</td>
<td>71</td>
<td>68</td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td>Percentage point gap between White and Hispanic (grade 10)</td>
<td>34</td>
<td>45</td>
<td>38</td>
<td>48</td>
<td>43</td>
<td>47</td>
<td>46</td>
<td>37</td>
</tr>
<tr>
<td>Percentage point gap between full price and free/reduced price lunch (grade 10)</td>
<td>54</td>
<td>52</td>
<td>44</td>
<td>52</td>
<td>53</td>
<td>50</td>
<td>50</td>
<td>36</td>
</tr>
</tbody>
</table>

As shown in Table 3 (above), results for math achievement were similar to those for
reading: The overall percentage of students in Middlerock reaching the Goal level in math ranged from the high 70s to low 80s on the CMT and mid 60s to low 70s on the CAPT over the eight year period. The gap between White and Hispanic students achieving the Goal level in math was 28 percentage points on the CMT and 42 percentage points on the CAPT with Whites scoring higher. The gap between full price and free/reduced price students in math was large with full price students scoring on average 41 percentage points higher than free/reduced lunch students on the CMT and 49 percentage points higher on the CAPT. Table 3 (above) also shows that gaps in math achievement persisted between the highest performing elementary school and the lowest performing elementary school in the district with the gap in math at goal between the two schools averaging 40 percentage points between 2003 and 2010.

Compounding the problem of flat test scores, disparities of achievement between schools and achievement gaps between various subgroups of students, in areas where Middlerock scores improved, its growth mostly failed to keep pace with rising scores in comparable districts. As shown in Table 4 (see below), on CMT Reading and Math at the Goal level, Middlerock scores either fell to or remained in the bottom third of districts in its Demographic Regional Group (DRG). In grade 5 in reading at the Goal level, Middlerock’s rank in DRG B declined from 7th in 2006 to 16th in 2011. In grade 8 reading at Goal, although scores increased, Middlerock’s rank remained near the bottom of districts in DRG B (18th in 2006 and 17th in 2011). In grade 5 in math at the Goal level, Middlerock’s scores increased 8 percentage points between 2006 and 2011, but its rank in DRG B declined from 14th in 2006 to 17th in 2011. In grade 8 in math at the Goal level, Middlerock’s scores increased 3 percentage points, but its rank in DRG B dropped from 8th in 2006 to 17th in 2011. Although the rankings should not be over interpreted because the differences would likely prove to be statistically non-significant, they proved important as
they contributed to both a sense of urgency for change in the district as well as confirmation that the curriculum reform adopted and implemented by the BOE did not succeed in raising Middlerock test scores above the gains being achieved in districts with similar demographic profiles.

Table 4

*Comparisons to Comparable Districts on CMT Reading and Math at Goal Level Spring 2006 to Spring 2011 in Grades 5 and 8*

<table>
<thead>
<tr>
<th></th>
<th>Reading</th>
<th>Math</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 5</td>
<td>Grade 8</td>
</tr>
<tr>
<td>DRG A Avg. (% at Goal)</td>
<td>87</td>
<td>86</td>
</tr>
<tr>
<td>DRG B Avg. (% at Goal)</td>
<td>80</td>
<td>81</td>
</tr>
<tr>
<td>Middlerock (% at Goal)</td>
<td>82</td>
<td>78</td>
</tr>
<tr>
<td>Rank in DRG B (2006: out of 20 districts) (2011: out of 19 districts)</td>
<td>7</td>
<td>16</td>
</tr>
</tbody>
</table>

**Middlerock’s Curriculum Alignment Reform**

Beginning in 1999, the Middlerock Board of Education embarked on a large-scale reform with curriculum alignment at the center of its efforts. Through a policy mandate, the BOE directed the Superintendent to create a timeline and set of procedures for a thorough subject-by-subject review of curricula (see Table 5 below for the curriculum review timeline). The BOE’s intentions were to align district curricula with state and national standards and to monitor implementation of the curricula through locally created assessments and state standardized testing. As stated in the policy (for the entire policy, see Appendix A - BOE Instruction - Curriculum Policy, 1999):
ADAPTIVE AND TECHNICAL PROBLEMS IN CURRICULUM ALIGNMENT REFORM

The Middlerock Public Schools are committed to a comprehensive process of curriculum planning and assessment to foster continuous improvement of student performance as measured by the highest local, regional, national and international standards of excellence. Curriculum includes the scope and sequence of content, concepts, and skills taught in a particular discipline (or combination of disciplines, for interdisciplinary curricula); textbooks and other core materials; identified measurable student learning objectives; and the methods of assessing student performance of learning objectives (BOE Policy: Instruction – Curriculum, 1999, p. 1).

Table 5

Curriculum Review Timeline

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Year(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOE completes Social Studies Review.</td>
<td>2001</td>
</tr>
<tr>
<td>BOE completes English/Language Arts Review.</td>
<td>2002</td>
</tr>
<tr>
<td>BOE completes Science Review (Phase I grades 3-5).</td>
<td>2003</td>
</tr>
<tr>
<td>BOE completes Science Review (Phase I grades K-2).</td>
<td>2004</td>
</tr>
<tr>
<td>BOE begins K-5 Math Review.</td>
<td>Jan 2004</td>
</tr>
<tr>
<td>The district hires math consultant to assist with review. Consultant presents</td>
<td>Jan 2004</td>
</tr>
<tr>
<td>assessment of existing math program and context for change to sub-group of BOE.</td>
<td></td>
</tr>
<tr>
<td>Consultant and district administrators present assessment of existing math program</td>
<td>April 2004</td>
</tr>
<tr>
<td>to sub-group of BOE. BOE requests additional information on 10 questions</td>
<td></td>
</tr>
<tr>
<td>District administrators submit written response to BOE 10 questions</td>
<td>June 2004</td>
</tr>
<tr>
<td>Consultant and district administrators present context for change to selected</td>
<td>July 2004</td>
</tr>
<tr>
<td>teachers and administrators</td>
<td></td>
</tr>
<tr>
<td>District administrators form Math Steering Committee (MSC). MSC begins writing</td>
<td>July 2004</td>
</tr>
<tr>
<td>curriculum.</td>
<td></td>
</tr>
<tr>
<td>First draft of new math curriculum is distributed among teachers, administrators</td>
<td>Fall 2004</td>
</tr>
<tr>
<td>and public.</td>
<td></td>
</tr>
<tr>
<td>Consultant and district administrators present context for change to all</td>
<td>Jan 2005</td>
</tr>
<tr>
<td>administrators</td>
<td></td>
</tr>
<tr>
<td>BOE discusses first draft of curriculum including: Learner Goal and Curriculum</td>
<td>April 2005</td>
</tr>
<tr>
<td>Objectives; Elementary Scope and Sequence; Elementary Textbook Adoption;</td>
<td></td>
</tr>
<tr>
<td>Implementation Plan; and, Staff Development Plan.</td>
<td></td>
</tr>
<tr>
<td>BOE approves math curriculum K-5 with staggered implementation (K-2 in 2005,</td>
<td>May 2005</td>
</tr>
<tr>
<td>3-5 in 2006)</td>
<td></td>
</tr>
<tr>
<td>District administrators conduct Staff Development Workshops</td>
<td>June-Aug 2005</td>
</tr>
<tr>
<td>Implementation of new math curriculum K-2</td>
<td>Sept 2005</td>
</tr>
<tr>
<td>Development of Walk-Through Protocol and implementation of Walk-Throughs at</td>
<td>Sept 2005</td>
</tr>
<tr>
<td>elementary level</td>
<td></td>
</tr>
<tr>
<td>Implementation of new math curriculum 3-5</td>
<td>Sept 2006</td>
</tr>
<tr>
<td>Monitoring Report to BOE</td>
<td>April 2006</td>
</tr>
<tr>
<td>Parent information workshops</td>
<td>Oct 2006</td>
</tr>
<tr>
<td>Math Improvement Report to BOE—begins consideration of secondary math program</td>
<td>May 2006</td>
</tr>
</tbody>
</table>
As outlined in Table 5 (above), the BOE began with a review of the social studies curriculum and worked closely with the Social Studies Coordinator. The BOE left the implementation of the curriculum to the Superintendent, but set timelines for review of data from the local curriculum assessments, in essence mandating the pace of implementation. As the BOE moved on to its next subject, reading/language arts, it hired a consultant to write the new curriculum. Done almost entirely out of district and with no participation from local teachers or administrators, the consultant produced a curriculum with over 265 discrete objectives in the 4th grade alone (Completed Curriculum, English/Language Arts, 2002). The BOE handed the curriculum to the incoming Reading/Language Arts Coordinator as “the curriculum” and set the expectation that she would implement it in the schools. The BOE also paid the consultant to write the local assessments. As the science review began, the BOE employed the same consultant who largely wrote the curriculum and assessments.

Beginning in January 2004, the district began a review of the math curriculum. A stated goal of the curriculum alignment was to “promote effective teaching and learning” as evidenced primarily through increased scores on local and standardized tests, smaller gaps between groups, and reduced variation among schools. The Math Program Coordinator, working with the Math Steering Committee and the district central office, devised a two-prong approach to improve overall achievement in math: (1) recommend that the BOE to adopt a new math program, EveryDay Math (EDM); and (2) train teachers and principals on the philosophy of the program as well as the instructional practices needed to implement it.

The adoption of EDM represented a shift in philosophies about teaching math. From a traditional sequential approach that emphasized mastery of a particular concept prior to advancing to the next, EDM “spiraled” concepts through the curriculum and provided students...
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with multiple opportunities to develop mastery. According to the Math Monitoring Report (2005): “Everyday Math provides fewer overall topics, but a broader more in-depth treatment of each concept. Everyday Math also ‘spirals’ back to revisit earlier concepts to reinforce student understanding”. The departure from a traditional math program required extensive education of BOE members, principals, and teachers.

I chose the math curriculum as the focus of this study because (a) it was the last major subject reviewed and reflected some of the lessons learned from earlier reviews, (b) it included significant amounts of training for teachers and administrators, and (c) it was followed by a small rise in math CMT scores, although, as noted in the problem statement of this paper, flatness in the scores persisted.

Data Sources

I used four primary data sources to answer the research questions that guide this study.

Interviews. The research used two sets of semi-structured interview data. First, I collected data from four interviews during my EdD coursework on Professional Learning. In those interviews, I explored interviewees’ experiences with professional learning during the implementation phase of the curriculum alignment (see Appendix B - Interview Consent Form and Appendix C - Protocol). Interview questions probed individual motivations, use of mental models, the role of key experiences, formal professional learning, and the impact of the social and physical setting in learning new material. Interviewees included two male and two female educators who were involved in the adoption and implementation of the district’s new math curriculum at various levels: a teacher relatively new to the profession, a principal, and two central office administrators closely associated with the math curriculum alignment reform. All four were White (see Table 6, below, for names, positions, and dates of participants).
Second, I used data from three additional interviews collected during my EdD coursework on Leadership. In the interviews I explored the relationship between the perceptions of front-line educators in Middlerock during the curriculum alignment reform and what research says about the adaptive and technical nature of effective leadership practices (see Appendix D - Interview Consent Form, Appendix E – Protocol Administrators, and Appendix F – Protocol Teachers). Specifically, interview questions probed the process of changing curriculum in Middlerock, teacher and administrator influence to shape curriculum, and the impact of curriculum on both the technical and adaptive aspects of teaching. Interviewees included a district central office administrator—a White male with many years of experience—a White female teacher with 10 years of elementary classroom experience, and a White male teacher with eight years of elementary classroom experience.

Table 6

<table>
<thead>
<tr>
<th>Participant Interviews from EdD Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name (pseudonym)</td>
</tr>
<tr>
<td>Curtis*</td>
</tr>
<tr>
<td>Jim</td>
</tr>
<tr>
<td>Terry</td>
</tr>
<tr>
<td>Erica</td>
</tr>
<tr>
<td>Curtis*</td>
</tr>
<tr>
<td>Nan</td>
</tr>
<tr>
<td>Barbara</td>
</tr>
</tbody>
</table>

* Curtis was interviewed for both EdD Courses.
**District documents.** Documents used in the research are listed in Table 7 below.

Table 7

*List of District Documents Used*

<table>
<thead>
<tr>
<th>Document Description</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOE Instruction - Curriculum Policy (1999)</td>
<td></td>
</tr>
<tr>
<td>Professional Development Plan Revised (2005)</td>
<td></td>
</tr>
<tr>
<td>Memo on Summer Math Workshops (2005)</td>
<td></td>
</tr>
<tr>
<td>Administrator Workshop Agenda (2005)</td>
<td></td>
</tr>
<tr>
<td>K-5 Mathematics Curriculum (2005)</td>
<td></td>
</tr>
<tr>
<td>Parent Meeting Notes (2006)</td>
<td></td>
</tr>
<tr>
<td>BOE Q and A (2006)</td>
<td></td>
</tr>
<tr>
<td>BOE Meeting (May 11, 2006)</td>
<td></td>
</tr>
<tr>
<td>Strategic School Profiles for Elementary School A, B and C (2006-2010)</td>
<td></td>
</tr>
<tr>
<td>Middle Rock High School Course of Study Guides (2006-2012)</td>
<td></td>
</tr>
<tr>
<td>BOE Policies and Procedures (2012)</td>
<td></td>
</tr>
</tbody>
</table>

I chose the documents listed in Table 7 (above) to represent different phases of the implementation and different perspectives on the implementation process. For example, the BOE documents from 1999 and 2006 (e.g., BOE Instruction - Curriculum Policy, 1999; BOE Q and A, 2006; BOE Meeting, May 11, 2006) represent the perspectives of the BOE at a seven-year interval. Documents developed by the district administrators from 2004 (Outline of Process, 2004; BOE Workshop Context for Change, 2004; MSC Workshop Context for Change Notes, 2004) and 2005-2006 (Math Monitoring Report, 2005; Math Review Part 4, 2006; Math Improvement Report, 2006) represent the perspectives of the district administration prior to the review and toward the end of implementation. Additional documents from 2005 (Professional Development Plan Revised, 2005; Memo on Summer Math Workshops, 2005; Administrator
Workshop Agenda, 2005; Walk-Through Protocol, 2005) highlight steps in the implementation process and offer insight into the approaches followed. The perspective of parents is represented by parent notes (Parent Meeting Notes, 2006). The strategic school profiles outline the goals and outcomes of the process from 2006-2010. Finally, the Course of Study Guides from 2006-2012 highlight perspectives on issues of social justice through course offerings. Documents that I was not able to acquire included: evaluations of professional development workshops and specific data from Walk-Throughs.

**Equity audit.** Equity audits are tools used by educators to tell a story with data (Sklar et al., 2004). Researchers have found that in discussions of variance in school outcomes, schools often routinely avoid overt discussions of race as a factor (Pollock, 2001). Thus, equity audits can assist teachers and administrators “in recognizing that there are substantial and persistent patterns of inequity internal to schools” (Sklar et al., 2004, p. 141). I conducted an equity audit of the Middlerock Public Schools during my EdD coursework on Social Justice. Specifically, I reviewed disaggregated standardized testing data from 2003-2012 to identify gaps between groups of students and patterns of underachievement by minority groups. I also reviewed the high school English curriculum for evidence of bias toward a particular geographical portion of the world or particular perspective. For this study, I expanded on the initial equity audit. I reviewed the English, social studies, and math course offerings in the Middlerock High School Course of Study Guides from 2006-2012. Specifically, through the equity audit I analyzed courses that identified the achievement gap as a focus of the course.

**Researcher observations.** Beginning in 1999, I worked in the district as a curriculum coordinator. Although the BOE did not review my particular curriculum area, I functioned as an observer of the review of all curriculum areas. I engaged in monthly policy-level discussions led
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by the Assistant Superintendent of Curriculum and the curriculum coordinators of each subject area. These meetings frequently discussed the curriculum alignment reform. I attended two or three BOE meetings a year where the topic of discussion was a review of a particular curriculum area. I maintained informal dialog with teachers and administrators charged with implementing the revised math curriculum. Additionally, as an administrator in the district, my role included observing teachers (including math teachers) and engaging in conversations about the lessons with the teachers and with other administrators. For example, a common practice was for teams of administrators to spend a full day observing various teachers at a school and providing feedback for the building principal. I engaged in these observations four or five times a year. I did not retain a written journal or any personal notes from this time period. Because I did not have informed consent to use informal conversations, for this study, when I use the term “Researcher Observations,” I will be referring to events that I observed in the public domain and for which a public record exists.

Data Analysis

This study used interpretive qualitative methods (Caelli, Ray, & Mill, 2003; Merriam et al. 2001) in order to describe the complex inter-relationships involved among the factors outlined in Research Questions 1-2. The unit of analysis for this study was the set of strategies identified in the research that were used to address technical problems and adaptive problems by Middlerock district personnel (e.g., the Board of Education, district central office administrators—superintendent, assistant superintendent, math curriculum coordinator—math consultant, building principals and teachers) during the planning and implementation of the math curriculum alignment.
I used a closed coding process—limiting the coding to the items related to the core variables (Fisher et al. 2006)—to analyze the data collected for Research Question 1 and Research Question 2. For the closed coding, I focused on particular strategies identified in the literature to address technical and adaptive problems through the lenses of instructional core, professional learning, leadership practices, policy adoption and policy implementation, and social justice and included: (a) interview data from individual educators with experience of the curriculum alignment process, (b) district documents involved with planning, implementing and monitoring the math curriculum alignment process, (c) equity audit data measuring gaps in achievement and possible bias in curriculum documents, and (d) researcher observations of public domain sessions.

I began the analysis by identifying ways the BOE framed curriculum alignment reform as a technical problem (Research Question 1). Broadly defined, as discussed previously in the background section, technical problems are those (a) with identifiable tasks that tend to be fairly straightforward, (b) which are fixable within a set period of time, and (c) for which the expertise to produce solutions exists using current problem solving processes. Using the broadly-defined definition, I analyzed curriculum alignment documents from Middlerock to find ways that the BOE framed curriculum alignment reform as a technical problem.

Once I identified the aspects of the curriculum alignment reform that the BOE framed as a technical problem, I employed the checklists I developed from the literature review. First, I explored whether the strategies used by the BOE to address curriculum alignment reform as a technical problem matched the strategies identified in the literature I reviewed for this study. Second, I employed three levels of match: High Match (i.e., matched most of the elements of the strategy); Moderate Match (i.e., matched some of the elements of the strategy but not others);
Low Match (i.e., matched few or none of the elements of the strategy). Third, I did a frequency count of the levels of match and displayed those data in a table (see Table 13, page 61).

I then employed open coding—the process of selecting and naming categories from analysis of the data (Corbin & Strauss, 1990)—to identify sub-themes that emerged from the analysis of Research Question 1. Finally, I used axial coding: the process of putting the data back together into main categories and their sub-categories (Glaser & Strauss, 1967). In my analysis I triangulated data in order to substantiate the themes that emerged (e.g., combined information from interviews, document analysis, and equity audit data to corroborate a theme) (Patton, 2002). I presented the results of this open and axial coding in sections labeled “Analysis of Research Question 1.”

Next, I repeated the process for adaptive problems (Research Question 2). I began the analysis by identifying ways the BOE framed curriculum alignment reform as an adaptive problem. Broadly defined, as discussed previously in the background section, an adaptive problem was one that (a) challenges deeply held values and beliefs, (b) necessitates a long-term commitment, and (c) requires communities to alter values and beliefs as they learn to work in new ways (i.e., no single expert can resolve the problems). Using the broadly-defined definition, I analyzed curriculum alignment documents from Middlerock to identify ways that the BOE framed curriculum alignment reform as an adaptive problem.

Once I described how the BOE framed the curriculum alignment reform as an adaptive problem, I then employed the checklists I developed from the literature review. First, I explored whether the strategies used by the BOE to address curriculum alignment reform as an adaptive problem matched the strategies identified in the literature I reviewed for this study. Second, I employed three levels of match: High Match (i.e., matched most of the elements of the strategy);
Moderate Match (i.e., matched some of the elements of the strategy but not others); Low Match (i.e., matched few or none of the elements of the strategy). Third, I did a frequency count of the levels of match and displayed those data in a table (see Table 20, page 105).

I then employed open coding to identify sub-themes that emerged from the analysis of Research Question 2. Finally, I used axial coding. In my analysis I triangulated data in order to substantiate the themes that emerged. I presented the results of this open and axial coding in sections labeled “Analysis of Research Question 2.”

Because I collected data as part of my coursework in the EdD program over the duration of three years, I was able to reflect continuously on the meaning of the information. I also had the benefit of discussing the information and my analyses in class meetings over this same three-year period. For example, since my level of match analysis involved subjectivity, I had another member of my EdD cohort go through the analysis as a debriefer as a means of controlling subjectivity. Even with the limitations inherent in the methods proposed for this study (see next section, Threats to Credibility and Trustworthiness), overall, the use of interpretive qualitative methods allowed for in-depth examination of the research questions, thereby offering perspectives on practices related to a set of technical and adaptive problems involved in curriculum alignment reform as they occurred in authentic settings (Gall, Gall, & Borg, 2007; Merriam, 2002).

**Threats to Credibility and Trustworthiness**

The methods used in this study are limited in a number of specific ways. First, although it is tempting to want to generalize any findings or recommendations from this study to other settings, because of the specific context of this study, the generalization of the results requires a careful consideration of the limits posed by the specific characteristics of this district.
Second, because of the nature of the methods used, the study only describes trends and relationships in the data. Where strong relationships appear to exist, follow-up research is necessary to (a) explore possible causative relationships and (b) to expand the generalizability of the results.

Third, given the explorative nature of this research, I addressed only the specific set of data points outlined in the research questions. The limited number of interviews and the focus on a single district suggested that findings should be used to generate questions for further analysis and not as a recipe for change. A thorough investigation of actual changes in beliefs and practices would serve to triangulate data from standardized testing, interviews and district documents. Finally, data from comparable districts would allow for quasi-experimental approaches to data collection.

Fourth, as noted throughout this study, technical problems can be addressed swiftly with visible results (Hess, 1999). Adaptive problems, especially those requiring a change of beliefs associated with a problem of practice, may take longer to materialize. Because of the relatively short time frame of this study, some of the analysis may not have fully captured aspects of long-term changes of adaptive problems related to the curriculum alignment reform.

Fifth, many of the recommendations to address adaptive problems assumed that districts are able to simplify the change process for teachers (e.g., provide them with fewer conflicting priorities, solicit greater participation, and restructure how time is used). The complexity of meeting externally derived mandates (e.g., federal, state, and local policy directives) and internally driven expectations (e.g., parents and others’ perceptions that change is too slow-paced to meet the needs of their child) place pressure on districts to (a) adopt many reforms simultaneously; (b) shorten the amount of time and resources allocated to the reform; and, (c)
streamline the process (e.g., employ top-down management) to deliver desired change. Because of the complex set of factors, my recommendations may have limited impact.

Sixth, the recommendations outlined in this study (e.g., recommendations for an expanded commitment to social justice) may require the willingness of a district to explore and expose beliefs and practices that could be very divisive in a community. For a district to consider some of the recommendations (e.g., explore ways to address problems related to social justice), they may have to balance the time and resources of such an agenda with other priorities for change.

Seventh, although I limited the use of “Researcher Observations” as evidence to only a few areas of the study and tried to contain those references to observations made in the public domain, I acknowledge that this strategy can be imperfect. Some of the information from my informal observations and conversations as an administrator in Middlerock may have leaked into my discussion and analysis. In addition, to protect the confidentiality of all involved, I worked to provide only summary statements of events that cannot be linked with specific individuals.

**Subjectivity Statement**

In qualitative research, transparency of the role of the researcher is critical. Patton (2002) writes: “Any given design inevitably reflects some imperfect interplay of resources, capabilities, purposes, possibilities, creativity, and personal judgments by the people involved” (p. 12). As an employee in Middlerock during the implementation of the curriculum alignment reform, it was necessary to examine my role for potential researcher bias.

During the initial data collection and analysis for my research, including the seven semi-structured interviews referenced above, I served as the district’s Director of Curriculum,
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Instruction, and Professional Learning. None of the interviewees were my direct reports. As such, there was minimal possibility of coercion.

Along with most of my administrator colleagues, I became skeptical over time as the curriculum alignment reform progressed. During the period of implementation, I viewed the BOE as overstepping its appropriate role and imposing curricular restrictions and accountability on the district in a fashion that was not beneficial to student learning. Anecdotally, many teachers in the district with whom I discussed the situation held a similar view. By the time the math curriculum review began, many were negatively influenced by previous BOE actions, including the overwhelming number of discrete objectives in the social studies, language arts, and science curricula; the excessive length and frequency of local curriculum assessments; the tight monitoring of instruction through externally shared assessments; and the overall lack of trust between the BOE and the district teachers and administrators. I acknowledge this subjective bias as a limitation on any conclusions drawn in my analysis. I worked to address this bias through the triangulation of data and, most extensively, through discussions with my peers during my EdD coursework. In our class discussions over a three-year period, my colleagues were well aware of my subjective bias. In their role as discussants, they continually challenged my analyses, conclusions, and recommendations in a way that helped me to identify the possible impact of my subjectivity. To the extent that their challenges and assistance did not eliminate personal bias from my analysis, this bias exists as a limit to the study.

Analysis: Middlerock Math Curriculum Reform

As stated in the Theoretical Framework above and shown in Figure 1, curriculum alignment reform that effectively addresses student achievement uses strategies that target the technical and adaptive nature of problems within the instructional core. Research identified
strategies to guide curriculum alignment reform in the following specific areas of focus: (a) principles of professional learning in a way that uses research on how individuals learn best to help professionals understand and implement strategies focused on the technical and adaptive nature of problems related to a curriculum alignment reform (Scheckley, Lemons, Kehrhahn, & Grenier, 2008); (b) leadership practices in way that uses research principles to align all members of the organization in the implementation of strategies focused on the technical and adaptive nature of problems related to a curriculum alignment reform (Randall & Coakley, 2007); (c) policy adoption and policy implementation in a way that employs research-based procedures that allow schools to harness external support as they set and pursue goals focused on the technical and adaptive nature of problems related to a curriculum alignment reform (Honig, 2006); and (d) social justice in a way that uses research-based principles to gain commitment throughout the organization to equal educational opportunities for all students through the implementation of strategies focused on the technical and adaptive nature of problems related to a curriculum alignment reform (Noguera, 2006). In my analysis of the Middlerock math curriculum alignment I explored (a) how the Middlerock BOE framed aspects of the reform as a technical problem and/or an adaptive problem and (b) whether the strategies used to address technical and/or adaptive problems matched those identified by the research I reviewed for this study.

Research Question I: Did the Middlerock BOE frame the math curriculum alignment reform as a technical problem?

As discussed in the literature review, broadly defined, technical problems are those with (a) identifiable tasks that tend to be fairly straightforward, (b) which are fixable within a set period of time, and (c) for which the expertise to produce solutions exists using current problem

First, the BOE identified the purpose of the work:

The Middlerock Public Schools are committed to a comprehensive process of curriculum planning and assessment to foster continuous improvement of student performance as measured by the highest local, regional, national and international standards of excellence (BOE Instruction - Curriculum Policy, 1999, p. 1).

Next, the BOE defined the scope of the task:

Curriculum includes the scope and sequence of content, concepts, and skills taught in a particular discipline [or combination of disciplines, for interdisciplinary curricula]; textbooks and other core materials; identified measurable student learning objectives; and the methods of assessing student performance of learning objectives (BOE Instruction - Curriculum Policy, 1999, p. 1).

Finally, the BOE framed the curriculum alignment work technically as the writing of curriculum objectives (e.g., “An orderly series of curriculum objectives that describe student learning shall be adopted by the Board of Education in each subject for each grade and course” [BOE Instruction - Curriculum Policy, 1999, p. 2]).

Second, the BOE curriculum policy document revealed that the BOE perceived the task to be fairly straightforward and fixable in a set a period of time using current problem solving processes. For example, the document listed the steps that the district would follow and the time frame for completion:

The Board of Education works with the administration in an ongoing cycle of review, revision, implementation, and evaluation of curriculum. The Board directs the Superintendent to develop and implement regulations that describe a process for educators to review, revise, develop, implement and evaluate curriculum and report to the Board on the status of each curriculum on a five year cycle (BOE Instruction - Curriculum Policy, 1999, p. 1).
Third, although the BOE required that additional expertise from outside the district be used in the review of objectives, the BOE acknowledged that at least some of the expertise was available in the district to complete the process:

During the process of curriculum development, the Superintendent shall assure that objectives are reviewed and critiqued by individuals from one or more of the following groups, as appropriate: 1. District faculty members in the appropriate grade, subject or course; 2. District administrators; 3. Nationally recognized experts in the subject field; 4. Faculty members in other school districts; 5. College and university professors in the subject field; 6. Employers in the occupational field related to the subject field (BOE Instruction - Curriculum Policy, 1999, p. 2).

In summary, because in aspects of its curriculum alignment reform the BOE addressed problems (a) with identifiable tasks that tended to be fairly straightforward, (b) which were fixable within a set period of time, and (c) for which the expertise to produce solutions existed using current problem solving processes, I concluded that the BOE framed many facets of the curriculum alignment reform as a series of technical problems. I now shift to analysis of the strategies used by the BOE and the district to address the technical problems related to the five areas of focus: instructional core, professional learning, leadership practices, policy adoption and policy implementation, and social justice.

**Match of strategies related to the instructional core.** According to the research reviewed for this study, the BOE would use the following set of primary strategies to address the technical problems in a curriculum alignment reform related to the instructional core: (a) Align curriculum with standards, instructional frameworks and assessments (Skrla, Scheurich & Johnson, 2000); (b) Reorganize units of instruction (Skrla, Scheurich & Johnson, 2000); (c) Develop pacing charts (Skrla, Scheurich & Johnson, 2000); and (d) Expand knowledge of the resources available through program materials (Skrla, Scheurich & Johnson, 2000). The information gathered from multiple sources indicated that the strategies used by the district had a
high match with the research-based strategies identified in the literature review to address the technical problems in curriculum alignment reform related to the instructional core (see Table 8 below).

Table 8

<table>
<thead>
<tr>
<th>Research-based strategies</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instructional Core</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Reorganize units of instruction</td>
<td>K-5 Math Curriculum (2005); Math Monitoring Report (2005); Participant Interview with Nan</td>
<td>High match</td>
</tr>
<tr>
<td>4. Expand knowledge of the resources available through program materials</td>
<td>Math Workshop for Administrators Agenda (January 2005); Participant Interview with Erica</td>
<td>High match</td>
</tr>
</tbody>
</table>

First, evidence that the district strategy for addressing aspects of curriculum alignment reform framed as a technical problem had a high match with the research-based strategy, Align curriculum with standards, instructional frameworks and assessments, was apparent in K-5 Math Curriculum (2005). This document listed all Content Strands and Clusters for kindergarten through grade five. For example, under the Grade 1 Content Strand for Number Sense, there were three Clusters (e.g., Place Value, Computation of Whole Numbers, Computation of Fractions and Decimals). Each Cluster listed five or six specific learning objectives. The strategy to align with an instructional framework was apparent in the Walk-Through Protocol (2005) that defined district expectations for instruction. For example, the document provided a rubric...
describing “best practice” in Organization of the Classroom, Characteristics of Instruction, and Student Engagement. Under each of these categories, the documents listed three to six indicators of expected practice. Finally, although assessments were not included in the curriculum approved by the BOE in 2005, the EDM program provided unit assessments. Evidence of assessments included: (a) In the Math Monitoring Report (2005), district administrators listed sample assessments of each objective; and (b) A review of the EDM website referenced assessments included with the program (http://everydaymath.uchicago.edu/teaching-topics/assessment-and-grading/).

Second, evidence that the district strategy had a high match with the research-based strategy, *Reorganize units of instruction*, was apparent in the completed curriculum (K-5 Math Curriculum, 2005). For example, units of instruction were defined by the Cluster (discussed in the above) and followed the sequence set by the EDM program. As noted in the Math Monitoring Report (2005), district administrators identified for each Cluster, the objectives, sample instructional examples, suggested resources, and sample assessment items.

Third, evidence that the district strategy had a high match with the research-based strategy, *Develop pacing charts*, was apparent in the Walk-Through Protocol (2005). The Walk-Through Protocol referenced “pacing” under Characteristics of Instruction: “Pacing: appropriate number of lessons completed (3-5 per week)” (p. 11). Although the actual pacing charts were not available for this research, all four interviewees during my EdD Leadership class referenced “pacing guides” (Interviews with Barbara, Evan, Nan, Curtis). Nan, a building principal, referenced the math pacing charts specifically: “In the math curriculum, it includes pacing charts so the teachers know how quickly they should be moving the children through” (Interview with Nan, 11-18-08).
Fourth, evidence that the district strategy had a high match with the research-based strategy, \textit{Expand knowledge of the resources available through program materials}, was apparent in Math Workshop for Administrators Agenda (January 2005) and in the interview with Erica. The workshop agenda referenced a review of the program materials (e.g., “Importance of using manipulatives in the classroom”) and the connection of EDM to the National Council of Teachers of Mathematics (NCTM) standards and Connecticut standards. In her interview, when asked how she developed proficiency with the new math curriculum, Erica referenced her review of the EDM materials: “I would say through carefully reading through all the materials provided by the EDM program. I poured through every book, highlighted, used post-its, sticky notes, and really just looked at it through myself independently” (Interview with Erica, 6-16-08).

In summary, analysis of the strategies used in Middlerock indicates that the district strategy had a high match with the research-based strategies to target the technical problems involved in a well-honed curriculum alignment reform. As summarized in Table 8 (above), the district strategies related to the instructional core had a high match with all four of the recommendations from research.

\textbf{Match of strategies related to professional learning.} According to the research reviewed for this study, the BOE would use the following set of primary strategies to address the technical problems in a curriculum alignment reform related to professional learning: (a) Train/present new material (Huffman, 2006); (b) Monitor through compliance (Lemons and Helsing, 2009); (c) Provide additional training as determined by policymakers or building leaders (Lemons and Helsing, 2009); and (d) Measure through participation, surveys of attendees and, sometimes, student outcomes (Huffman, 2006). The information gathered from multiple sources indicated that the strategies used by the district had a high match with the research-based
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strategies identified in the literature review to address the technical problems in curriculum alignment reform related to professional learning (see Table 9 below).

Table 9

Research-based Strategies Used to Address Technical Problems in Curriculum Alignment Reform Related to Professional Learning, Evidence Used and Level of Match

<table>
<thead>
<tr>
<th>Professional Learning</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Train/present new material</td>
<td>Math Improvement Report (May 2006); Participant Interview with Erica</td>
<td>High match</td>
</tr>
<tr>
<td>2. Monitor through compliance</td>
<td>Math Workshop for Administrators Agenda (January 2005); Walk-Through Protocol (2005); Math Improvement Report (May 2006); Researcher Observations</td>
<td>High match</td>
</tr>
<tr>
<td>3. Provide additional training as determined by policy makers or building leaders</td>
<td>Math Improvement Report (May 2006); Researcher Observations</td>
<td>High match</td>
</tr>
<tr>
<td>4. Measure through participation, surveys of attendees and, sometimes, student outcomes</td>
<td>Researcher Observations</td>
<td>High match</td>
</tr>
</tbody>
</table>

First, evidence that the district strategy for addressing aspects of curriculum alignment reform framed as a technical problem had a high match with the research-based strategy, *Train/present new material*, was apparent in the Math Improvement Report (May 2006) and in Participant Interview with Erica. The Math Improvement Report (May 2006) highlighted efforts by Middlerock administrators to devise and implement a process for professional learning that addressed the technical problems involved with the adoption of the new math program.

Following approval of the curriculum from the BOE, district administrators organized a series of full-day workshops to orient staff to EDM. As stated in the report, the goals of the workshops were to provide: “a comprehensive program of professional development… to support the adoption of the curriculum documents and the instructional materials” (Math Improvement
The workshops included an orientation to the textbooks, the suggested sequence of instruction and the ancillary materials (e.g., software, problem solving extensions, assessment and other support materials). The district invited lead math teachers—five per building—and building administrators to attend. The document described plans for additional district-led workshops at a later date for all teachers and for follow up training over a five-year period “to support and build capacity among our staff to teach mathematics” (Math Improvement Report, May 2006). According to Erica, a classroom teacher, the workshops accomplished the goal of orienting teachers to the materials:

Well the training was great. They really walked you through the program and showed you what your EDM hour should look like, which I thought was excellent. They really taught you how to establish your routine; they went into depth explaining on how you could use the exploration and the projects and what not. So they just kind of explained all of these things that you were supposed to be doing and told you how you could best implement them (Participant Interview with Erica, 6-16-08).

Second, evidence that the district strategy had a high match with the research-based strategy, Monitor through compliance, was apparent in the Math Workshop for Administrators Agenda (January 2005), Walk-Through Protocol (2005), Math Improvement Report (May 2006), and Researcher Observations. First, the agenda for the workshop for administrators demonstrated that district administrators trained building principals in what to look for during classroom visits. For example, under the agenda item “Overview: a Standards-based Classroom,” specific activities included: “Basal vs. Standards approach; What to look for in a math classroom; Questioning strategies by teachers; and Observational assessment chart for teachers” (Math Workshop for Administrators Agenda, January 2005, p. 1). Second, district administrators initiated a structured process of data collection through Walk-Throughs (Walk-Through Protocol, 2005). In a report to the BOE, district administrators stated the purpose of the Walk-Throughs:
To provide additional support for teachers using the Everyday Math program, the district has adopted a “Walk-Through” model to evaluate how effective the implementation plan is being carried out. Walk-Through teams of teachers and administrators have visited every kindergarten through grade two classroom to observe teachers using the new materials. The teams provide the building staff with feedback regarding their observations as well as listen to teacher concerns and their suggestions for improving the process (Math Improvement Report, May 2006).

Analysis of the Walk-Through Protocol, revealed that participants on the Walk-Throughs collected data on several technical aspects of curriculum implementation. The Walk-Through Protocol identified three primary areas of focus for participants with indicators under each area: (1) Organization of the Classroom defined as (a) space and resources matched to instruction, (b) procedures and routines support instructional standards, (c) allocation of instructional time aligned with standards; (2) Characteristics of Instruction defined as (a) lesson design aligned with curriculum objectives, (b) expectations for learning clearly communicated, (c) teaching strategies reflect instructional standards, (d) technology used appropriately to support instruction, (e) assessment used to inform instruction, (f) instruction differentiated to the needs of learners; and (3) Student Engagement defined as (a) student behavior reflects engagement, (b) classroom discourse purposeful and indicative of higher order thinking, (c) student work demonstrates deep understanding. Of the 12 indicators above, at least eight were indicators of ways the curriculum implementation was framed as a technical problem (e.g., allocation of space, scheduling of time, communication of objectives).

Third, evidence that the district strategy had a high match with the research-based strategy, *Provide additional training as determined by policy makers or building leaders*, was apparent in the Math Improvement Report (May 2006) and Researcher Observations. As noted above, this report specified that the district was planning a schedule of professional learning over the subsequent five years “to support and build capacity among our staff to teach mathematics.”
From Researcher Observations of BOE meetings where district administrators updated the BOE, I was aware that the district offered additional workshops, primarily in (a) the use of pacing charts and (b) the availability of new assessments to monitor student progress.

Fourth, evidence that the district strategy had a high match with the research-based strategy, *Measure through participation, surveys of attendees and, sometimes, student outcomes*, was apparent from Researcher Observations. As a planner of professional learning activities in my curriculum area and through direct observation of professional learning activities in other curriculum areas, I was aware that staff completed satisfaction surveys following all workshops. However, I was not able to locate the data from those surveys.

In summary, analysis of the strategies related to professional learning used in Middlerock indicated that the district had a high match with the strategies suggested in the literature to target the technical problems involved in a well-honed curriculum alignment reform. As shown in Table 9 (above), of the four primary strategies, the district strategies related to professional learning had a high match with all four of the recommendations from research.

**Match of strategies related to leadership practices.** According to the research reviewed for this study, the BOE would use the following set of primary strategies to address the technical problems in a curriculum alignment reform related to leadership practices: (a) Exercise top-down strategies (Hightower & McLaughlin, 2006; Lemons & Helsing, 2009); and (b) Manage the structures and processes that support effective instruction (e.g., organizing, budgeting, and dealing with disruptions inside and outside the system) (Elmore, 2000). The information gathered from multiple sources indicated that the strategies used by the district had a high match with the research-based strategies identified in the literature review to address the technical problems in curriculum alignment reform related to leadership practices (see Table 10 below).
First, evidence that the district strategy for addressing aspects of curriculum alignment reform framed as a technical problem had a high match with the research-based strategy, **Exercise top-down strategies**, was apparent in Participant Interviews with Nan and Barbara. As noted above in Methods and Procedures section, for previous curricula, the BOE hired an outside consultant to write curriculum objectives and assessments with little or no input from local educators. With the math curriculum review, the BOE shifted course and engaged in a more locally driven process (e.g., district administrators formed a Math Steering Committee of teachers and administrators who researched best practices, wrote curriculum objectives, established pacing charts, defined instructional standards, and guided the implementation of professional learning and progress monitoring). From the perspective of the building principal and the classroom teacher, however, the process for the adoption of the new program felt similar to previous reviews: The BOE approved the curriculum and the district directed all staff in its use. For example, Nan, a building principal commented:

> On the other hand, the teachers do feel that things are being imposed on them, not everything, but a lot of things... [With Everyday Math] I had to make sure that the math coach was there monitoring the teachers, making sure they weren’t modifying the materials to teach it the old way. So, in this district, it is top-down, as far as curriculum goes (11-18-08).

Barbara, a teacher, voiced a similar perception:
My understanding is that they [curriculum decisions] are made by the Board. And, my impression...[is that] it’s been like a dog and pony show. They [the Board] will ask the coordinators and the coordinators will get teachers involved, but then, the Board’s like, nope, and that they don’t trust the people that they have in this building, and that they then just change their minds and they… re-write the curriculum (11-13-08).

Second, evidence that the district strategy had a high match with the research-based strategy, *Manage the structures and processes that support effective instruction*, was apparent in the Math Monitoring Report (March 2005). In this document, submitted to the BOE for its review, the district central office presented a detailed plan outlining how specific technical problems related to the curriculum alignment reform had been implemented. These specifics included: (a) cost of textbooks and consultants; (b) the timeframe for program roll out, and (c) the schedule of professional learning workshops.

In summary, analysis of the strategies related to leadership practices used in Middlerock indicated that the district had a high match with the strategies suggested in the literature to target the technical problems involved in a well-honed curriculum alignment reform. As shown in Table 10 (above), of the two primary strategies, the district strategies related to leadership practices had a high match with both of the recommendations from research.

**Match of strategies related to policy adoption and policy implementation.** According to the research reviewed for this study, the BOE would use the following set of primary strategies to address the technical problems in a curriculum alignment reform related to policy adoption and policy implementation: (a) Adopt policy with little input of front-line workers (Lemons & Helsing, 2009); (b) Build tight accountability systems into policy (Lemons & Helsing, 2009); and (c) Monitor through bureaucratic controls (Lemons & Helsing, 2009). The information gathered from multiple sources indicated that the strategies used by the district had a high match with the research-based strategies identified in the literature review to address the
technical problems in curriculum alignment reform related to policy adoption and policy implementation (see Table 11 below).

Table 11

<table>
<thead>
<tr>
<th>Policy Adoption and Policy Implementation</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Adopt policy with little input of front-line workers</td>
<td>BOE Curriculum Policy (1999); Participant Interviews with Jim, Curtis and Terry</td>
<td>High match</td>
</tr>
</tbody>
</table>

First, evidence that the district strategy for addressing aspects of curriculum alignment reform framed as a technical problem had a high match with the research-based strategy, *Adopt policy with little input of front-line workers*, was apparent in the BOE Instruction - Curriculum Policy (1999) and in the Participant Interviews with Jim, Curtis and Terry. In a shift from previous curricula reviews, with the math curriculum, the district sought to gather input from front-line workers and other stakeholders. Terry and Curtis, central office administrators associated closely with the curriculum alignment reform, both credited the involvement of the Math Steering Committee, a group of lead teachers and administrators, as a critical corrective step in the curriculum alignment process (Participant Interviews with Terry [6-13-08] and Curtis, [11-7-08]). In his Participant Interview, Curtis described his efforts to influence a shift in the BOE’s approach into what Curtis considered to be its proper role and to make the curriculum review process more inclusive of staff input:
you know skills related to taking a Board that was way too far involved in the design of curriculum and sort of helping them to assume their proper role and letting the staff get into their proper role and bringing everybody together and developing consensus around what’s the best program for Middlerock. Without developing that consensus, we could have picked the best program in the world and we wouldn’t have been able to implement it successfully within the town (Participant Interview with Curtis, 5-29-08).

Educators below the BOE level, however, felt that the BOE’s actions were not meaningful in addressing technical problems. Interviews with teachers and building principals confirmed the perception that the BOE and district central office worked in relative isolation from front-line workers. For example, in his interview, Jim commented:

This [adoption of EDM] was a district directive. Certainly it came, I’m sure after research had gone into other programs of which I was not privy to, but obviously the district had pulled together a group of people to make those decisions. Once the decision was made, it was made and we were to follow along and see to the implementation (Participant Interview with Jim, 6-13-08).

Second, evidence that the district strategy had a high match with the research-based strategy, *Build tight accountability systems into policy*, was apparent in the BOE Instruction - Curriculum Policy (1999) and Walk-Through Protocol (2005). Where the initial curriculum reviews reflected a strong desire on the part of the BOE to hold educators accountable through the development of local curriculum assessments (BOE Instruction - Curriculum Policy, 1999), the district built accountability systems into the math curriculum review through implementation of the pacing charts and through the Walk-Through process. Building principals and district administrators used the pacing charts to monitor coverage of the curriculum—a necessary component to address technical problems. As noted previously, the Walk-Throughs allowed administrators and lead teachers to gather data firsthand on compliance with technical aspects of problems required for implementation of the new curriculum.

Third, evidence that the district strategy had a high match with the research-based strategy, *Monitor through bureaucratic controls*, was apparent in the BOE Policies and
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Procedures (2012) and the Math Monitoring Report (2005). Each year, the BOE mandated a report that identified progress with implementation and results based on standardized testing:

A Monitoring Reports is a comprehensive annual report presented to the Board of Education by Administration. The report summarizes compliance with a given Board Policy, detailing governance issues, management issues, and progress made toward achieving goals and objectives set in previous reports and/or by the District's Strategic Improvement Plan and the Board of Education's Success System (BOE Policies and Procedures, 2012, http://gsdpublicdash.com/policy.aspx).

As evidenced by the Math Monitoring Report (2005), the district complied with the BOE intentions. In the report, district administrators detailed the process for reviewing the math curriculum and his recommendations for implementation. The BOE voted to approve the monitoring report during its April 2005 BOE meeting.

In summary, analysis of the strategies related to policy adoption and policy implementation used in Middlerock indicated that the district had a high match with the strategies suggested in the literature to target the technical problems involved in a well-honed curriculum alignment reform. As shown in Table 11 (above), of the three primary strategies, the district strategies related to policy adoption and policy implementation had a high match with all three of the recommendations from research.

**Match of strategies related to social justice.** In order to assess the strategies used to address the technical problems in a curriculum alignment reform related to social justice, it is necessary to broaden the discussion to all four curricula—social studies, English, science and math—as the math curriculum alone presented relatively few opportunities to demonstrate a commitment to social justice. According to the research reviewed for this study, the BOE would use the following set of primary strategies to address the technical problems in a curriculum alignment reform related to social justice: (a) Make social justice contributions to the curriculum (Banks et al., 2005); and (b) Add social justice related concepts, themes, and diverse perspectives.
to the curriculum (Banks et al., 2005). The information gathered from multiple sources indicated that the strategies used by the district had a moderate to low match with the research-based strategies identified in the literature review to address the technical problems in curriculum alignment reform related to social justice (see Table 12 below).

Table 12

<table>
<thead>
<tr>
<th>Social Justice</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Make social justice “contributions” to the curriculum</td>
<td>BOE Instruction - Curriculum Policy (1999); K-5 Mathematics Curriculum (2005); Middlerock High School Course of Study Guides (2006-2012)</td>
<td>Moderate match</td>
</tr>
<tr>
<td>2. Add social justice related concepts, themes, and diverse perspectives to the curriculum</td>
<td>Completed Curricula in Social Studies, English, Science, Math</td>
<td>Low match</td>
</tr>
</tbody>
</table>

First, evidence that the district strategy had a moderate match with the research-based strategy, *Make social justice contributions to the curriculum*, was apparent in the BOE Instruction - Curriculum Policy (1999), K-5 Mathematics Curriculum (2005) and in the Middlerock High School Course of Study Guides (2006-2012). As noted above, the BOE Instruction - Curriculum Policy (1999) included language that specified the intent for inclusive curricula: “Curricula shall address the diverse needs of students” (p. 1). In the document, the BOE elaborated that for each course, a set of objectives must: “Reflect the abilities and needs of a diverse student body” (p. 2). The K-5 Mathematics Curriculum (2005), however, did not reference any particular “contributions” (e.g., holidays or heroes that would reflect a broad swath of interests and backgrounds).

Analysis of the Middlerock High School Course of Study Guides (CoSG) revealed a
moderate match with the strategy to make contributions. In the introduction to the English section, the document highlighted the need for many cultural viewpoints:

The Middlerock High School Program prepares students to become independent learners who are proficient in writing, speaking critical reading, thinking, listening, and viewing. Students use the language arts to explore and respond to classical and contemporary works from many cultures and literary periods, with emphasis on Western cultural tradition and American literary heritage (CoSG 2006-2007).

The courses offered, however, did not align with the philosophical statement in the introduction. For example, in 2006-07, of the 28 English courses listed in the CoSG, none made explicit reference to “many cultures” in the description of the course. In social studies, of the 17 courses offered, only one made explicit reference to “many cultures.” A comparison of the CoSGs between 2006 and 2012 revealed small additional “contributions.” For example, by 2012, of the same 28 courses in English, two had been changed to reflect “many cultures.” The description of a remedial level course stated:

As members of a multicultural world, it is imperative that we learn about the diverse people around us even as we discover the self. In this course students will examine and analyze the diverse heritages and universal values that make up our world through the literary and artistic works of many different cultures. The fiction, non-fiction, poetry and plays, music, art and assorted media play an integral role in uncovering the essential ties among different groups of people (CoSG English, 2012-2013).

In social studies, two courses were added that made contributions: China Today and Contemporary Global Issues.

Second, evidence that the district strategy had a low match with the research-based strategy, Add social justice related concepts, themes, and perspectives to the curriculum, was apparent in the completed curricula (e.g., social studies, English, science, math). A review of the curriculum in social studies, English, science and math suggested that the quantity of content mandated in the subject-by-subject reviews relegated the addition of concepts, themes and perspectives to the back burner.
In summary, analysis of the strategies related to social justice used in Middlerock indicated that the district had a moderate to low match with the strategies suggested in the literature to target the technical problems involved in a well-honed curriculum alignment reform. As shown in Table 12 (above), of the two primary strategies, the district strategies related to social justice had a moderate match with one of the recommendations from research and a low match with the other.

For all areas (e.g., instructional core, professional learning, leadership practices, policy adoption and policy implementation, social justice) as shown in Table 13 (below), of the 15 strategies to address technical problems that research suggested contributes to a well-honed curriculum alignment reform focused on the instructional core the district had a high match with 86.7%, a moderate match with 6.7% and a low match with 6.7%.

Table 13

<table>
<thead>
<tr>
<th>All strategies</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High match</td>
<td>13</td>
<td>86.7%</td>
</tr>
<tr>
<td>Moderate match</td>
<td>1</td>
<td>6.7%</td>
</tr>
<tr>
<td>Low match</td>
<td>1</td>
<td>6.7%</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

**Analysis of Research Question I**

As noted in the previous section, the curriculum alignment reform in Middlerock had a high match with 86.7% of the strategies identified in the literature to address technical problems involved with a math curriculum alignment reform. Analysis revealed that the strategies used in Middlerock contributed to the successful implementation of the technical aspects of a curriculum alignment reform. As Curtis, a central office administrator commented:

Well one of the major changes in the district over the last several years has been changing the K-8 math program. That was a large-scale change for us. We went from a very sort of
Basic facts oriented math program to a constructivist math program, and we have successfully implemented it, we are seeing improvements in our results, so the scope of the change was large and it’s also been successful as judged by virtually everyone at this point (Participant Interview with Curtis, 11-7-08).

**Instructional Core.** The high match with the strategies involved with the technical problems related to the instructional core, ensured that the district employed a common process consistent in all schools (e.g., the curriculum was aligned with standards and targeted at the instructional core). Prior to the curriculum alignment reform, schools in Middlerock acted with a high level of autonomy. For example, three elementary schools in the district used EDM, six used Scott Foresman, and two used other programs. Curtis described the impact of the centralization of curriculum following the math curriculum alignment reform:

> When we have discussions of curriculum the culture has changed to the point where there is a pretty clear understanding that if it’s something we’re doing as a district, the expectation is that everyone is doing it. It’s not there just to provide you with guidance or something that’s optional. And that’s been a hard road for us (Participant Interview with Curtis 11-7-08).

**Professional learning.** The high match with the strategies involved with the technical problems related to professional learning enabled the district to provide all teachers, coaches and administrators with training in the technical components of the new program (e.g., how to organize and access materials; what to look for in a lesson; the pace by which teaching needed to proceed). The training also introduced staff to the philosophical shifts required in the new program. Erica, a teacher who was closely associated with the math curriculum alignment reform, praised the training:

> Well the training was great. They really walked you through the program and showed you what your EDM hour should look like, which I thought was excellent. They really taught you how to establish your routine, they went into depth explaining on how you could use the exploration and the projects and what not. So they just kind of explained all of these things that you were supposed to be doing and told you how you could best implement them. So, the whole thing was just very helpful. And it was nice to be able to ask different questions that I had, you know, what parts of the program do you have to do.
and what can you supplement and change and what not. So it was a good question and answer session for me (Participant Interview with Erica, 6-16-08).

**Leadership practices.** The high match with the strategies involved with the technical problems related to leadership practices allowed for an efficient rollout of the new program. The district followed a top-down approach: Decisions were made centrally and spread down to the instructional level through curriculum documents and training. By mandating the same program for all schools and classrooms and training all personnel in the same organization and teaching strategies, the district controlled the pace of change and the allocation of resources.

The high match with the strategies involved with the technical problems related to leadership practices also allowed for efficient management of non-instructional areas (e.g., budget, communication, facilities) to minimize disruptions to the instructional core. As noted in the Math Monitoring Report (2005), district administrators managed all the purchasing of materials, scheduling of training, and rollout of the program. They communicated directly with the BOE so that management issues were aligned with budget timeframes.

**Policy adoption and policy implementation.** The high match with the strategies involved with the technical problems related to policy adoption and policy implementation contributed to a new math curriculum with little need for input from teachers and building administrators. The BOE’s conventional approach to policy adoption and policy implementation brought about the changes in the technical aspects of the reform sought in the policy (e.g., the BOE approved the new math curriculum and teachers replaced the old math program with EDM). Because district administrators worked directly with the policy-makers (the BOE), they were able to work out a plan to stagger the implementation of the curriculum over a two-year period (Math Monitoring Report, 2005).

**Social justice.** The moderate match with the strategies involved with the technical
problems related to social justice led to a slightly more inclusive curriculum by adding courses that emphasized many cultures. Although these additions were made to English and social studies courses and were not related to the math curriculum review, they highlighted a district trend to provide curricula that was more inclusive of many cultures.

The low match with the strategy to add social justice related concepts, themes, and diverse perspectives to the curriculum impeded the curriculum alignment reform. First, the failure to add social justice related concepts and themes contributed to teachers’ frustration with the new curriculum. According to Terry, teachers and building principals commented that the curriculum relegated teaching to “coverage” of large amounts of content-specific knowledge with little emphasis on broad-based conceptual understanding. For example, in his interview, Terry expressed concern about the excessive factual information contained in the science curriculum:

Because the science curriculum…was delivered to us… not only was it not a realistic curriculum, it was huge. There was just so much that folks who had written it really didn’t take into account: the amount of time that you had to teach or the competency of the teachers who were doing it, to teach that level of science, and a realistic idea of what children were capable of learning, and the method that they were learning, because it was really a lecture-delivered program. Teachers stand and deliver, show pictures, have them read books … there was no hands on learning going on in that science curriculum and then children were expected to be assessed in it, so teachers were feeling very pressured, but didn’t have the time to teach it. They were feeling pressure because they didn’t understand some of the objectives. It was a level of science that was beyond their training. And I feel students were also being asked to absorb factual information that they had no connection to. They couldn’t see how that related to them and their world, so they had no real interest. They were literally being turned off (Participant Interview with Terry, 6-13-08).

Although it was beyond the scope of this research to assign causation to a possible correlation between the mismatch of strategies related to social justice and the persistent gaps in student achievement identified in the problem statement, it is an area where further study could provide insight.
Research Question II: Did the Middlerock BOE frame the math curriculum alignment reform as an adaptive problem?

As discussed in the literature review, broadly defined, adaptive problems involve tasks that (a) challenge deeply held values and beliefs, (b) necessitate a long-term commitment, and (c) require communities to alter values and beliefs as they learn to work in new ways (i.e., no single expert can resolve the problems). A review of the BOE Instruction - Curriculum Policy (1999) revealed that the BOE framed aspects of the math curriculum alignment reform broadly as an adaptive problem.

In order to assess if the Middlerock BOE framed aspects of the math curriculum alignment reform as an adaptive problem, it is necessary to describe the context within which the BOE wrote its policy. Several BOE members commented in public meetings\(^5\) that curriculum and instructional practices prior to the adoption of the BOE Instruction – Curriculum Policy (1999) reflected the beliefs and values of local educational leaders and were (a) too heavily geared toward skills over rich content, (b) were not sufficiently comprehensive, and (c) did not challenge a full range of learners. Curtis, a central office administrator, corroborated these perceptions in his interview conducted five years after the BOE adopted the curriculum policy:

For the period of time I was working on curriculum in this district, a problem was that we were coming out of a time period where as a reaction to a very skills-based and I would say loosely implemented curriculum [referring to curricula that existed prior to the BOE Instruction - Curriculum Policy of 1999], we’ve gone through a five-year period of just an extreme reaction where the BOE was tightening up the curriculum and for them, that meant a knowledge-based curriculum that was incredibly explicit in terms of the information that was being taught, it meant very high degrees of accountability (Participant Interview with Curtis, 11-7-08).

\(^5\) Evidence of BOE member comments and perceptions comes from my role as observer of the process at public events (e.g., Board meetings). I was not able to locate recorded data in the public records.
Through its Curriculum Review Policy (1999), the BOE addressed the three aspects of adaptive problems identified in the research-based definition. First, the BOE framed the curriculum alignment reform as a challenge to the values and beliefs that had led to the current state of affairs. For example, the Curriculum Review Policy (1999) included “principles” to guide curriculum alignment: “(a) Curricula shall be content rich and shall promote students’ development of basic skills, critical thinking and creativity” (p. 1); “(b) Curricula shall address the diverse needs of students” (p. 1); and “(c) State and national standards, sound research findings, best educational practices, and post-secondary expectations of students should form the basis of curriculum development, evaluation, and revision” (p. 1) These principles required a shift in what the BOE perceived to be the prevailing values and beliefs among educators prior to the reform. In his interview, Curtis emphasized how the BOE framed the math curriculum alignment reform as a shifting of beliefs and practices:

One of the reasons we picked that approach also, was that there was a lot of disagreement over who had the authority to design curriculum and, within the community and within the Board, and what the parents’ role was, what the Board’s role was, so there were a lot of different reasons why we chose the approach that we chose (Participant Interview with Curtis, 11-7-08).

Second, the BOE framed the curriculum alignment reform as a long-term commitment:

The Board of Education works with the administration in an ongoing cycle of review, revision, implementation, and evaluation of curriculum. The Board directs the Superintendent to develop and implement regulations that describe a process for educators to review, revise, develop, implement and evaluate curriculum and report to the Board on the status of each curriculum on a five year cycle” (Curriculum Review Policy, 1999, p. 1).

And, “Curriculum design, development, implementation, assessment and revision shall be a planned, ongoing, and systematic process, which is supported by the school system” (Curriculum Review Policy, 1999, p. 1).
Third, the BOE acknowledged that no single expert could resolve the problem. To address their perception held prior to the curriculum alignment reform that educators worked on curriculum in isolation from the broader community, the Board framed the reform as one which required the community to alter values and beliefs and to work in new ways: “This is a collaborative process, involving input from teachers, administrators, parents, community members, and students, as appropriate” (Curriculum Review Policy, 1999, p. 1). In his interview, Curtis confirmed that the math curriculum alignment reform was framed as an inclusive process that altered previous approaches:

You know, what’s interesting in this district is that you have people, many different stakeholder groups that take an active interest in curriculum. A lot of districts, that’s the sole responsibility of the professionals. The Board is not that interested in it. Parents, by and large are not that focused on it. That is not true here… Curriculum is developed here, it’s not simply an exercise that the professionals engage in. It’s a collaborative exercise with both the parents as stakeholders and the BOE as an oversight body (Participant Interview with Curtis, 11-7-08).

In summary, because in aspects of its curriculum alignment reform the BOE addressed problems that (a) challenged deeply held values and beliefs, (b) necessitated a long-term commitment, and (c) required the community to alter its values and beliefs as it learned to work in new ways (i.e., no single expert could resolve the problems), I concluded that the BOE framed aspects of the process as an adaptive problem. I now shift to analysis of the strategies used by the BOE and the district to address the adaptive problems related to the five areas of focus: instructional core, professional learning, leadership practices, policy adoption and policy implementation, and social justice.

**Match of strategies related to the instructional core.** According to the research reviewed for this study, the BOE would use the following set of primary strategies to address the adaptive problems in a curriculum alignment reform related to the instructional core: (a) Develop
ADAPTIVE AND TECHNICAL PROBLEMS IN CURRICULUM ALIGNMENT REFORM

connections between and among different subject areas (Lemons & Helsing, 2009); (b) Contrast how previous philosophies of teaching are compatible or incompatible with the philosophy of a new curriculum (Lemons & Helsing, 2009); and (c) Adjust instruction to align with shifts in philosophy of the curriculum (Huffman, 2006). The information gathered from multiple sources indicated that the strategies used by the district had a low match with the research-based primary strategies identified in the literature review to address the adaptive problems in curriculum alignment reform related to the instructional core (see Table 14 below).

Table 14

<table>
<thead>
<tr>
<th>Instructional Core</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Develop connections between and among different subject areas</td>
<td>BOE Instruction - Curriculum Policy (1999); Completed Curricula in Social Studies, English, Science, Math; Participant Interviews with Terry and Curtis</td>
<td>Low match</td>
</tr>
<tr>
<td>2. Contrast how previous philosophies of teaching are compatible or incompatible with the philosophy of a new curriculum</td>
<td>BOE Instruction - Curriculum Policy (1999); BOE Workshop Context for Change (January 2005); MSC Workshop Context for Change Notes (July 2004); Administrator Workshop Agenda (January 2005); Professional Development Plan Revised (May 2005); Memo on Summer Math Workshops (June 2005)</td>
<td>Low match</td>
</tr>
</tbody>
</table>
First, evidence that the district strategy had a low match with the research-based primary strategy, *develop connections between and among different subject areas*, was apparent in the BOE Instruction - Curriculum Policy (1999). The policy specified that curriculum reviews would be done “for a particular discipline (or combination of disciplines, for interdisciplinary curricula)” (p. 1). As evidenced in the completed curricula for social studies, English, science and math, however, the BOE conducted each curriculum review in isolation of other subjects. As noted in the participant interview with Terry (above), there was significant criticism from teachers and administrators that the subject-by-subject reviews resulted in excessive content and impeded connections between different subject areas. Curtis, another central office administrator, drew a similar conclusion:

"Parts of it [the curriculum] are still in a format where [there] are simply lists of things for students to know and do and there really aren’t a lot of strong connections. You know, one of the challenges for us is that I’m not sure that we have a set of guiding principles in place yet, you know I think we’re moving toward that, but I don’t think we have a set of guiding principles in place (Participant Interview with Curtis, 11-7-08)."

Curtis further underscored that the district had a low match with this strategy when he described an effort after the curricula were completed to develop connections between and among curriculum. Beginning in 2006, district administrators, acting independently of the BOE, adopted the Understanding by Design curriculum framework and began work on building interdisciplinary and theme-based connections into the curricula:

"A lot of the work that we did at that time was sort of under the table. We had the district mandated curriculum and the curriculum folks working with me, we didn’t abandon that curriculum we attempted to soften it and transform it. We used things like Understanding by Design to just plow through huge piles of facts and just organize them in a way that was more meaningful, first to the teachers that were teaching the curriculum and also hopefully to the students (Participant Interview with Curtis, 11-7-08)."

Second, evidence that the district strategy had a low match with the research-based primary strategy, *contrast how previous philosophies of teaching are compatible or incompatible*
with the philosophy of a new curriculum, was apparent in the BOE Instruction - Curriculum Policy (1999), the BOE Workshop Context for Change (January 2005), the MSC Workshop Context for Change Notes (July 2004), and the Administrator Workshop Agenda (January 2005). For example, in BOE Instruction - Curriculum Policy (1999) under the sub-heading, “Use of Objectives,” the BOE specified: “training current district teachers, if necessary, in any revised subject matter content and/or in instructional methods for teaching that content” (p. 3). Other documents listed above highlighted changes from current practices with the new program.

Extending the contrasting of philosophies to the teacher level, in the Professional Development Plan Revised (May 2005) and in the Memo on Summer Math Workshops (June 2005), district administrators listed activities designed to provide an orientation to EDM, best practices in primary math instruction, and differentiation. However, as will be discussed in the section on professional learning below, the training for district teachers emphasized mainly technical components with EDM (e.g., the organization of materials) and not the contrasting of philosophies.

Third, evidence that the district strategy had a low match with the research-based primary strategy, adjust instruction to align with shifts in philosophy of the curriculum, was apparent in the BOE Instruction - Curriculum Policy (1999). In the document, the BOE stated: “a sound curriculum review and design process promotes effective teaching and learning” (p. 1). Analysis of the Walk-Through Protocol (2005), however, revealed less attention from district administrators on adjustments in instruction than on technical compliance with the new program. As discussed in the analysis of technical problems (see section on Analysis of Research Question I, p. 61), of the 12 indicators included in the Walk-Through Protocol (2005), at least eight primarily measured expertise with technical aspects of the new program. The indicator on
Differentiation (e.g., “instruction differentiated to the needs of learners” p. 1) and the three under Student Engagement (e.g., “[a] student behavior reflects engagement, [b] classroom discourse is purposeful and indicative of higher order thinking, and [c] student work demonstrates deep understanding” p. 1) were more closely associated with the types of strategies to address adaptive problems. From my perspective as an observer of the process, however, the single visits were limited to 20 minutes in each classroom and did not allow Walk-Through participants to identify adequately shifts in teacher behavior associated with adaptive problems. To elaborate, when Walk-Through participants identified high levels of student engagement, higher order thinking, or deeper understanding, they could not decipher if those student outcomes were a result of long-standing teacher practices or were attributable to shifts in instruction brought on by the new curriculum.

In summary, analysis of the strategies related to the instructional core used in Middlerock indicated that the district had a low match with the primary strategies suggested in the literature to target the adaptive problems involved in a well-honed curriculum alignment reform. As shown in Table 14 (above), of the three primary strategies, the district strategies related to the instructional core had a low match with all three of the recommendations from research.

**Match of strategies related to professional learning.** According to the research reviewed for this study, the BOE would use the following set of strategies to address the adaptive problems in a curriculum alignment reform related to the professional learning: (a) Work to change the mental models that guide teachers’ practice to align with the principles of the reform effort (Eckert & Bell, 2005); (b) Align new learning with other reform efforts (Garet et al., 2001); (c) Support change in practice by encouraging professional communication among teachers that focuses on the reform efforts (Garet et al., 2001); (d) Take advantage of day-to-day
informal contact during team time and staff meetings in order to effect the goals of the reform (Saylor & Kahrhan, 2003); and (e) Provide coaching resources and administrative support to teachers as they grapple with ways to implement the adaptive problems related to the new curriculum (Saylor & Kahrhan, 2003). The information gathered from multiple sources indicated that the strategies used by the district had a moderate to low match with the research-based primary strategies identified in the literature review to address the adaptive problems in curriculum alignment reform related to professional learning (see Table 15 below).

Table 15

<table>
<thead>
<tr>
<th>Professional Learning (PL)</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Work to change the mental models that guide teachers’ practice to align with the principles of the reform effort</td>
<td>Various documents identified in 1a – 1-d.</td>
<td>Low match</td>
</tr>
<tr>
<td>a. Identify how values, beliefs, and knowledge held prior to exposure to new learning influence mental models</td>
<td>Participant Interviews; Professional Development Plan Revised (May 2005); Memo on Summer Math Workshops (June 2005); and Administrator Workshop Agenda (January 2005)</td>
<td>Low match</td>
</tr>
<tr>
<td>b. Recognize that mental models guide actions, decisions, and the use of information and feedback</td>
<td>Participant Interviews</td>
<td>Low match</td>
</tr>
<tr>
<td>c. Acknowledge that mental models are unique to each individual and do not necessarily conform to recognized &quot;best practices&quot;</td>
<td>Participant Interviews; MSC workshop context for change notes (July 2004); Memo on Summer Math Workshops (June 2005)</td>
<td>Low match</td>
</tr>
<tr>
<td>d. Link new learning to teachers’ other experiences</td>
<td>Participant interviews</td>
<td>Low match</td>
</tr>
<tr>
<td>2. Align new learning with other reform efforts</td>
<td>BOE Instruction - Curriculum Policy (1999); BOE Meeting (May 11, 2006)</td>
<td>Moderate match</td>
</tr>
<tr>
<td>3. Support change in practice by encouraging</td>
<td>Participant Interviews</td>
<td>Moderate</td>
</tr>
<tr>
<td>professional communication among teachers that focuses on the reform efforts</td>
<td>match</td>
<td></td>
</tr>
<tr>
<td>4. Take advantage of day-to-day informal contact during team time and staff meetings in order to effect the goals of the reform</td>
<td>Participant Interviews</td>
<td>Low match</td>
</tr>
</tbody>
</table>
Table 15 (continued)

<table>
<thead>
<tr>
<th>Research-based Strategies Used to Address Adaptive Problems in Curriculum Alignment Reform Related to Professional Learning, Evidence Used and Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Provide coaching resources and administrative support to teachers as they grapple with ways to implement the adaptive problems related to the new curriculum</td>
</tr>
</tbody>
</table>

Research highlighted four supporting strategies for districts to implement the primary strategy: *Work to change the mental models that guide teachers’ practice to align with the principles of the reform effort*: (a) Identify how values, beliefs, and knowledge held prior to exposure to new learning influence mental models (Eckert & Bell, 2005); (b) Recognize that mental models guide actions, decisions, and the use of information and feedback (Eckert & Bell, 2005); (c) Acknowledge that mental models are unique to each individual and do not necessarily conform to recognized "best practices" (Eckert & Bell, 2005); and, (d) Link new learning to teachers’ other experiences (Garet et al., 2001). The information gathered from multiple sources indicated that the strategies used by the district during the curriculum alignment reform had a low match with the research-based supporting strategies identified in the literature review to address the adaptive problems related to professional learning (see Table 15 above).

First, evidence that the district strategy had a low match with the research-based supporting strategy, *Identify how values, beliefs, and knowledge held prior to exposure to new learning influence mental models*, was apparent in Participant Interviews; Professional Development Plan Revised (May 2005); Memo on Summer Math Workshops (June 2005); and Administrator Workshop Agenda (January 2005). In the interview with Erica, she described how prior experiences of frustration as a student and later as a teacher using a traditional approach to math influenced her mental model and emboldened her to embrace change in the program:
My background experience in math completely played into me wholeheartedly grasping EDM and diving right into it. I had a horrible experience with math as a child. Having gone to Catholic school we did traditional math where you stuck with the same topic for 4-6 weeks, it was absolute torture. If you could do more difficult math you were not challenged at all. If you struggled, there really was very little reinforcement (Participant Interview with Erica, 6-16-08).

Prior experiences influenced others in the district, but in their cases, they contributed to a reluctance to adopt EDM. Jim, for example, commented that the teachers in his school were satisfied with the results from the traditional math program and saw little need to change: “The school that I manage is a very successful school by all measures, kind of a ‘if it ain’t broke, don’t fix I’ kind of mentality exists to some extent” (Participant Interview with Jim, 6-13-08).

According to Terry, other teachers’ mental models were heavily shaped by past experiences with previous curriculum reviews and with the abundance of competing initiatives (Participant Interview with Terry, 6-13-08). As noted previously, although the workshop documents for EDM (e.g., Professional Development Plan Revised May 2005, Memo on Summer Math Workshops June 2005, and Administrator Workshop Agenda January 2005) presented both the philosophical rationale for the program and the technical knowledge of its components, they did not address the impact of past experiences on mental models. Based on evidence from the Participant Interview with Erica, by relying on a workshop model to present the new program, the district violated the spirit of the research-based principle to discuss and coordinate different philosophies.

Second, evidence that the district strategy had a low match with the research-based supporting strategy, Recognize that mental models guide actions, decisions, and the use of information and feedback, was apparent in Participant Interviews. The training model employed—workshops run by outside consultants—presented a one-size-fits-all approach. There was no evidence that presenters deviated from the script to acknowledge that mental models...
guide actions. For example, Erica’s mental model prepared her for the technical components of
the program, not the philosophical shifts. In her interview, she praised the training she received
but reflected only on the additional technical work she did to prepare her students for math using
the traditional program and the relative ease with which the new program made these materials
available:

> When I became a teacher I was determined to get my students to love math and up until
> EDM, I spent a lot of time doing extra planning and bringing in different things on my
> own to make math more exciting and interesting and do a lot more hands on things, so it
> was a lot of leg work on my part based on my horrible experience with math, but then
> EDM came around and they had everything. All of this hard work that I had been doing
> for years was done for me (Participant Interview with Erica, 6-16-08).

Third, evidence that the district strategy had a low match with the research-based
supporting strategy, *Acknowledge that mental models are unique to each individual and do not
necessarily conform to recognized "best practices,"* was apparent in Participant Interviews; MSC
Workshop Context for Change Notes (July 2004); and, Memo on Summer Math Workshops
(June 2005). Without an approach that identified the unique needs of participants, the workshop
met the technical needs of most (e.g., an overview to the materials and their use), but failed to
impact the adaptive issues. For example, Erica, who was closely associated with the math
curriculum alignment reform, received training in advance of other teachers that was intended to
create a context for change (MSC Workshop Context for Change Notes July 2004). With this
training and her subsequent work with the MSC in writing curriculum, Erica was in a unique
situation relative to other district teachers. The district workshops for all teachers, however,
failed to address the particular needs of individual learners (Memo on Summer Math Workshops,
June 2005). For example, in her interview, Erica described how she tuned out much of the
training and used the time to review materials:
I noticed during that training day that a lot of teachers were just learning and beginning to understand EDM, but I already had an initial understanding. So I would sit there going through my materials as they were doing the training figuring out how I could take it to the next level. And how I could implement it better and better understand it, and so the different things and the different ways I wanted to go with that (Participant Interview with Erica 6-16-08).

Fourth, evidence that the district strategy had a low match with the research-based supporting strategy, *Link new learning to teachers’ other experiences*, was apparent in Participant Interviews. As noted above with the low match of recognizing that mental models guide actions and decisions, the professional learning workshops, as described by Erica, did not draw on teachers’ other experiences. Seeing as most of the professional learning for EDM came in the form of workshops presented to large groups of teachers, opportunities for teachers to link this new learning to their other experiences was left to the teachers acting individually; there was not a systematic approach.

Shifting to the second primary strategy used to address adaptive problems in curriculum alignment reform related to professional learning, evidence that the district strategy had a moderate match with the research-based primary strategy, *Align new learning with other reform efforts*, was apparent in BOE Instruction - Curriculum Policy (1999), and BOE Meeting (May 11, 2006). Although the new math curriculum was aligned with the BOE’s curriculum alignment reform (BOE Instruction - Curriculum Policy, 1999), there was a plethora of conflicting priorities in the district that created competition for teachers’ time and focus. For example, in 2006, in addition to the implementation of the previous three curricula reviews over the past five years, the district trained teachers in instructional practices such as differentiation and group work, focused elementary teachers on the philosophy and implementation of Balanced Literacy, required all teachers to address the increasing diversity in their classrooms (see demographic changes in the Methods section), and implemented a computer-based program to plan...
interventions and monitor progress for all students who scored below Goal on the CMT or CAPT (Researcher Observation of public domain BOE meetings). At the May 11, 2006 BOE meeting, following a discussion of the proposed new math curriculum, several BOE members voiced concern about the scope of the district’s new initiatives. The minutes recorded that one BOE members expressed “reservations that we are attempting to do too much and she is concerned about overwhelming students and staff” (BOE Meeting, May 11, 2006).

Third, evidence that the district strategy had a moderate match with the research-based primary strategy, *Support change in practice by encouraging professional communication among teachers that focuses on the reform efforts*, was apparent in Participant Interviews. There was no evidence in district documents that formal plans existed to use collaboration among teachers to acquire the knowledge and skills necessary to address adaptive problems. At the school level, teacher collaboration did contribute to Erica’s new learning:

I had two afternoons where I did staff development, where I had the staff come together and bring questions and concerns and what not and we sat there together and tackled them and it was nice to be able to be the one giving the answers (Participant Interview with Erica, 6-16-08).

However, the schools’ efforts to use collaboration to deepen learning—as is necessary to address adaptive problems—were neither systematic nor ongoing. In some cases, the minimal amount of time allocated for collaboration broke down over personality clashes. According to Erica:

To be perfectly honest, I taught EDM for two years when I was in second grade and that, at that point in time was not a cohesive team in my school. We did not work together or really at all…when you are on a team with teachers that have not embraced the program, do not completely understand the program and then see a colleague getting a lot of praise for how they are doing the program, it can cause a lot of animosity. And that really hurt the team out that year (Participant Interview with Erica, 6-16-08).

Fourth, evidence that the district strategy had a low match with the research-based primary strategy, *Take advantage of day-to-day informal contact during team time and staff*
meetings in order to effect the goals of the reform, was apparent in Participant Interviews. Saylor and Kahrhan (2003) noted that by embedding activities related to new learning in the day-to-day environment of teachers, “the program provided ongoing social support in the form of encouragement, collaboration, and guidance from peers and from administrators” (p. 49). Evidence from participant interviews in Middlerock, however, suggested that learning activities were not formally embedded in the day-to-day activities of teachers. Erica described a process of learning that was largely characterized by individual review of materials and occasional collaboration with her colleagues on the Math Steering Committee or observation of teachers during Walk-Throughs. She commented that other teachers sometimes came to her room to discuss ideas, but that this was infrequent and constrained by time and personality differences (Participant Interview with Erica, 6-16-08).

Fifth, evidence that the district strategy had a moderate match with the research-based primary strategy, Provide coaching resources and administrative support to teachers as they grapple with ways to implement the adaptive problems related to the new curriculum, was apparent in BOE Instruction - Curriculum Policy, 1999; Participant Interviews; and Walk-Through Protocol, 2005. First, the BOE Instruction - Curriculum Policy (1999) made no reference to coaching, but it did acknowledge the role of “staff developers” and “coordinators” in training teachers in the new objectives. Second, although the district provided coaching, it was insufficient for teachers to tackle adaptive problems. For example, district administrators trained lead teachers in each building to be a resource to others, but as shown in the previous section, principals provided insufficient collaboration time to take advantage of the expertise. In addition, the district maintained a part-time instructional coach in each school. At the elementary level, however, these coaches were primarily used for literacy coaching—a significant need given the
district implementation of Balanced Literacy. One coaching initiative identified by Erica as contributing to her knowledge and skills was the Walk-Throughs that she participated in:

The EDM Walk-Throughs gave me so much information--just seeing the way different teachers ran the program. A big part of this program is management and any time you can steal a management idea from somebody else is excellent (Participant Interview with Erica, 6-16-08).

As noted above, the Walk-Throughs primarily targeted technical compliance with the program materials and instructional practices and did not contribute significantly to strategies that targeted adaptive problems related to the implementation of the new curriculum.

In summary, analysis of the strategies related to professional learning used in Middlerock indicated that the district had a moderate to low match with the strategies suggested in the literature to target the adaptive problems involved in a well-honed curriculum alignment reform. As shown in Table 15 (above), of the five primary strategies, the district strategies related to professional learning had a moderate match with three and a low match with two of the recommendations from research. Of the four supporting strategies, the district strategies had a low match with all four.

**Match of strategies related to leadership practices.** According to Randall and Coakley (2007), the BOE would use the following set of strategies to address the adaptive problems in a curriculum alignment reform related to the leadership practices: (a) Identify the adaptive challenge—present challenging, new, uncommon situations; (b) Focus attention on the problem to make all stakeholders aware that change must occur; (c) Frame the issues in such a way as to sustain their attention; (d) Maintain stress at a productive level to ensure continued efforts toward change; and (e) Secure ownership of both the problem and the solution from stakeholders themselves. The information gathered from multiple sources indicated that the strategies used by the district had a moderate match with the research-based primary strategies identified in the
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literature review to address the adaptive problems in curriculum alignment reform related to leadership practices (see Table 16 below).

Table 16

*Research-based Strategies Used to Address Adaptive Problems in Curriculum Alignment Reform Related to Leadership Practices, Evidence Used and Level of Match*

<table>
<thead>
<tr>
<th>Leadership Practices</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify the adaptive challenge—present challenging, new, uncommon situations</td>
<td>BOE Instruction - Curriculum Policy (1999); Participant Interviews</td>
<td>Moderate match</td>
</tr>
<tr>
<td>2. Focus attention on the problem to make all stakeholders aware that change must occur</td>
<td>Various documents identified in 2a - 2e</td>
<td>Moderate match</td>
</tr>
<tr>
<td>a. Get people to pay attention to key issues</td>
<td>BOE Workshop Context for Change (January 2004); Math Monitoring Report (March 2005); Participant Interviews</td>
<td>High match</td>
</tr>
<tr>
<td>b. Secure commitments from those who will help sell the initiative</td>
<td>MSC workshop context for change notes (July 2004); Professional Development Plan Revised (May 2005); Administrator Workshop Agenda (January 2005); Participant Interviews</td>
<td>Moderate match</td>
</tr>
<tr>
<td>c. Engage those who are reluctant about the change</td>
<td>Participant Interviews; Researcher observations</td>
<td>Moderate match</td>
</tr>
<tr>
<td>d. Adopt the behavior expected from others</td>
<td>BOE Q and A (April 2006); Math Improvement Report (May 2006)</td>
<td>High match</td>
</tr>
<tr>
<td>e. Take responsibility for problems facing the organization</td>
<td>BOE Meeting (May 11, 2006)</td>
<td>High match</td>
</tr>
<tr>
<td>3. Frame the issues in such a way as to sustain their attention</td>
<td>Various documents identified in 3a - 3b</td>
<td>Moderate match</td>
</tr>
<tr>
<td>a. Determine the time when issues must be presented to stakeholders</td>
<td>Parent Meeting Notes (October 2006); Math Review Part 4 (April 2006); BOE Q and A (April 2006); Math Improvement Report (May 2006)</td>
<td>High match</td>
</tr>
<tr>
<td>b. Step back from the issues and allow stakeholders to discover the need for change</td>
<td>Participant Interviews</td>
<td>Low match</td>
</tr>
</tbody>
</table>
Table 16 (continued)

Research-based Strategies Used to Address Adaptive Problems in Curriculum Alignment Reform Related to Leadership Practices, Evidence Used and Level of Match

<table>
<thead>
<tr>
<th>Leadership Practices</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.</strong> Maintain stress at a productive level to ensure continued efforts toward change</td>
<td>Various documents identified in 4a - 4c</td>
<td>Moderate match</td>
</tr>
<tr>
<td>a. Secure ownership of the change</td>
<td>Participant Interviews</td>
<td>Low match</td>
</tr>
<tr>
<td>b. Sustain the conditions through which stakeholders take responsibility for problem solving</td>
<td>Participant Interviews</td>
<td>Low match</td>
</tr>
<tr>
<td>c. Challenge employees’ expectations</td>
<td>BOE Workshop Context for Change (January 2004); MSC Workshop Context for Change Notes (July 2004); Walk-Through Protocol, 2005; Participant Interviews</td>
<td>Moderate match</td>
</tr>
<tr>
<td><strong>5.</strong> Secure ownership of both the problem and the solution from stakeholders themselves</td>
<td>Various documents identified in 5a and 5b</td>
<td>Moderate match</td>
</tr>
<tr>
<td>a. Align conflicting stakeholder interests to achieve a higher purpose</td>
<td>Math Monitoring Report (2005); Participant Interviews</td>
<td>Moderate match</td>
</tr>
<tr>
<td>b. Uphold the productive stress required for change to occur</td>
<td>Math Improvement Report May 2006; Participant Interviews; BOE Meeting (May 2006)</td>
<td>Moderate match</td>
</tr>
<tr>
<td><strong>6.</strong> Create a safe environment</td>
<td>Various documents identified in 6a and 6b</td>
<td>Moderate match</td>
</tr>
<tr>
<td>a. Slow the pace of change when possible</td>
<td>Math Improvement Report May 2006</td>
<td>Moderate match</td>
</tr>
<tr>
<td>b. Create a secure place to discuss disparate perspectives</td>
<td>Participant Interviews</td>
<td>Low match</td>
</tr>
</tbody>
</table>

First, evidence that the district strategy had a moderate match with the research-based primary strategy, *Identify the adaptive challenge—present challenging, new, uncommon situations* (Randall & Coakley, 2007), was apparent in BOE Instruction - Curriculum Policy (1999) and Participant Interviews. In the BOE Instruction - Curriculum Policy (1999), the BOE sought to “promote effective teaching and learning” resulting in “continuous improvement of
student performance as measured by the highest local, regional, national and international standards of excellence” (p. 1). Although this policy could be interpreted as an adaptive challenge, the BOE addressed mainly the technical work involved (e.g., rewriting curriculum objectives, creating local assessments, monitoring progress). In interviews with educators for this study, few expressed an understanding of the BOE’s intentions or saw the BOE’s effort as an adaptive challenge. On the contrary, the perception of teachers and administrators was that the BOE pursued the curriculum alignment reform to impose greater centralization and accountability on the educational system. For example, Curtis, a central office administrator commented:

Certainly up until very recently, curriculum was written primarily as an accountability document for the BOE listing out our sort of guarantee of the things that we’re teaching and the primary discussion on curriculum was between district-level staff and the Board of Education rather than really talking to the teaching staff (Participant Interview with Curtis, 11-7-08).

Second, Randall and Coakley (2007) highlighted five supporting strategies for districts to implement the primary strategy: Focus attention on the problem to make all stakeholders aware that change must occur: (a) Get people to pay attention to key issues; (b) Secure commitments from those who would help sell the initiative; (c) Engage those who were reluctant about the change; (d) Adopt the behavior expected from others; and (e) Take responsibility for problems facing the organization. The information gathered from multiple sources indicated that the strategies used by the district during the curriculum alignment reform had a moderate to high match with the research-based supporting strategies identified in the literature review to address the adaptive problems related to leadership practices (see Table 16 above).

First, evidence that the district strategy had a high match with the research-based supporting strategy, Get people to pay attention to key issues, was apparent in BOE Workshop
Context for Change (January 2004); Math Monitoring Report (March 2005); and Participant Interviews. Altering the process employed by the BOE on the previous curriculum reviews, the BOE engaged with district administrators to align the district around the key issues—in this case to build district-level support for change in math. District administrators got people’s attention for the need to change by conducting information sessions for the BOE, parent groups, administrators and teachers (BOE Workshop Context for Change, January 2004; Math Monitoring Report, March 2005). Curtis summarized the effort to build a common understanding:

We knew that we were entering into an area where change was going to be controversial, where people held different opinions about what the correct way was to teach math and how to design a math curriculum…We decided rather than going right at it and evaluating different math programs and the strengths and weaknesses, try to develop…consensus around what constituted a good math program. We chose that route because we were really trying not to get into a situation where we started with controversy; we wanted to start with something that everyone agreed on (Participant Interview with Curtis, 5-29-08).

Second, evidence that the district strategy had a moderate match with the research-based supporting strategy, Secure commitments from those who will help sell the initiative, was apparent in MSC Workshop Context for Change Notes (July 2004); Professional Development Plan Revised (May 2005); Administrator Workshop Agenda (January 2005); and Participant Interviews. District administrators worked to get lead educators committed to the new program. They formed a Math Steering Committee and conducted several training sessions for principals. The impact of his efforts, however, may have fallen short of expectations. For example, in his interview, Jim implied that compliance with a top-down directive, not focused attention on an adaptive problem, was the driving force behind his efforts: “When word of the new program came out, it certainly was incumbent on me to try to manage this change and try to implement it as the district had prescribed” (Participant Interview with Jim, 6-13-08).
Third, evidence that the district strategy had a moderate match with the research-based supporting strategy, Engage those who are reluctant about the change, was apparent in Participant Interviews and Researcher Observations. As noted above, adaptive problems require a long-term commitment to challenge values and beliefs. One barrier to address adaptive problems related to the new math program was the prior experience of many teachers with continuous change in the district. Middlerock experienced a revolving door of superintendents during its implementation of the curriculum alignment reform (Researcher Observations of public domain BOE meetings). Combined with the heavy workload resulting from the reviews of the social studies, English and science curricula, many teachers’ prior experiences conditioned them to resist change rather than embrace it. According to Erica:

If you look at the history in the district, they really just bounce from one program to another and it’s been that way across the gamut whether it’s in reading or in math. I will say that most of my colleagues did not think it [EDM] was here to stay. They said that Middlerock takes something on for three years and in three years it’s going to be gone. So why bother really having a thorough understanding of the program because it’s going to be gone in a few years (Participant Interview with Erica, 6-16-08).

Fourth, evidence that the district strategy had a high match with the research-based supporting strategy, Adopt the behavior expected from others, was apparent in BOE Q and A (April 2006) and Math Improvement Report (May 2006). Both the BOE and district administrators showed flexibility. In BOE Q and A (April 2006) and in the Math Improvement Report (May 2006), the BOE signaled a willingness to listen to teacher-level concerns about the mounting strain of other conflicting priorities. The BOE agreed with district administrators to spread the implementation out over a period of years—first K-2, then 3-5, and finally 6-8 and the high school.

Fifth, evidence that the district strategy had a high match with the research-based supporting strategy, Take responsibility for problems facing the organization, was apparent in
BOE Meeting (May 11, 2006). As noted earlier, BOE members voiced concern about the pace of change and required district administrators to revise their plans for professional learning.

Shifting to the third primary strategy, research highlighted two supporting strategies for districts to implement the primary strategy, *Frame the issues in such a way as to sustain their attention* (Randall & Coakley, 2007): (a) Determine the time when issues must be presented to stakeholders; and (b) Step back from the issues and allowed stakeholders to discover the need for change. The information gathered from multiple sources indicated that the strategies used by the district during the curriculum alignment reform had a moderate match with the research-based supporting strategies identified in the literature review to address the adaptive problems related to leadership practices (see Table 16 above).

First, evidence that the district strategy had a high match with the research-based supporting strategy, *Determine the time when issues must be presented to stakeholders*, was apparent in Outline of Process (2004); BOE Workshop Context for Change (2004); MSC Workshop Context for Change Notes (2004); Parent Meeting Notes (October 2006); Math Review Part 4 (April 2006); BOE Q and A (April 2006); and Math Improvement Report (May 2006). District administrators sought the input of various stakeholders at multiple points prior to recommending EDM to the BOE. For example, district administrators (a) presented an assessment of the existing math program to a sub-group of the BOE and responded to BOE requests for additional information (Outline of Process, 2004; BOE Workshop Context for Change, 2004); (b) presented the context for change to selected teachers and administrators (MSC Workshop Context for Change Notes, 2004); (c) distributed the first draft of the new math curriculum among teachers, administrators (Math Review Part 4, April 2006; BOE Q and A,
Second, evidence that the district strategy had a low match with the research-based supporting strategy, *Step back from the issues and allow stakeholders to discover the need for change*, was apparent in Participant Interviews. As noted in the previous section on professional learning, in the absence of systematic and ongoing collaboration, educators had little chance to compare their current mental models to the demands of the new learning. Short of a structured means for challenging previous beliefs and practices, some educators limited their new learning to technical aspects only. For example, while reflecting on teacher conversations about curriculum in his school, Evan commented on other teachers’ inability to see the connections between subjects (an adaptive problem):

> It’s [teacher conversations around curriculum] not conceptual so much, it’s more or less skill-based and while the discussions are really focused on discipline, the particular discipline, they do have certain connections, but it’s [the conversation] not at that conceptual level right now (Participant Interview with Evan, 11-13-08).

Shifting to the fourth primary strategy, research highlighted three supporting strategies for districts to implement the primary strategy, *Maintain stress at a productive level to ensure continued efforts toward change* (Randall and Coakley, 2007): (a) Secure ownership of the change; (b) Sustain the conditions through which stakeholders take responsibility for problem solving; and (c) Challenge employees’ expectations. The information gathered from multiple sources indicated that the strategies used by the district during the curriculum alignment reform had a low to moderate match with the research-based supporting strategies identified in the literature review to address the adaptive problems related to leadership practices (see Table 16 above).
First, evidence that the district strategy had a low match with the research-based supporting strategy, *Secure ownership of the change*, was apparent in Participant Interviews. As noted above, efforts to secure ownership of the change by principals and teachers in the curriculum review were well intentioned but ultimately ineffective. In interviews, teachers and principals accepted the mandate to implement the new math program, but with the exception of Erica who was closely associated with the math curriculum alignment reform, none expressed ownership of the process. For example, Jim voiced compliance, not enthusiastic engagement, when asked if he exercised autonomy in the implementation of the program:

No, because we were not told that we could do any grade level, it had to be K-2 and then it had to be 3-5. Everyone had to go to a meeting and everyone had to be trained. So no, I don’t know that there was a lot of autonomy (Participant Interview with Jim, 6-13-12).

Second, evidence that the district strategy had a low match with the research-based supporting strategy, *Sustain the conditions through which stakeholders take responsibility for problem solving*, was apparent in Participant Interviews. Efforts to shift responsibility to teachers for problem solving were not accompanied by structures that would allow them to do so. Teachers continued to struggle under the weight of many initiatives and areas of new learning. As shown in the comments of Erica above, teachers’ problem solving efforts focused mainly on organizing the wealth of materials provided.

Third, evidence that the district strategy had a moderate match with the research-based supporting strategy, *Challenge employees’ expectations*, was apparent in BOE Workshop Context for Change, January 2004; MSC Workshop Context for Change Notes, July 2004; Walk-Through Protocol, 2005; and Participant Interviews. Through the trainings and Walk-Throughs, the district instructed principals and lead teachers in what to look for in EDM lessons. Although
most of the focus was on technical aspects of the program, there was some evidence that the
district succeeded in shifting some behavior. For example, Jim commented:

This program certainly does help kids understand the “why” of math and we need to
address it in this way…I can’t think of one person in the last two years who said to me,
you know this program still doesn’t do it (Participant Interview with Jim, 6-13-08).

Nan gave a similar assessment:

I’m not seeing teachers banging away at facts, and not a lot of drilling. There is some
drilling, but basically, they are carrying out that EDM where there’s a lot of cooperative
work, kids are not trying to converge on one right answer (Participant Interview with
Nan, 11-18-08).

Shifting to the fifth primary strategy, research highlighted two supporting strategies for
districts to implement the primary strategy: Secure ownership of both the problem and the
solution from stakeholders themselves (Randall and Coakley, 2007): (a) Align conflicting
stakeholder interests to achieve a higher purpose; and (b) Uphold the productive stress required
for change to occur. The information gathered from multiple sources indicated that the strategies
used by the district had a moderate match with the research-based supporting strategies identified
in the literature review to address the adaptive problems in curriculum alignment reform related
to leadership practices (see Table 16 above).

First, evidence that the district strategy had a moderate match with the research-based
supporting strategy, Align conflicting stakeholder interests to achieve a higher purpose, was
apparent in the Math Monitoring Report (2005) and Participant Interviews. In the Math
Monitoring Report (2005), district administrators nested the adoption of EDM in five broad
themes of math instruction: conceptual understanding (e.g., comprehension of mathematical
concepts, operations and skills); procedural fluency (e.g., skill in carrying out procedures
flexibly, accurately, efficiently, and appropriately); strategic competence (e.g., ability to
formulate, represent, and solve mathematical problems); adaptive reasoning (e.g., capacity for
logical thought, reflection, explanation, and justification); and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy). Whether or not these themes would be considered a “higher purpose” is debatable. Evidence from interviews, however, suggested that teachers were far more focused on the technical aspects of the program than on achieving a higher purpose.

Second, evidence that the district strategy had a moderate match with the research-based supporting strategy, *Uphold the productive stress required for change to occur*, was apparent in the Math Improvement Report, May 2006; Participant Interviews; and BOE Meeting (May 2006). As noted above, in May 2005 when the BOE approved the math curriculum, it voted to stagger the implementation. As evidenced from Participant Interviews with Erica, Evan and Barbara, however, very few teachers concurred that the pace of change had slowed or that the stress created by the new curriculum was at a healthy level. Although the district focused only on EDM in K-2 in 2005, the teachers in grades 3-5 were equally consumed with the new learning related to Balanced Literacy (Walk-Through Protocol, 2005). In 2006 when the district implemented EDM in grades 3-5, the K-2 teachers focused heavily on Balanced Literacy. With insufficient time to assimilate the new science curriculum from 2003 and the new learning in math and literacy, elementary teachers in particular strained to manage all the change. As noted previously, BOE members concurred by voicing reservations in public that they were overwhelming staff by attempting to do too much (BOE Meeting, May 11, 2006).

Shifting to the sixth primary strategy, research highlighted two supporting strategies for districts to implement the primary strategy: *Create a safe environment* (Randall and Coakley, 2007): (a) Slow the pace of change when possible; and (b) Create a secure place to discuss disparate perspectives. The information gathered from multiple sources indicated that the
ADAPTIVE AND TECHNICAL PROBLEMS IN CURRICULUM ALIGNMENT REFORM

strategies used by the district had a low to moderate match with the research-based supporting strategies identified in the literature review to address the adaptive problems in curriculum alignment reform related to leadership practices (see Table 16 above).

First, evidence that the district strategy had a moderate match with the research-based supporting strategy, Slow the pace of change when possible, was apparent in the Math Improvement Report, May 2006. The district did slow the pace of change with the math curriculum, but it failed to reduce the overall amount of change for teachers.

Second, evidence that the district strategy had a low match with the research-based supporting strategy, Create a secure place to discuss disparate perspectives, was apparent in Participant Interviews. Unlike many districts that were implementing professional learning communities of teachers in 2005 and 2006, Middlerock failed to provide for similarly structured collaborative opportunities. Evan summed up the sentiment:

[The district needs] to listen to the teachers and how they want to incorporate the curriculum and how they want to take that curriculum and help guide their students to more understanding. If it comes from the teachers with some parameters in place you’re going to have a much more passionate approach to education and the teaching of the students rather than if something is more or less prescribed and passed down to teachers (Participant Interview with Evan, 11-13-08).

In summary, analysis of the strategies related to leadership practices used in Middlerock indicated that the district had a low to moderate match with the strategies suggested in the literature to target the adaptive problems involved in a well-honed curriculum alignment reform. As shown in Table 16 (above), of the six primary strategies, the district strategies related to leadership practices had a moderate match with all six of the recommendations from research. Of the fourteen supporting strategies, the district strategies had a high match with four, a moderate match with six and a low match with four.
Match of strategies related to policy adoption and policy implementation. According to the Honig and Hatch (2004), the BOE would use the following set of primary strategies to address the adaptive problems in a curriculum alignment reform related to policy adoption and policy implementation: (a) Schools develop school-wide goals and strategies; and (b) Schools use external demands to advance their goals and strategies. The information gathered from multiple sources indicated that the strategies used by the district had a moderate match with the research-based primary strategies identified in the literature review to address the adaptive problems in curriculum alignment reform related to policy adoption and policy implementation (see Table 17 below).
Table 17

*Research-based Strategies Used to Address Adaptive Problems in Curriculum Alignment Reform Related to Policy Adoption and Policy Implementation, Evidence Used and Level of Match*

<table>
<thead>
<tr>
<th>Policy adoption and policy implementation</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Schools develop school-wide goals and strategies</strong></td>
<td>Various documents identified in 1a - 1b</td>
<td>Moderate match</td>
</tr>
<tr>
<td><em>a. Create and maintain collective decision-making structures</em></td>
<td>Various documents identified in 1a-i – 1a-ii</td>
<td>Moderate match</td>
</tr>
<tr>
<td><em>i. Provide individuals with opportunities to participate in the goal and strategy setting process</em></td>
<td>Strategic School Profiles (2006-2010); Teacher Evaluation and Professional Learning (TEPL) Plan (2009)</td>
<td>Moderate match</td>
</tr>
<tr>
<td><em>ii. Facilitate participation through formal decision-making bodies within schools</em></td>
<td>BOE Policies and Procedures: Strategic Roadmap and Annual Goals (2010-2011)</td>
<td>Moderate match</td>
</tr>
<tr>
<td><strong>b. Manage information</strong></td>
<td>Strategic School Profiles (2006-2010)</td>
<td>Moderate match</td>
</tr>
<tr>
<td><strong>2. Schools use external demands to advance their goals and strategies</strong></td>
<td>Various documents identified in 2a - 2b</td>
<td>Moderate match</td>
</tr>
<tr>
<td><em>a. Bridge</em></td>
<td>Participant Interviews; Various documents identified in 2a-i – 2a-ii</td>
<td>Moderate match</td>
</tr>
<tr>
<td><em>i. Engage selectively with external demands by incorporating members of external organizations into the school’s organizational structures</em></td>
<td>Researcher Observations; Participant Interviews</td>
<td>Moderate match</td>
</tr>
<tr>
<td><em>ii. Work to shape the terms of compliance with external demands</em></td>
<td>Researcher Observations</td>
<td>Low match</td>
</tr>
<tr>
<td><strong>b. Buffer</strong></td>
<td>Various documents identified in 2b-i – 2b-ii</td>
<td>Low match</td>
</tr>
<tr>
<td><em>i. Adopt symbolically</em></td>
<td>Researcher Observations</td>
<td>Low match</td>
</tr>
<tr>
<td><em>ii. Add peripheral structures</em></td>
<td>Walk-Through Protocol (2005)</td>
<td>Low match</td>
</tr>
</tbody>
</table>

Research highlighted two supporting strategies for districts to implement the primary strategy: *Schools develop school-wide goals and strategies* (Honig & Hatch, 2004): (a) Create and maintain collective decision-making structures; and (b) Manage information. Honig and
Hatch (2004) explained that to match the first supporting strategy, *Create and maintain collective decision-making structures*, districts pursued two sub-supporting strategies: (i) Provide individuals with opportunities to participate in the goal and strategy setting process; and (ii) Facilitate participation through formal decision-making bodies within schools. The information gathered from multiple sources indicated that the district’s supporting strategies and sub-supporting strategies used in curriculum alignment reform had a moderate match with the research-based strategies (see Table 17 above).

First, evidence that the district strategies had a moderate match with the research-based supporting strategy, *Create and maintain collective decision-making structures*, was apparent in various documents identified below in the discussion of the sub-supporting strategies. As will be shown below, because the district had a moderate match with the two sub-supporting strategies, I concluded that the district had a moderate match with the supporting strategy.

For the first sub-supporting strategy, *Provide individuals with opportunities to participate in the goal and strategy setting process*, evidence that the district had a moderate match with the research-based strategy was apparent in the Teacher Evaluation and Professional Learning (TEPL) Plan (2009), and Strategic School Profiles (2006-2010). According to the district TEPL Plan (2009), Middlerock required each teacher to submit an individual goal for improvement. Further, individual goals had to be aligned to school goals. A review of strategic school profiles for the three elementary schools identified in Table 1 (page 32), however, revealed that between the 2006-2007 and 2009-2010 school years, none of the schools identified math as the primary focus for the school (see Table 18 below).
As a result, at least through the formal goal setting process, few teachers focused their improvement on the new learning associated with EDM.

For the second sub-supporting strategy, *Facilitate participation through formal decision-making bodies within schools*, evidence that the district strategies had a moderate match with the research-based strategy was apparent in BOE Policies and Procedures: Strategic Roadmap and Annual Goals (2010-2011). As evidenced in BOE Policies and Procedures: Strategic Roadmap and Annual Goals (2010-2011), each school had a formal decision-making body, the Strategic Improvement Team (SIT). The SIT committee consisted of teachers, administrators and parents. Its task was to review data and set goals for the school. As shown in Table 17 (above), the SITs almost exclusive focus on literacy development suggested that formal decision-making bodies did not advance the schools’ work on adaptive issues related to the new math program (Strategic School Profiles, 2006-2010).


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**Table 18**

*Middlerock School Improvement Foci (2006 – 2010)*

<table>
<thead>
<tr>
<th>School</th>
<th>06-07</th>
<th>07-08</th>
<th>08-09</th>
<th>09-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary School A</td>
<td>Literacy</td>
<td>Literacy</td>
<td>Literacy</td>
<td>Literacy</td>
</tr>
<tr>
<td>Elementary School B</td>
<td>Literacy</td>
<td>Literacy</td>
<td>Literacy</td>
<td>Literacy</td>
</tr>
<tr>
<td>Elementary School C</td>
<td>Individual progress monitoring</td>
<td>Writing*</td>
<td>Social-emotional learning</td>
<td>Social-emotional learning</td>
</tr>
</tbody>
</table>

* In its School Improvement Plans and Activities, School B mentioned the implementation of EDM as contributing to the rise in the Spring 2007 CMT scores. The goal for the school, however, was writing.
about their school performance and use[d] those data as the basis for revisiting their goals and strategies” (p. 21). As noted above, to the extent that formal decision-making committees reviewed data and set goals, they did so around literacy, not the new math program.

Shifting to the second primary strategy used to address adaptive problems in curriculum alignment reform related to policy adoption and policy implementation, research highlighted two supporting strategies for districts to implement the primary strategy: *Schools use external demands to advance their goals and strategies* (Honig & Hatch, 2004): (a) Bridge; and (b) Buffer. Honig and Hatch (2004) explained that to match the first supporting strategy, Bridge, districts pursued two sub-supporting strategies: (i) Engage selectively with external demands by incorporating members of external organizations into the school’s organizational structures; and (ii) Work to shape the terms of compliance with external demands. The information gathered from multiple sources indicated that the district’s supporting strategies and sub-supporting strategies used during the curriculum alignment reform had a low to moderate match with the research-based strategies (see Table 17 above).

First, evidence that the district strategies had a moderate match with the research-based supporting strategy, *Bridge*, was apparent in various documents identified below in the discussion of the sub-supporting strategies. Newmann, Smith, Allensworth, and Bryk (2001) explained that the advantage of “bridging” was that by inviting increased interaction with external demands, schools had the opportunity to attract additional resources and to innovate for improved performance—both conditions necessary to address adaptive problems. As will be shown below, because the district had a low to moderate match with the two sub-supporting strategies, I concluded that the district had a moderate match with the supporting strategy.

For the first sub-supporting strategy, *Engage selectively with external demands by*
incorporating members of external organizations into the school’s organizational structures, evidence that the district had a moderate match with the research-based strategy was apparent in Participant Interviews. Where schools matched this sub-supporting strategy, it was primarily for assistance with the technical demands of the new program. As examples, Nan, a building principal, used the district math coach to ensure compliance. Erica brought knowledge and ideas of the technical components of the program from meetings of the Math Steering Committee to the teachers of her school. Terry, a central office administrator, provided technical feedback to school staff from Walk-Throughs and additional training workshops. One area where a school matched this sub-supporting strategy was in its efforts to persuade parents of the value of the new program. As Jim, a building principal, noted:

> I thought that it was very helpful to have support from central office to come out to these meetings and to engage parents in conversation. I found that once we directed them to websites, we showed them information, we showed them the research, we talked about where this program came from, the history of this program, they bought into it (6-13-08).

For the second sub-supporting strategy, Work to shape the terms of compliance with external demands, evidence that the district had a low match with the research-based strategy was apparent in the Walk-Through Protocol (2005). As noted previously, the Walk-Through Protocol (2005) identified the components of math instruction the district expected to see and referenced the pacing charts that all teachers were expected to follow. Teachers and building principals were not authorized to alter the program for anything more than when to schedule math and what day of the week to include math games. Jim commented: “there is some autonomy, there is some autonomy in the buildings, where it relates to curriculum, we don’t have a whole lot. We’re pretty much locked into curriculum” (Participant Interview with Jim, 6-13-08).

Shifting to the second supporting strategy, Honig and Hatch (2004) explained that to
match the second supporting strategy, *Buffer*, districts pursued two sub-supporting strategies: (i) Adopt symbolically and (ii) Add peripheral structures. First, evidence that the district strategies had a moderate match with the research-based supporting strategy, *Buffer*, was apparent in various documents identified below in the discussion of the sub-supporting strategies. Honig and Hatch (2004) described buffering as strategies by schools and teachers that limited the linkages to the new policy. The advantage of buffering was that it simplified the demands of a new policy and enabled staff members to focus on the changes identified by staff as of greatest importance.

For the first sub-supporting strategy, *Adopt symbolically*, evidence that the district had a low match with the research-based strategy was apparent in Participant Interviews and the Walk-Through Protocol (2005). Unlike with curricula in social studies, language arts and science where interview evidence suggested that teachers symbolically adopted aspects of the new program (e.g., based on what was assessed, teachers learned what objectives they could safely ignore [Participant Interview with Barbara, 11-13-08]), with the implementation of the new math curriculum pacing charts limited symbolic adoption (Walk-Through Protocol, 2005). As noted above, the district provided the pacing charts to building principals and asked them to monitor compliance on a weekly basis.

For the second sub-supporting strategy, *Add peripheral structures*, evidence that the district had a low match with the research-based strategy was apparent in the Walk-Through Protocol (2005). Through the Walk-Through Protocol, the district tightly defined acceptable classroom practices and limited materials to those provided by EDM.

In summary, analysis of the strategies related to policy adoption and policy implementation used in Middlerock indicated that the district had a low to moderate match with
the strategies suggested in the literature to target the adaptive problems involved in a well-honed curriculum alignment reform. As shown in Table 17 (above), of the two primary strategies, the district strategies related to policy adoption and policy implementation had a moderate match with both of the recommendations from research. Of the four supporting strategies, the district strategies had a moderate match with three and a low match with one. Of the six sub-supporting strategies, the district had a moderate match with three and a low match with three.

**Match of strategies related to social justice.** According to the research reviewed for this study (Banks et al., 2005; Banks, 1995), the BOE would use the following set of primary strategies to address the adaptive problems in a curriculum alignment reform related to social justice: (a) Shift to a transformative approach; (b) Use curriculum alignment to advance social action; and (c) Provide professional development programs. The information gathered from multiple sources indicated that the strategies used by the district had a moderate to low match with the research-based primary strategies identified in the literature review to address the adaptive problems in curriculum alignment reform related to social justice (see Table 19 below).
Table 19

Research-based Strategies Used to Address Adaptive Problems in Curriculum Alignment Reform Related to Social Justice, Evidence Used and Level of Match

<table>
<thead>
<tr>
<th>Social Justice</th>
<th>Evidence Used</th>
<th>Level of Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Shift to a transformative approach</td>
<td>Various documents identified in 1a - 1c</td>
<td>Low match</td>
</tr>
<tr>
<td>b. Expand on the literary canon</td>
<td>Completed Curricula in Social Studies, English, Science, Math</td>
<td>Moderate match</td>
</tr>
<tr>
<td>c. Break down traditional homogeneous grouping practices that relegate students of color and low income to low-level classes</td>
<td>Walk-Through Protocol (2005); Participant Interviews</td>
<td>Moderate match</td>
</tr>
<tr>
<td>2. Use curriculum alignment to advance social action</td>
<td>Various documents identified in 2a - 2b</td>
<td>Low match</td>
</tr>
<tr>
<td>a. Mandate learning outcomes that required students to make decisions about social issues</td>
<td>Participant Interviews; Completed Curricula in Social Studies, English, Science, Math</td>
<td>Low match</td>
</tr>
<tr>
<td>b. Take action to expose and remedy inequities in their community</td>
<td>Math Monitoring Report March 2005; Completed Curricula in Social Studies, English, Science, Math</td>
<td>Low match</td>
</tr>
<tr>
<td>3. Provide professional development programs</td>
<td>Professional Development Plan Revised (May 2005); Memo on Summer Math Workshops (June 2005); Administrator Workshop Agenda (January 2005); Participant Interviews</td>
<td>Low match</td>
</tr>
</tbody>
</table>

In order to assess the impact of the BOE curriculum alignment reform on adaptive problems related to social justice, it is necessary to broaden the discussion to all four curricula—
social studies, English, science and math—as the math curriculum alone presented relatively few opportunities to demonstrate a commitment to social justice.

Research highlighted three supporting strategies for districts to implement the primary strategy: *Shift to a transformative approach* (Banks, 1995): (a) Challenge mainstream academic knowledge; (b) Expand on the literary canon; and (c) Break down traditional homogeneous grouping practices that relegate students of color and low income to low-level classes (Banks et al., 2005). The information gathered from multiple sources indicated that the strategies used by the district during the curriculum alignment reform had a low to moderate match with the research-based supporting strategies related to social justice (see Table 19 above).

First, evidence that the district strategy had a low match with the research-based supporting strategy, *Challenge mainstream academic knowledge*, was apparent in BOE Instruction - Curriculum Policy (1999); Completed Curricula in Social Studies, English, Science, Math; and Walk-Through Protocol (2005). According to Banks (1995), transformative curriculum is designed with explicit ways that students of varied races and cultural backgrounds can respond to content differently. BOE Instruction - Curriculum Policy (1999) made one reference to a differentiated approach to curriculum alignment: “Curriculum shall address the diverse needs of students” (p. 1). Nowhere in the document, however, did the BOE indicate a desire to review the curriculum to identify possible or perceived bias. It is unclear if by “diverse” the district was referring to a range of academic abilities or to different cultural backgrounds. A review of additional documents used for this study (Completed Curricula in Social Studies, English, Science, Math) did not reveal explicit reference to adapting the curriculum to address the perspectives offered by race and cultural backgrounds. In the Walk-Through Protocol (2005), there was reference to grouping practices that took into consideration “race and ethnicity.” As will be
shown below (see paragraph on third supporting strategy), however, no evidence existed to support that the reference in the written document was acted upon in practice.

Second, evidence that the district strategy had a moderate match with the research-based supporting strategy, *Expand on the literary canon*, was apparent in Completed Curricula in Social Studies, English, Science, Math. Although the curriculum alignment policy resulted in a significant expansion of content for each subject area, it did not expand on the literary canon. For example, a review of the social studies and English curricula revealed a preponderance of content derived from the Western canon. In the English curriculum of Middlerock High School, 85% of core texts were written by men, nearly all came from Western European countries, and very few considered themes that explicitly related to the lives of students of color.

Third, evidence that the district strategy had a moderate match with the research-based supporting strategy, *Break down traditional homogeneous grouping practices that relegate students of color and low income to low-level classes*, was apparent in Walk-Through Protocol (2005) and Participant Interviews. District administrators addressed grouping practices as part of the implementation of EDM. In the Walk-Through Protocol (2005), district administrators defined instructional standards of practice for Everyday Math (K-2). Under Organization of the Classroom, the document specified that: “Students [should be] heterogeneous[ly] grouped in terms of skill, gender, race or ethnicity.” The same document under Student Behavior stated: “Student-directed small (heterogeneously) group explorations [should be] evident.” This focus on heterogeneous grouping at the elementary level was a significant shift of practice. For example, Jim, a building principal, commented:

for the longest time, students were homogeneously grouped in this school, so it was a double whammy, not only do you bring on another program, you are eliminating the grouping which had been a tried and true method, or at least thought to be here at the
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...school. So it was incumbent upon me to be able to stand in front of those people and say, ‘that was then and this is now’ (Participant Interview with Jim, 6-13-08).

Other than district administrators defining a shift to heterogeneous grouping, however, evidence suggested that neither the BOE nor the district sought to frame the issue in terms of social justice. In advocating the practice, district administrators did not advance a transformative agenda, rather they viewed heterogeneous grouping as a necessary means to greater math achievement for all students.

Shifting to the second primary strategy, research highlighted two supporting strategies for districts to implement the primary strategy, *Use curriculum alignment to advance social action* (Banks et al., 2005): (a) Mandate learning outcomes that required students to make decisions about social issues; and (b) Take action to expose and remedy inequities in their community. The information gathered from multiple sources indicated that the strategies used by the district during the curriculum alignment reform had a low match with the research-based supporting strategies identified in the literature review to address the adaptive problems related to social justice (see Table 19 above).

First, evidence that the district strategy had a low match with the research-based supporting strategy, *Mandate learning outcomes that required students to make decisions about social issues*, was apparent in Participant Interviews and Completed Curricula in Social Studies, English, Science, Math. By adopting curricula that placed an excessive burden on staff both in the new learning required and the amount of content to cover, the BOE may have impeded work toward advancing social action. For example, according to the Terry:

> Not only was it not a realistic curriculum, it was huge, there was just so much that folks who had written it really didn’t take into account: the amount of time that you had to teach or the competency of the teachers who were doing it, to teach that level of science, and a realistic idea of what children were capable of learning, and the method that they were learning, because it was really a lecture-delivered program (Participant Interview...
A review of Completed Curricula in Social Studies and English revealed no evidence that students were required to make decisions about social issues.

Second, evidence that the district strategy had a low match with the research-based supporting strategy, *Take action to expose and remedy inequities in their community*, was apparent in Math Monitoring Report, March 2005; Completed Curricula in Social Studies, English, Science, Math. Taken collectively, the documents suggested that the “inequities” targeted by the BOE were not linked to institutional racism but to insufficient rigor for all students.

Shifting to the third primary strategy, evidence that the district strategy had a low match with the research-based primary strategy, *Provide professional development programs aligned with a social justice agenda*, was apparent in Professional Development Plan Revised (May 2005); Memo on Summer Math Workshops (June 2005); Administrator Workshop Agenda (January 2005); and Participant Interviews. As noted in the Professional Learning section of this paper, most of the training provided technical assistance with the vast amount of material support provided by EDM (Professional Development Plan Revised, May 2005; Memo on Summer Math Workshops, June 2005); Administrator Workshop Agenda, January 2005; Participant Interview with Erica). There was no evidence that the content of professional learning addressed differences in race or culture that might suggest alternative approaches to teaching. Further, the lack of systematic collaboration for teachers around problems of practice prevented them from exploring how their beliefs and values impacted students of different backgrounds.

In summary, analysis of the strategies related to a commitment to social justice used in Middlerock indicated that the district had a low to moderate match with the strategies suggested
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in the literature to target the adaptive problems involved in a well-honed curriculum alignment reform. As shown in Table 19 (above), of the three primary strategies related to social justice recommended by research, the district strategies had a low match with all three. Of the five supporting strategies, the district strategies had a moderate match with two and a low match with three.

For all areas (e.g., instructional core, professional learning, leadership practices, policy adoption and policy implementation, social justice) as shown in Table 20 (below), of the 52 strategies to address adaptive problems that research suggested contribute to a well-honed curriculum alignment reform focused on the instructional core the district had a high match with four (7.7%), a moderate match with 25 (48.1%) and a low match with 23 (44.2%).

Table 20

<table>
<thead>
<tr>
<th>All strategies</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High match</td>
<td>4</td>
<td>7.7%</td>
</tr>
<tr>
<td>Moderate match</td>
<td>25</td>
<td>48.1%</td>
</tr>
<tr>
<td>Low match</td>
<td>23</td>
<td>44.2%</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100%</td>
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</table>

Analysis of Research Question II

As noted in the previous section, the curriculum alignment reform in Middlerock had a High Match with 7.7% of the strategies identified in the literature to address adaptive problems involved with a math curriculum alignment reform. Analysis revealed that the strategies used in Middlerock impeded the successful implementation of the adaptive aspects of a curriculum alignment reform.

Instructional core. First, the low match with the research-based strategy “develop connections between and among different subject areas” (Lemons & Helsing, 2009) suggested
that the district failed to treat curriculum alignment reform as an opportunity to shift beliefs and practices about curriculum. First, the curricula (social studies, English, science and math) added up to too much for teachers to adequately teach in the amount of time allotted (Participant Interview with Terry, 6-13-08). Second, there was excessive new learning for the elementary teachers and insufficient time to address more than the technical aspects of problems involved (Participant Interviews with Erica, 6-16-08; and Barbara, 11-13-08). The BOE acknowledged these unintended consequences (BOE Meeting May 11, 2006) and tried to adjust the pace of implementation for the math curriculum (Math Improvement Report, 2006). However, the implications of these unintended consequences suggested that the subject-by-subject reviews, with little to no effort to find linkages between and among the subjects, impeded work on adaptive problems by overwhelming teachers both in the amount of information they needed to teach and in the amount of time they had to learn new approaches.

Second, the low match with the research-based strategy “contrast how previous philosophies of teaching are compatible or incompatible with the philosophy of a new curriculum” (Lemons & Helsing, 2009) suggested that the district’s strategies relegated a focus on adaptive problems to individual initiative. Although the district initiated the review with the intention of shifting teachers’ beliefs and practices (BOE Workshop Context for Change, 2004), evidence suggested that the vast majority of change was in the technical aspects of implementing the new math program (Participant Interview with Erica, 6-16-08; Walk-Through Protocol, 2005). The implication of failing to provide a systematic means for teachers to contrast how previous philosophies of teaching are compatible or incompatible with the philosophy of the new curriculum is that adaptive problems take a back seat to the more pressing needs of addressing the technical aspects of the reform.
Third, the low match with the research-based strategy “adjust instruction to align with shifts in philosophy of the curriculum” (Huffman, 2006) suggested that district policy changes delivered to teachers with little input are limited in their ability to impact instructional practices. As discussed above, for a variety of reasons (e.g., excessive amount of content, insufficient time, inadequate support, and a lack of systematic implementation) shifts in beliefs and practices associated with adaptive problems, might have occurred with individuals, but were not realized throughout the district.

**Professional learning.** First, the low match with the research-based strategy “work to change the mental models that guide teachers/ practice to align with the principles of the reform” (Eckert & Bell, 2005) suggested that professional learning focused primarily on a workshop model (e.g., presentations covering large amounts of material and instructional practices) was insufficient to help teachers shift beliefs and practices. As noted in the analysis of the professional learning section of this paper, many teachers were conditioned to view the adoption of EDM as just one more change that likely would not last. As Erica noted, many teachers opted not to invest large amounts of time or energy in the program. As evidenced by the Walk-Through Protocol (2005) and the Participant Interview with Curtis (11-7-08), teachers addressed the technical aspects necessary for the implementation of the program (e.g., they used the new materials and followed the pacing charts), but the level of teacher buy-in needed to address the adaptive problems was not evidenced in the data (Participant Interview with Erica, 6-16-08). Further, there was evidence in the interviews with Nan and Jim that high levels of monitoring were necessary to ensure that teachers followed the EDM program and did not revert back to previously developed materials and strategies. This mismatch between the implementation of strategies in Middlerock and the strategy identified in the research suggested that professional
learning models that failed to allow teachers to analyze and adjust mental models impeded work to address adaptive problems.

Second, the moderate match with the research-based strategy “align new learning with other reform efforts (Garet et al., 2001) suggested that only partial alignment of new learning with other reform efforts was insufficient in helping teachers address adaptive problems required for successful implementation of the program. As shown in the sections above, elementary teachers were expected to implement four major new curricula in a five-year period. In their interviews, Barbara and Evan noted that teachers made choices to develop expertise in one or two areas at the expense of others. Barbara, for example, dedicated all of her team time and outside learning to literacy and social studies. Her approach to EDM was to learn enough to get by (i.e., focus on the technical problems without a corresponding exploration of beliefs and practices).

Third, the moderate match with the research-based strategy “support for change in practice by encouraging professional communication among teachers that focuses on the reform efforts” (Garet et al., 2001) suggested a failure to adequately address the adaptive problems associated with successful implementation of the program. The research suggested that adaptive problems required a narrow focus, ample time, and sufficient opportunities to discuss the new learning (Lemons & Helsing, 2009)—none of which were present in the Middlerock case.

Fourth, the low match with the research-based strategy “take advantage of day-to-day informal contact during team time and staff meetings in order to effect the goals of the reform” (Saylor & Kahrhan, 2003) suggested that insufficient efforts impeded teachers in the acquisition of the knowledge and skills necessary to address adaptive problems. In her participant interview, Erica commented on the benefits from a group of teachers getting together a couple of times after
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school when provided with program time and occasionally during common planning time. As was shown in the analysis above, however, because of the limited time and the lack of systematic planning and prioritization these collaborative opportunities focused primarily on technical components of the new program.

Fifth, the moderate match with the research-based strategy “provide coaching resources and administrative support to teachers as they grapple with ways to implement the adaptive problems related to the new curriculum” (Saylor & Kahrhan, 2003) suggested that the districts’ strategies did not adequately address adaptive problems necessary for successful implementation of the new curriculum. A coaching model that was understaffed and diluted in its mission (i.e., focused on Balanced Literacy, new science objectives, and EDM) provided insufficient coaching required for teachers to tackle adaptive problems.

Leadership practices. First, the moderate match with the research-based strategy “identify the adaptive challenge—present challenging, new, uncommon situations” (Randall & Coakly, 2007) suggested that the reform was limited to technical work (e.g., rewriting curriculum objectives, creating local assessments, monitoring progress) thus failing to adequately address adaptive problems. For example, under the strain of other initiatives and with monitoring (e.g., pacing charts and Walk-Throughs) primarily focused on technical compliance, Erica directed her attention to the organization of materials and implementation of new technical techniques. There was little evidence that she dedicated time and effort to fully understanding how the program differed conceptually (e.g., the spiral approach) or what that philosophical difference looked like in practice.

Second, the moderate match with the research-based strategy “focus attention on the problem to make all stakeholders aware that change must occur” (Randall & Coakly, 2007)
suggested that the district failed to secure buy-in for changes necessary to address adaptive problems. As Barbara noted in her Participant Interview (11-13-08), the absence of trust between and among the BOE, the district central office, and the staff impeded efforts to focus attention on shifts of beliefs and practices. According to Barbara, the efforts of the district central office to make the case for change were well intentioned, but ultimately did not persuade teachers—many voiced frustration with the pace of change in the district.

Third, the moderate match with the research-based strategy “frame the issues in such a way as to sustain their attention” (Randall & Coakly, 2007) suggested that the district strategies did not adequately address adaptive problems. Having learned some lessons from previous reviews of curricula (e.g., social studies, English, and science), the district attempted to frame the issues to sustain attention. Both Curtis and Terry highlighted the multiple presentations to the BOE, administrators, teachers, and parents to make the case for change. The Math Monitoring Report (2005) noted the formation of the Math Steering Committee and a slightly slowed down process of implementation as positive changes in their effort to frame the issues and implement change in a manner that would allow for shifts in beliefs and practices. As noted above, however, the effort came in the context of teachers and administrators conditioned by prior experience to believe that curriculum alignment happened outside of the day-to-day functioning of teachers. Many staff members had grown accustomed to waiting for the new curriculum and adjusting once it had been passed down in completed form. As a result, the strategy of framing the issue to sustain attention that should have contributed to teachers’ ability to address adaptive problems had minimal impact.

Fourth, the moderate match with the research-based strategies “maintain stress at a productive level to ensure continued efforts toward change,” “secure ownership of both the
problem and the solution from stakeholders themselves,” and “create a safe environment” (Randall & Coakly, 2007) suggested that district strategies did not adequately address adaptive problems necessary for a successful implementation of the new math curriculum. As noted throughout this paper, the evidence suggested that the stress on teachers from years of frequent change combined with the frequent turnover of leadership in the district led to a level of engagement with the new math program that could be described as compliant—an insufficient level to address adaptive problems associated with a successful curriculum alignment reform.

**Policy adoption and policy implementation.** First, the moderate match with the research-based strategy “schools develop school-wide goals and strategies” (Honig & Hatch, 2004) suggested that a goal setting process that required schools to conform to district priorities with little attention to the needs of local actors (e.g., teachers, administrators, and parents of a school community) was not adequate to build the deep engagement necessary to address adaptive problems. As noted in the previous section, even though the newest change in the district was the math curriculum, none of the elementary schools adopted goals for math.

Second, the moderate match with the research-based strategy “schools use external demands to advance their goals and strategies” (Honig & Hatch, 2004) suggested that the district strategies did not adequately address adaptive problems. The evidence suggested that bridging and buffering, as used in the Middlerock case primarily to facilitate change in technical aspects of the new program, did not contribute to changes in the adaptive aspects. In the absence of a coaching model dedicated to shifting teachers’ beliefs and practices in math instruction, structured and consistent collaboration time for teachers to work together on problems of practice, and a laser focus on one area of change at a time (Schmoker, 2011), teachers were not supported in the work of addressing adaptive problems.
Social justice. First, the low match with the research-based strategy “shift to a transformative approach” (Banks, 1995) suggested that without explicit “courageous conversations” (Singleton & Linton, 2006) about the impact of curriculum on students from different races, cultures, and levels of economic status, curriculum changes failed to challenge the beliefs and values of the staff.

Second, the low match with the research-based strategy “use curriculum alignment to advance social action” (Banks et al., 2005) suggested that a curriculum alignment reform that made changes in the technical aspects of the program only (e.g., the addition of certain holidays, an expansion of the scope of literary works or regions of the world) did not lead teachers to consider a social action agenda—exposing and remedying inequities in their community.

Third, the low match with the research-based strategy “provide professional development programs aligned with a social justice agenda” (Banks et al., 2005) suggested that professional learning that focused primarily on the technical aspects of the program failed to challenge teachers’ own biases—a necessary step to address adaptive problems.

Discussion

In summary, although evidence suggested that the Middlerock BOE sought to implement strategies to address both technical and adaptive problems of curriculum alignment reform focused on the instructional core, analysis conducted for this paper revealed that the BOE achieved only changes characterized as technical; it did not realize the desired level of change associated with adaptive problems.

The overarching emphasis on technical problems could, by some measures, be considered a success. The implementation of the new math curriculum seemed to have positive impacts on standardized test scores. Following the implementation of the new math curriculum, Middlerock
experienced a rise in its standardized test scores, a decrease in the gaps between subgroups and a reduction in variation between the highest and lowest performing elementary schools (see Table 21 below). For example, from 2006 to 2012 aggregated for grades 3-8, the percentage of students achieving at the Goal level on the CMT increased by 7.8% (from 77% in 2006 to 83% in 2012). The gap between White students and Hispanic students (grades 3-8) decreased by 13.8% (from 29 percentage points in 2006 to 25 percentage points in 2012). The gap between students receiving Free or Reduced Lunch and students paying Full Lunch (grades 3-8) decreased by 16.3% (from 43 percentage points in 2006 to 36 percentage points in 2012). Finally, the gap between the average of the three highest achieving elementary schools and the average of the three lowest achieving elementary schools decreased by 16.7% (from 30 percentage points in 2006 to 25 percentage points in 2012).

Table 21
*Middlerock Standardized Test results at Goal Level (2006 – 2012)*

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<tbody>
<tr>
<td>District (all students 3-8)</td>
<td>77</td>
<td>80</td>
<td>78</td>
<td>81</td>
<td>82</td>
<td>82</td>
<td>83</td>
</tr>
<tr>
<td>Percentage point gap between White and Hispanic (grades 3-8)</td>
<td>29</td>
<td>27</td>
<td>29</td>
<td>25</td>
<td>27</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Percentage point gap between full price and free/reduced price lunch (grades 3-8)</td>
<td>43</td>
<td>36</td>
<td>42</td>
<td>36</td>
<td>35</td>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>Variation among schools (percentage point difference between the average of the three highest performing schools and the average of the three lowest performing schools—grades 3-5)</td>
<td>30</td>
<td>19</td>
<td>26</td>
<td>28</td>
<td>24</td>
<td>24</td>
<td>25</td>
</tr>
</tbody>
</table>

Although changes to CMT scores were in the direction that the BOE desired, the scores indicated that a good deal of work remains. As shown in the Statement of Problem section of this paper, over the six-year time frame of this study, scores remained mostly flat, large gaps between subgroups persisted, and the variation among schools remained large. For example the CMT scores still place the district in the lower levels of its DRG. Students who qualify for Free or
Reduced Lunch are still 36 percentage points behind their counterparts. White students still outperform Hispanic students by a wide margin. The analyses conducted in this study suggest that the BOE’s failure to address fully the adaptive problems related to curriculum reform contributed to this outcome.

Related research suggests that addressing these important issues will require the BOE to grapple with the more complex, adaptive problems related to curriculum reform. In a comprehensive review of school reform involving 20 school systems around the world, Mourshed, Chijioke and Barber (2010) identified patterns that successful school systems followed to progress from poor to fair, fair to good, good to great, and great to excellent. According to the report, systems made progress from any starting point. To progress from the lower performing levels, interventions that addressed technical problems were sufficient: “At this stage, interventions focus on consolidating the system foundations; this includes the production of high quality performance data, ensuring teacher and school accountability, and creating appropriate financing, organization structure, and pedagogy models” (p. 20). The transition from great to excellent, in contrast, required interventions that targeted adaptive problems: “the interventions of this stage move the locus of improvement from the center to the schools themselves; the focus is on introducing peer-based learning through school-based and system-wide interaction, as well as supporting system-sponsored innovation and experimentation” (p. 20).

As in many cases of educational reform (see Mourshed, Chijioke & Barber, 2010 for examples), the Middlerock BOE addressed the technical problems associated with curriculum alignment reform. As shown above in Table 21 (above), corresponding with these technical improvements, Middlerock experienced a modest rise in achievement scores, a narrowing of
gaps between groups of students, and reduced variation among schools. In the section that follows I address suggestions that districts like Middlerock – ones that have addressed the technical problems related to curriculum alignment reform—might follow to move forward from good to great by addressing adaptive problems.

**Recommendations for Practice**

The following recommendations suggest steps that other districts similar to Middlerock—those that have addressed the technical problems associated with curriculum alignment reform—might consider to ensure that curriculum alignment reform successfully addresses adaptive problems.

**Instructional Core: Steps to Address Adaptive Problems**

One strategy districts would pursue to address the adaptive problems of curriculum alignment reform related to the instructional cores is to develop connections between and among different subject areas (Lemons & Helsing, 2009). The rationale behind this recommendation is that with limited hours in a school day and relative limits on the amount of new learning that can be achieved (i.e., by teachers to teach and students to learn), it is necessary for teachers to guide students to conceptual understandings across disciplines. One strategy districts could take to develop connections between and among curricular areas is to develop an overarching framework as a first step in the curriculum review process. Wiggins and McTighe (2007) suggested the development of learning principles—major concepts embedded in curriculum that clarify what learning for understanding means and requires. Zmuda (2007) provided some specific examples of learning principles: “Engaged and sustained learning, a prerequisite for understanding, requires that learners constantly see the value of their work and feel a growing sense of efficacy when facing worthy challenges; Success at transfer depends upon
understanding the big ideas that connect otherwise isolated or inert facts, skills, and experiences so that new challenges can be met and new experiences understood” (p. 1). A second step districts can take is to develop transdisciplinary units of instruction—the exploration of a relevant issue or problem that integrates the perspectives of multiple disciplines in order to connect new knowledge and deeper understanding to real life experiences (Richards, 2012). Richards (2012) provided an example of an eighth grade class where under the broad themes of democracy, the environment, nutrition, and service-learning projects, students explored topics such as climate change, population growth, energy sources, local government election processes, and the calorie count and nutritional value of food served in their school cafeteria (p. 10).

A second recommendation to address adaptive problems of curriculum alignment reform related to the instructional core is for districts to build structures that will support the contrasting of philosophies between the old curriculum and the new curriculum. One step districts can take is to make explicit in curriculum documents and supplemental materials how the philosophies associated with the new curriculum are compatible and incompatible with an existing instructional framework. For example, through a supplemental text that helps teachers interpret curriculum documents, examples of instructional practices that support one philosophy can be contrasted with instructional practices that support another. Further, the district can provide video-taped models of teachers implementing instructional practices aligned with a particular philosophy. A second step is to provide teachers with the means (e.g., time and protocols) to collaborate around the similarities and differences of philosophies. As noted in the Middlerock case, the district strategies relegated the contrasting of philosophies to the drive of individual teachers. As a result, the district had a low match with the research-based strategy.
A third recommendation to address adaptive problems of curriculum alignment reform is to provide teachers with the resources (e.g., collaboration time, coaching support, easily interpreted reference material) to allow them to adjust instruction in alignment to shifts in philosophy. Research has shown that when teachers collaborate around a problem of practice related to their day-to-day working conditions, they are capable of shifting beliefs and practices (Sheckley, Lemons, Kehrhahn, & Grenier, 2008).

**Professional Learning: Steps to Address Adaptive Problems**

As shown in the research, to address adaptive problems, teachers need time, expertise and structures to consider the impact of mental models on desired new learning (Sheckley, Lemons, Kehrhahn, & Grenier, 2008). One step districts could take is to build a systematic and collaborative approach to inquiries of problems of practice that are locally determined and related to the broader district-level reform. Specific steps could include: (a) explore—both individually and collaboratively—conceptual understandings that uncover teachers’ mental models (e.g., concept maps, journaling, small group discussion, envisioning new possibilities; Zmuda, 2010); (b) build new models (e.g., research on best practices, trial and error with common instructional practices); (c) compare and contrast initial mental models with new models to identify gaps; and (d) collaboratively develop action plans to explore means for bridging the gaps they identify (e.g., plan common instructional strategies, monitor implementation, evaluate the impact on student learning, revise and continue process).

As suggested from the Middlerock case, the steps suggested above require a lengthy time frame (e.g., teachers and schools given permission to explore single areas of change over a long period of time), stability in the district (e.g., consistent leadership focused on relatively few priorities), a systematic and structured approach to building collaborative teams of teachers, and
adequate coaching resources (e.g., school embedded expertise with sufficient knowledge of content and pedagogy).

**Leadership: Steps to Address Adaptive Problems**

Research suggested that a district’s mission and vision provide a unified direction, clear roles supporting school improvement, and alignment of goals and strategies (Agullard & Goughnour, 2006; Honig, 2003; Honig & Hatch, 2004; Hightower & McLaughlin, 2006; Childress, Elmore, Grossman, & Moore Johnson, 2007; Moss & Brookhart, 2012). According to Childress et al. (2007), the mission and vision of a district gets infused into the system through a theory or action (i.e., articulated statements of belief to guide the district in selecting strategies that will have the greatest impact on the instructional core). As evidenced in the Middlerock case, in the absence of a theory of action, the scope of a reform was limited to changes of the technical aspects of the curriculum alignment reform. Specific steps to use mission, vision and a theory of action in a curriculum alignment reform to address adaptive aspects include: (a) Form a community task force with representatives from all constituencies to develop the mission, vision, and theory of action; (b) Disseminate the work of the task force broadly, gather feedback and build consensus; (c) Allow schools to work within the guidelines of the mission, vision, and theory of action to implement the new curriculum in a way that aligns to local conditions; and (d) Hold schools accountable for student outcomes, not the means by which they pursued change.

As suggested from the Middlerock case, the steps outlined above require a limited scope of change (i.e., prioritization around four or five theories of action with change at any particular school level reduced to one or two identified areas), the building of trust, and the allowance of monitored flexibility.

**Policy Adoption and Policy Implementation: Steps to Address Adaptive Problems**
One step districts could take for policy adoption and policy implementation to address adaptive problems is to establish an alternative approach to the conventional, top-down model. As noted in the Theoretical Framework section of this paper, a “conventional” model is defined as “a set of segmented, separated, functionally sequenced stages” (Hall & McGintry, 1997, p. 439). The first step would be to begin with a clear identification of the problem and a shared understanding of the problem by all stakeholders. Through the goal setting process at the school, district, and BOE levels, careful study is necessary to tease out the issues related to a perceived problem and the extent to which an identified problem is actually affecting student achievement. For solutions to the problem to address adaptive problems, districts could work to ensure that all stakeholders share identification of a problem, especially those charged with implementation.

Second, as shown in the Theoretical Framework section of this paper, Lemons and Helsing (2009) found that a reform often had limited impact when districts (a) failed to distinguish between the demands of technical and adaptive problems involved in the reform and (b) imposed technical solutions and processes to adaptive problems. A suggestion is for policymakers to make explicit the type of problem being addressed (i.e., identify the technical and adaptive problems involved).

Third, in seeking to bring about shifts in practice, policymakers could attend to both the desired outcomes and the process by which they will accomplish these goals (Coburn & Stein, 2006). A significant step in any process of addressing adaptive problems is the engagement of participants whose behavior the policymakers are most hoping to change. Allotting school and teacher teams with adequate time and limited priority areas could help reduce the gap between the intentions of policymakers and the implementation of policy in practice.
Fourth, because individual cognitive framing (Spillane, Reiser, & Gomez, 2006; Datnow, 2006) and the social context within which teachers work (Ball, 1987) heavily influence the implementation of policy, there will always be a gap between the intended policy and the policy in practice, at least for adaptive problems. It is necessary, therefore, for policy to be formulated with varying outcomes in mind. For example, with curriculum alignment reform, districts could specify the broad themes and content of curriculum and provide teams of teachers with time and resources to shape the actual implementation in a way that best responds to local conditions.

**Social Justice: Steps to Address Adaptive Problems**

As shown in the research, curriculum alignment reform is an important tool available to districts to address issues of social justice (Noguera, 2006; Brackett, 2008; Banks, 1995; Camangian, 2008). One step districts could take is to form a community task force charged with exploring and exposing how past and current practices contribute to inequities. The formation of such a task force requires a clearly defined scope of work and explicit acknowledgment that recommendations will be implemented. The task force could spend a full year investigating, communicating and forming recommendations. The recommendations from the task force would serve as the foundation for curriculum alignment work.

A second step districts could take in writing and revising of curriculum is to adopt a two pronged approach: (a) prescribe a common curriculum ensuring equity of course opportunity; and (b) build commitment of staff to contribute toward the development, implementation, and monitoring of curriculum. This command/commitment strategy (Rowan, 1990) allows central office to support inclusive and transformative education through curriculum while engaging staff in dialogue about racial separation and inequities.
The inclusion of certain topics in curriculum is ultimately a choice. Districts decide what to teach and what can be safely left aside (Camangian, 2008). Therefore, districts determine if multiple cultures are represented, how they are interpreted, how power is defined and the lens through which culture is analyzed. The role of teachers and building administrators is critical in culturally responsive implementation (Noguera, 2006). Teachers need time with colleagues to flesh out curriculum documents, to challenge beliefs, and to surface unconscious biases where they exist.

**Final Comment**

Analysis of the curriculum alignment reform in Middlerock has sharpened my focus on the challenges confronting educational systems in their quests to change beliefs and practices. As was evidenced in Middlerock and supported in the report by Moursed, Chijioke and Barber (2010), districts succumb to the fallacy that change in technical aspects of initiatives, and the corresponding bump in student achievement, will lead to sustained improvement. This appears to have been the case in Middlerock. As an observer at BOE meetings, there were expressions of relief and pride in the first few years after the implementation of the math curriculum alignment reform: scores were up and the changes in instructional practices appeared to be taking hold. As additional initiatives emerged and crowded out the attention placed on math, a sense of complacency developed. Even though there was ample evidence that math scores across the state were rising and in many cases at a faster pace than those in Middlerock, the Middlerock administration held fast to the belief that the changes to technical aspects of math instruction would continue to produce desired results.

As scores flattened, gaps between subgroups remained large, and the variation between the highest perform and lowest performing schools failed to shrink significantly, parents in the
district struck a tone of urgency for change (as observed at multiple BOE meetings during the public comment period). Now, eight years after the start of the math curriculum alignment reform, the district is abandoning the EDM program and beginning a new math curriculum review (Researcher Observations of public domain BOE meetings).

Middlerock has a choice to make. It can change programs, emphasize the technical aspects of the new program, and appreciate the small, short-term bump in scores that are likely to follow. This researcher is hopeful that the district will pursue an alternative approach. Following the recommendations set forth in this study, the district could set as its highest priority the need to address adaptive problems. As an educational system, we are not going to make any progress in school reform until we tackle the complex and intricate issues in the form of adaptive problems that accompany curriculum alignment reform.
References


ADAPTIVE AND TECHNICAL PROBLEMS IN CURRICULUM ALIGNMENT REFORM


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ADAPTIVE AND TECHNICAL PROBLEMS IN CURRICULUM ALIGNMENT REFORM


Retrieved from http://competentclassroom.com
Appendix A

POLICIES AND REGULATIONS

Policy
Title: INSTRUCTION CURRICULUM
Adoption Date: 1999

The Middlerock Public Schools are committed to a comprehensive process of curriculum planning and assessment to foster continuous improvement of student performance as measured by the highest local, regional, national and international standards of excellence. Curriculum includes the scope and sequence of content, concepts, and skills taught in a particular discipline (or combination of disciplines, for interdisciplinary curricula); textbooks and other core materials; identified measurable student learning objectives; and the methods of assessing student performance of learning objectives.

The Board of Education is responsible for establishing the educational goals for the Middlerock Public Schools; for adopting measurable student learning objectives for each curriculum; for determining the assessments by which progress toward these goals will be measured; for approving all curricula and textbooks; and for approving all course additions or deletions. In accordance with Connecticut General Statute 10-220, this is a collaborative process, involving input from teachers, administrators, parents, community members, and students, as appropriate.

The Board of Education works with the administration in an ongoing cycle of review, revision, implementation, and evaluation of curriculum. The Board directs the Superintendent to develop and implement regulations that describe a process for educators to review, revise, develop, implement and evaluate curriculum and report to the Board on the status of each curriculum on a five year cycle. A sound curriculum review and design process promotes effective teaching and learning. The following basic principles shall guide curriculum review and revisions:

- Curriculum design, development, implementation, assessment and revision shall be a planned, ongoing, and systematic process, which is supported by the school system.
- All curricula shall undergo regular review.
- Curricula shall be content rich and shall promote students’ development of basic skills, critical thinking and creativity.
- Curricula shall address the diverse needs of students.
- State and national standards, sound research findings, best educational practices, and post-secondary expectations of students should form the basis of curriculum development, evaluation, and revision.
- Teachers and administrators shall participate in curriculum development, evaluation, and revision.

Objectives
An orderly series of curriculum objectives that describe student learning shall be adopted by the Board of Education in each subject for each grade and course.
Characteristics of Individual Learning Objectives

Each learning objective shall have the following characteristics:

- Be important for students to learn. That is, each objective shall be important either in and of itself or as a foundation supporting some more important, more advanced objective.
- Be specific and measurable.
- Be simply and clearly worded so that most lay people can read and understand it.

Characteristics of the Set of Objectives for Each Grade or Course

The set of objectives adopted in each subject for each grade or course shall have the following characteristics:

- Be at levels of difficulty that challenge all students.
- Reflect the abilities and needs of a diverse student body.
- Cover a coherent and comprehensive set of topics within the subject for that grade, or course, or for the world of work.
- Build on objectives taught in preceding grades or courses.
- Prepare students for the objectives of the succeeding grade or course.
- Support and be integrated with appropriate objectives in other curricula designed for the same student population.

Review of Objectives

During the process of curriculum development, the Superintendent shall assure that objectives are reviewed and critiqued by individuals from one or more of the following groups, as appropriate:

- District faculty members in the appropriate grade, subject or course
- District administrators
- Nationally recognized experts in the subject field
- Faculty members in other school districts
- College and university professors in the subject field
- Employers in the occupational field related to the subject field

Brief documentation shall be made of the critiques provided by the reviewers. This documentation shall be reviewed by the Board of Education as part of its process of adopting objectives for any grade or course.

Use of Objectives

Once objectives for any grade or course have been adopted by the Board of Education, the approved objectives shall be used by all people who are responsible for developing and implementing curriculum (i.e., program coordinators and administrators, ad hoc curriculum committees, staff developers, principals, and teachers) for the following purposes, among others:

- Selecting textbooks and other instructional materials for the grade or course
- Acquainting newly employed district teachers with the objectives of the grade(s) or courses they will be teaching
• Training current district teachers, if necessary, in any revised subject matter content and/or in instructional methods for teaching that content
• Informing parents as to what their children are expected to learn in each grade or course
• Selecting and/or creating assessments to see whether students have mastered the objectives for a grade or course

**Assessment**

A comprehensive and systematic process for evaluating curricular programs is essential. The outcomes of program evaluation provide direction for staff development and for curriculum revision and improvement. The Superintendent shall be responsible for assuring that program effectiveness is assessed through a variety of measures. The assessment for each curriculum area shall include the following:

- Method of assessing implementation of new curriculum
- Measures to be used for evaluation of student progress during implementation and maintenance phases
- Measures to be used for evaluation of a program.

Program effectiveness shall be measured through a variety of data sources. While student achievement data is a primary source, other sources may also be appropriate (e.g., teacher, parent, and student perceptions: follow-up data on student performance, etc.).
Appendix B

Interview Consent Form

Consent Form for Participation in a Research Project

University of Connecticut

Course Instructor: Professor Barry G. Sheckley, PhD.
Student Researcher:
Study Title: EDLR 337 Professional Learning Interview

1. Invitation to Participate
   Good afternoon/evening. My name is ____________. Before we begin, I would like to
   thank you for taking the time to talk with me today.
   I am working on a research project for a course offered in the Adult Learning Program at
   the University of Connecticut.

2. Purpose
   We are interested in knowing more about adults’ professional learning experiences.

3. Description of Procedures
   During the next hour or so, I will ask you some questions about professional learning
   with an emphasis on your proficiency and how you developed it. I’d also like your
   consent to tape-record your response so that I may review your words at a later time.

4. Risks and Inconveniences
   We believe this interview does not involve any risk to you. This should take
   approximately 45 minutes of your time.

5. Benefits
   Although you may find it interesting to participate in this study, there will be no direct
   benefit to you from your participation.

6. Confidentiality
   All of your responses will be anonymous. Only I will know your name. Your answers
   will be combined with those from other people we interview to get an overall picture of
   about how adults develop proficiency.

   You should also know that the UConn Institutional Review Board (IRB) and the Office of
   Research Compliance may inspect study records as part of its auditing program, but these
   reviews will only focus on the researchers and not on your responses or involvement. The
   IRB is a group of people who review research studies to protect the rights and welfare of
   research participants.

10. Voluntary Participation
    You do not have to be in this study if you do not want to. If you agree to be in the study, but
    later change your mind, you may drop out at any time. There are no penalties or
    consequences of any kind if you decide that you do not want to participate.
Appendix C
Interview Protocol

Course Instructor: Professor Barry G. Sheckley, PhD.
Student Researcher: Chris Winters
Study Title: EDLR 337 Professional Learning Interview

OK? Ready to begin?
Now that the tape-recorder is on, please state your name, the date, and that you consent to have your response tape-recorded.

Part 2: Background Information.
To begin, would you tell me about your prior work experience? _____________________

[NOTE: During the discussion probe to get an estimate of number of years of experience. If necessary, ask “Do you have fewer than 3 years of experience? 3-5? 5-10? 10-15? 15-20? More than 20?”]

In this interview, I’m particularly interested in discussing your work and experience [related to resolving this problem of practice]. Would you tell me in general about your prior experiences [related to resolving this problem of practice]. 6 [NOTE: As above, probe for information on the nature and extent of the interviewee’s experience related to resolving this problem of practice]

Part 3: Individual Components of Professional Learning

OK. Tell me about your specific proficiency in addressing or [resolving this problem of practice] …. 1.

1. …by “proficiency,” I mean an area in which you both have knowledge about [resolving this problem of practice] and can apply it skillfully to solve problems related to [resolving this problem of practice]. Can you identify an area or topic in which you have proficiency as it relates to resolving [this problem of practice]______________________________

[NOTE: The person may have trouble identifying – or admitting to having – an area of proficiency related to resolving the problem of practice. If necessary, expand the discussion with examples such as: “Often times it’s an area in which people consult you or ask your

6 As appropriate, you can omit this phrase “…as it relates to resolving the problem of practice.” Occasionally insert the phrase just to keep your interviewee focused on the problem of practice.
advice because they view you as having well developed skills in addressing or resolving this problem of practice.” In any event keep probing to help an understanding of the person’s proficiency as it relates to addressing the problem of practice. At a minimum you need a statement that completes the phrase “This is what I can do well related to resolving [this problem of practice….]”

2. In general, what prompted you to develop this proficiency [related to resolving this problem of practice]? …..[pause and wait for response—then keep probing].

If the person does not mention this issue, ask: Any way that an external reward (e.g., Recognition? Notoriety? Money?) was involved in the development of your proficiency [as it relates to resolving this problem of practice]? 

On a scale where 1=not at all important to 10=very important, how important was this sense of external reward?

1=not important 10=very important

Briefly explain why you gave this rating. 

If the person does not mention this issue, ask: “Any way that a sense of “internal satisfaction” was involved in the development of your proficiency as it relates [to resolving this problem of practice]? 

3. On a scale where 1=not at all important to 10=very important, how important was this sense of internal satisfaction in the development of your proficiency related [to resolving this problem of practice]?

1=not important 10=very important

Briefly explain why you gave this rating. 

4. Let’s talk about a few other factors that may have been involved in the development of your proficiency [related to resolving this problem of practice].

Any way that feeling “competent” as a professional was involved in the development of your proficiency [as it relates to resolving this problem of practice.] 

On a scale where 1=not at all important to 10=very important, how important was this sense of competence?

1=not important 10=very important

Briefly explain why you gave this rating. 

How about a desire to be autonomous in your work? Any way that a desire to feel 

7 The 1st and 3rd questions in this sequence may appear redundant. They are not. If you find that your interviewee rates any factor on the high end of the scale, in your analysis you’ll want to explain “why” they gave this rating. The answer to this third question will help you.
“autonomous” as a professional may have been involved in the development of your proficiency [as it relates to resolving this problem of practice]? 

On a scale where 1=not at all important to 10=very important, how important was this sense of autonomy?

1=not important _____________________________ 10=very important

Briefly explain why you gave this rating. ______________________________________

5. Finally, how about “relatedness?” Any way that a desire to feel “related” – a part of a team, connected with others – may have been involved in the development of your proficiency [as it relates to resolving this problem of practice]?

On a scale where 1=not at all important to 10=very important, how important was this sense of relatedness?

1=not important _____________________________ 10=very important

Briefly explain why you gave this rating. ______________________________________

6. Now, let’s talk about how you use your proficiency. Would you give me an example or an instance in which you used your proficiency - when you used information skillfully – to address [this problem of practice]?

Continuing with this example, would you discuss briefly how you planned, monitored, and evaluated your actions while addressing this situation [Note: Clarify the 3 steps—planning step where you figured out what you were going to do, monitoring step where you literally “watched yourself” and kept track of whether things were going according to plan, evaluating step where you were taking stock, assessing whether this was the best course of action. Use the ideas in the Ertner and Newby article to explain this process]

…planning______________________________________________

…monitoring______________________________________________

…evaluating______________________________________________

7. Researchers tell us that professionals will use a “mental model” – or “storyline” – about a situation when addressing a problem of practice. For many professionals these mental models represent a composite of their prior experiences with this situation. [Note: Help to clarify that when you say “mental models” you’re referring to complex frameworks individuals develop of “how the world works.” Use the ideas in the Seel article to explain the idea of mental models]. Did you have any sense of using an overarching mental model of this problem of practice in this situation?

If so, would you describe briefly how you used your mental model to guide your professional work in this example [where you addressed this problem of
8. OK if we talk about how you developed this mental model? Think back to a time, say 10 years ago, when you had not yet developed your current mental model of practice relative to [resolving this problem of practice]. What are 5 or 6 ways you would differentiate between then (when you had little or no proficiency/experience) and now (when you have more proficiency/ experience) [related to resolving this problem of practice]?

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[Note: At the end of this section you should have enough information to discuss the individual component of the Professional Learning Model. Specifically, you should have information about innate psychological needs, self-regulation, and mental models. You should also have information on how these factors work to influence professional learning as it relates to proficiency in resolving a problem of practice. If you do not have this information, revisit the questions. Ask probing questions—tell me more, would you expand on that—to generate the information you need]

Part 4: Key Experiences

9. In your own words, how did you develop your current level of professional proficiency [relative to resolving this problem of practice]. ______________________________

10. Briefly, what were 4 or 5 key activities, events, or occurrences that enhanced the development of your proficiency [in resolving this problem of practice]? For each activity, would you also describe how it helped you to develop your proficiency [related to resolving this problem of practice]?

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Of these activities, which one was the most influential? Please explain why.

I’m also interested in your experiences with formal “professional development” programs (e.g., workshops, conferences, academic classes) related to [resolving this problem of practice]. In general, what were your experiences with such formal professional learning programs?

….. How frequently did you participate in such programs? Monthly? Quarterly? Yearly? Once every few years?

….. what were their strengths [in helping you gain proficiency in resolving this problem of practice]?

….. limitations [in helping you gain proficiency in resolving this problem of practice]?

….. On a scale where 1 = not at all important to 10 = very important, how important were formal professional learning programs [in helping you gain proficiency in resolving this problem of practice]?

Briefly explain why you gave this rating.

11. Here’s a “heads up.” As the last question in this interview, I'm going to ask you to draw a map of your professional learning process – a map that may include how the answers to these last few questions fit together.

[Note: At the end of this section you should have enough information to discuss the Key Experiences component of the Professional Learning Model. Specifically, you should have information about key experiences (also known as the multifaceted, experience-based process) that provides the foundation for professionals’ learning. If you do not have this information, revisit the questions. Ask probing questions—tell me more, would you expand on that—to generate the information you will need]

Part 5: Environment

12. Let’s talk briefly about the environment in which you work. By “environment” I don’t mean the desk and chairs in your workspace. Instead, I mean the broad milieu – the social and physical setting – in which you work. Can you give me a specific example of how your work environment helped you to develop your proficiency [in addressing this problem of practice]?

Let’s talk more about the general work environment that encased this example. Did your work environment have a climate (or culture) that actively supported and encouraged you to develop your professional skills related [to resolving this problem of practice]? If so, briefly describe examples of the supports you received.
If not, briefly describe examples of how the environment discouraged or impeded the development of your proficiency [related to resolving this problem of practice].

.....what about challenges? What examples do you have of your work environment challenging you to develop, refine, or improve your proficiency [in resolving this problem of practice]? ___________________________________________________

.....On a scale where 1=not at all important to 10=very important, overall, how important was your work environment in helping you to develop your proficiency [related to resolving this problem of practice]?  
1=not important ________________________________ 10=very important

Briefly explain why you gave this rating. ________________________________

13. What about feedback you received in your work environment? Did feedback from people within your environment - students, colleagues, supervisors – help you to develop your proficiency [related to resolving this problem of practice]?  
_________________________________________________

Explain more how this feedback helped to develop your proficiency [related to resolving this problem of practice]_________________________________________________

.....On a scale where 1=not at all important to 10=very important, overall, how important was the feedback you received within your work environment in helping you to develop your proficiency [related to resolving this problem of practice]?  
1=not important ________________________________ 10=very important

Briefly explain why you gave this rating. ________________________________

14. Can you describe any examples within your work environment when you had opportunities to engage in “inquiry,” – in a process where you and others questioned current practices and explored ways to improve? ______________________________________________

.....On a scale where 1=not at all important to 10=very important, overall, how important was participation in inquiry activities within your work environment in helping you to develop your proficiency [related to resolving this problem of practice]?  
1=not important ________________________________ 10=very important

Briefly explain why you gave this rating. ________________________________

15. One more question. Can you give me an example of an occasion where you worked collaboratively with your colleagues on resolving a problem of practice?___________
….On a scale where 1=not at all important to 10=very important, overall, how important was working together with colleagues within your work environment in helping you to develop your proficiency [related to resolving this problem of practice]?

1=not important _______________________________ 10=very important

Briefly explain why you gave this rating. ____________________________

16. …anything more about your work environment? ____________________________

[Note: At the end of this section you should have enough information to discuss the environment component of the Professional Learning Model. Specifically, you should have information about how a work environment enhances professional learning. If you do not have this information, revisit the questions. Ask probing questions to generate the information you will need]

Part 6: Map

17. Over the last hour or so we’ve talked about many issues related to how you developed your proficiency [related to resolving this problem of practice]. Let’s try to pull all the ideas together. Using this blank piece of paper, would you briefly outline the process that was involved as you developed your proficiency [related to resolving this problem of practice]. How do the items you talked about in this interview fit together?

Part 6: Conclusion

18. Any more ideas you’d like to add about your proficiency [related to resolving this problem of practice] or how you developed it? Any more thoughts on professional development [related to resolving this problem of practice]?

Any closing thoughts on your professional learning experiences in general? __________

Again, I want to explain that this interview is anonymous. If you have any misgivings about your interview during the next day or so, give me a call. If you want to know about the results of the project, I will gladly talk with you again at the end of August when I have finished analyzing the data.

Thank you again for your time. Your responses have been very helpful.
Appendix D

Interview Consent Form – Leadership

*Information Sheet for Interview*

University of Connecticut

**Principal Investigator:** EDLR 6092/Richard Lemons

**Student:** Chris Winters

**Course Name and Number:** EDLR 6092

**Title of Study:** Leadership and Instructional Practice

You are invited to participate in this interview regarding instructional leadership. I am a graduate student at the University of Connecticut, and I am conducting interviews as part of my course work. I am interested in understanding the forms of leadership that have the strongest influence on instructional practice.

Your participation in this study will require participation in a brief interview. This should take approximately 60-90 minutes of your time. Your participation will be anonymous, and you will not be contacted again in the future. You will not be paid for being in this study. We believe this interview does not involve any risk to you. Although you may find it interesting to participate in this study, there will be no direct benefit to you from your participation.

You do not have to be in this study if you do not want to be. I will be happy to answer any questions you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact me, (the student) at or my advisor, Richard Lemons at (860) 486-4284. If you have any questions about your rights as a research participant you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8802. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.
Thank you.
Appendix E

EDLR 6092 Inquiry Project: Leadership and Instructional Practice

Interview Protocol for administrators

Interviewees have signed the informed consent form:

OK? Ready to begin?

Now that the tape-recorder is on, please state your name, the date, and that you consent to have your response tape-recorded.

A. Context
Introduction: In this research, I’m interested in the process by which curriculum change takes place and the impact of curriculum change on instruction. Please know that there are no right or wrong answers to my questions. I’m interested in comparisons of how people in different roles in the organization perceive issues about curriculum and instruction.

A.1. What is like to be an administrator in this district/school?

B. School Focus/ Curriculum Improvement Efforts
B.1. How do you define curriculum? What is included in “curriculum” and what is not included?

Probes: would you consider the following to be part of “curriculum”:

- Pacing guides
- Prescribed or suggested instructional strategies
- Units of instruction
- Unit assessments

B.2. How would you characterize the curriculum in your district?

- Balance of content and skills, concepts and factual evidence?
- Does it provide guidance for teaching?
- Does it emphasize meaningful, relevant understanding?

B.4. In this district, how are decisions about the curriculum made?

B.5. In this school, how are decisions about the curriculum made?

B.6. On a scale from 1-10 with 1 being a little and 10 being a lot, how much influence do you have over the curriculum? Explain.
B.7. On a scale from 1-10 with 1 being a little and 10 being a lot, how much influence WOULD YOU LIKE to have over the curriculum (over what you teach)? Explain.

B.8. On a scale from 1-10, how much does the curriculum influence what happens in the teachers’ classrooms? Explain.

Probes (1-10): Regarding what gets taught
   Regarding the assessments given
   Regarding the materials used
   Regarding the instructional practices employed

B.9. What particular responsibilities have you assumed in relationship to these issues/goals?

B.10. Are there particular school/district activities you think it would be important for me to attend to have a fuller understanding of the school’s work in this area (these areas)?

E. Social Distribution (for admin only)
   E1. What is your overall goal in relationship to changing or refining the curriculum?
   E3. Are there individuals and/or organizations inside or outside of the school that are helping you with this task? If so, who are they?
   E4. If so, how are they assisting? What is it they do?
   E5. Where and when does the work on this issue occur?

F. Situational Context (for teachers, probe how they adapt, implement, buy into curriculum change, for admin, focus on district-level thinking regarding changing curriculum)
   F1. Are there particular things about the way this district/school is organized that help in this work? If so, what? In what ways?
   F2. Are there particular things about the way this district/school is organized that inhibit progress in this work? If so, what? In what ways?
   F3. Are there any other factors you haven’t yet mentioned that influence the way you go about this work?

G. Perceived Effectiveness
   G1. How effective have you been in these areas? Explain? Why or why not?
   G2. How do you know how effective you have been? What are your measures?
   G3. What is the biggest challenge you are facing in doing this work?

H. Teaching Practice
   H1. Are there curriculum reforms underway at your school that target [their subject matter or grade level]?
      Describe
      Who introduced those?
Who else is involved? In what ways?
Is this affecting the way you teach?

H.2. In this school, to whom do teachers turn to for assistance in issues of teaching and learning?
   If so, who are these people?
   Why do you think people turn to them?

I. Group Interaction/Contexts for Improvement Efforts
   I.1. Are there meetings in your school that focus on developing, interpreting or implementing curriculum?
   I.2. Do you have opportunities to attend/get involved in some of the meetings at this school?
      If yes, tell me about some of these meetings you have attended?
      Probe: Composition of group
      Purpose/goal of this group
   I.3. Do these meetings influence how you teach?
      If so? Which meetings? How?
   I.4. On a scale from 1-10, if 1 meant complete autonomy over curriculum and 10 meant no autonomy over curriculum, How much autonomy over the curriculum would you like to have? Explain.
   I.5. On a scale from 1-10, if 1 meant complete central office control over the curriculum and 10 meant no central office control over the curriculum, how much control do you think central office should have over the curriculum?

J. Wrap-up
   J1. This is a project on the role of curriculum change in influencing instructional improvement. If there were one lesson, one message, that we should take back from this study—what would it be?
EDLR 6092 Inquiry Project: Leadership and Instructional Practice

Interview Protocol for teachers

AFTER Interviewees have signed the informed consent form:

OK? Ready to begin?

Now that the tape-recorder is on, please state your name, the date, and that you consent to have your response tape-recorded.

A. Context

Introduction: In this research, I’m interested in the process by which curriculum change takes place and the impact of curriculum change on instruction. Please know that there are no right or wrong answers to my questions. I’m interested in comparisons of how people in different roles in the organization perceive issues about curriculum and instruction.

A.1. What is like to be a teacher in this district/school?

B. School Focus/ Curriculum Improvement Efforts

B.1. How do you define curriculum? What is included in “curriculum” and what is not included?

Probes: would you consider the following to be part of “curriculum”:

- Pacing guides
- Prescribed or suggested instructional strategies
- Units of instruction
- Unit assessments

B.2. How would you characterize the curriculum in your district?

- Balance of content and skills, concepts and factual evidence?
- Does it provide guidance for teaching?
- Does it emphasize meaningful, relevant understanding?

B.3. Have there been any changes in the curriculum that you teach this year or in recent years?

B.4. In this district, how are decisions about the curriculum made?

B.5. In this school, how are decisions about the curriculum made?

B.6. On a scale from 1-10 with 1 being a little and 10 being a lot, how much influence do you have over the curriculum? Explain.
B.7. On a scale from 1-10 with 1 being a little and 10 being a lot, how much influence WOULD YOU LIKE to have over the curriculum (over what you teach)? Explain.

B.8. On a scale from 1-10, how much does the curriculum influence what happens in your classroom? Explain.

Probes (1-10): Regarding what you teach
   - Regarding the assessments you give
   - Regarding the materials you use
   - Regarding the instructional practices you employ

B.9. What particular responsibilities have you assumed in relationship to these issues/goals?

B.10. Are there particular school activities you think it would be important for me to attend to have a fuller understanding of the school’s work in this area (these areas)?

E. Social Distribution (for admin only)
   E1. What is your overall goal in relationship to changing or refining the curriculum?
   E3. Are there individuals and/or organizations inside or outside of the school that are helping you with this task? If so, who are they?
   E4. If so, how are they assisting? What is it they do?
   E5. Where and when does the work on this issue occur?

F. Situational Context (for teachers, probe how they adapt, implement, buy into curriculum change, for admin, focus on district-level thinking regarding changing curriculum)
   F1. Are there particular things about the way this district/school is organized that help in this work? If so, what? In what ways?
   F2. Are there particular things about the way this district/school is organized that inhibit progress in this work? If so, what? In what ways?
   F3. Are there any other factors you haven’t yet mentioned that influence the way you go about this work?

G. Perceived Effectiveness
   G1. How effective have you been in these areas? Explain? Why or why not?
   G2. How do you know how effective you have been? What are your measures?
   G3. What is the biggest challenge you are facing in doing this work?

H. Teaching Practice
   H1. Are there curriculum reforms underway at your school that target [their subject matter or grade level]?

       Describe

       Who introduced those?
Who else is involved? In what ways?
Is this affecting the way you teach?

H.2. In this school, to whom do teachers turn to for assistance in issues of teaching and learning?
If so, who are these people?
Why do you think people turn to them?

I. Group Interaction/Contexts for Improvement Efforts

I.1. Are there meetings in your school that focus on developing, interpreting or implementing curriculum?

I.2. Do you have opportunities to attend/get involved in some of the meetings at this school?
   If yes, tell me about some of these meetings you have attended?
   Probe: Composition of group
   Purpose/goal of this group

I.3. Do these meetings influence how you teach?
   If so? Which meetings? How?

I.4. On a scale from 1-10, if 1 meant complete autonomy over curriculum and 10 meant no autonomy over curriculum, How much autonomy over the curriculum would you like to have? Explain.

I.5. On a scale from 1-10, if 1 meant complete central office control over the curriculum and 10 meant no central office control over the curriculum, how much control do you think central office should have over the curriculum?

J. Wrap-up

J1. This is a project on the role of curriculum change in influencing instructional improvement. If there were one lesson, one message, that we should take back from this study—what would it be?