Meeting the Needs of Students with Disabilities: Characteristics of Universal Design of Instruction in Odds-Beating Middle Schools

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Abstract

In this multiple case study we examined six middle schools with above predicted student achievement outcomes on Common Core State Standards (CCSS) assessments in mathematics and English language arts. We drew upon the Universal Design for Instruction (UDI) framework to characterize the nature of teachers' practices with particular attention to how they approach instruction for students with disabilities (SWD). Through analysis of focus group interviews and observational field notes we 1) identified shared characteristics of UDI practices across all schools and 2) noted two schools with exemplary attention to three UDI principles: community of learners; flexibility in use; and tolerance for error. The exemplars provide evidence of how educators have shifted from a dichotomous understanding of abled/disabled to all-enabled through the use of UDI practices. This research offers implications for policy and practice by providing empirically-grounded findings regarding the nature of teachers' instruction for SWD in odds-beating schools.

Keywords. Universal Design for Instruction, Common Core State Standards, instructional practices, diversity

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Over the past several decades public schools in the United States have experienced a significant increase in the numbers of students with disabilities (SWD) they serve. For example, nation-wide statistics show that in the late 1970's approximately 8% of the total student population was identified as SWD, and that number has grown to over 12% in recent years (United States Department of Education, 2015). However, throughout this period, the persistence of physical, institutional, and attitudinal barriers for SWDs has inhibited their full inclusion and participation in school activities and, more broadly, in society (Pivik, McComas & Laflamme, 2002; Anaby, Hand, Bradley, DiRezze, Forhan, DiGiacomo, & Law, 2013).

Another trend identified in the research is one that suggests the over-representation of ethnically- and linguistically-diverse students (e.g. African-American, Hispanic/Latino, English language

learners) as SWDs (Artiles, Trent, & Palmer, 2004; Fletcher & Navarrete, 2011; Artiles, 2011; Harry & Fenton, 2016). Although contradictory findings have also been reported among some scholars (Morgan, Farkas, Hillemeir, Mattison, Maczuga & Li, 2015), the social stratification that promotes the identification of ethnically- and linguistically-diverse students as SWD has been a persistent concern. This over-representation has been attributed in part to norms of schools being aligned with the majority white and native-English speaking population and this systematic prejudice (not disability) correlated with suboptimal learning opportunities and academic achievement (Morgan et al., 2015; Wilson, 2017).

Such trends are set within a U.S. public school context characterized by waves of reforms intended to ensure all students equitable access to a rigorous curriculum (Partnership for 21st Century Skills, 2008). For example, the Common Core State Standards (CCSS) (i.e. a set of disciplinary college and career-readiness standards with cross-cutting themes[1]), data-driven instruction (DDI) (i.e. a system to use assessment data to inform instruction), and Annual Professional Performance Reviews (APPR) (i.e. formal evaluations of teachers' performance taking student achievement into account) were three key components of President Obama's Race-to-the-Top (RttT) policy reforms intended to ensure students, including SWD, are prepared for college or career. These reforms implemented in the early 2010's in states across the U.S., while expected to impact the instructional core of schools (what teachers teach and how students learn), nonetheless, left little guidance on how educators were to adapt their processes and practices to meet SWD needs (Wilcox, Lawson, & Angelis, 2017).

Thus, an important question was raised: How do educators in consistently better-performing schools meet the needs of a growing population of SWD in the face of policy changes intended to better prepare all students for college or career?

This study, as part of a larger mixed-method multiple case study, sought to identify the characteristics of processes and practices in middle schools with above-predicted student outcomes on state wide assessments, taking into account such demographic features as percentages of economically disadvantaged (a poverty indicator) and ethnically and linguistically diverse students served, which are all factors highly correlated with achievement outcomes (Goldsmith, 2011; Kena, Aud, Johnson, Wang, Zhang, Rathbun, & Kristapovich, 2014). The larger study was framed by social ecological theory (Bronfrenbrenner, 1993) that posits a relationship between individual performance and the proximal (e.g. classroom) and more distal (e.g. school and home) nested systems within which that individual exists.

Data collected in these schools, referred to as "odds-beating" schools because of their significantly better student outcomes on state wide assessments taking into account demographic factors, were analyzed using the Universal Design for Instruction (UDI) framework: This framework, as discussed in more detail below, includes nine elements intended to be used for planning and preparing classroom instruction accessible to all students. In alignment with this

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[1] The CCSS include reading, writing, speaking, and listening standards in and across each discipline.. See explanation of cross-cutting themes at http://www.corestandards.org/ELA-Literacy/introduction/key-design-consideration/ . In New York State, the site of this study, CCSS were referred to as Common Core Learning Standards (CCLS) that included some differences from other states' CCSS.

framework, this study seeks to contribute insight into the elements of UDI in schools with odds-beating student outcomes with potential implications for policy, future research, and practice.

Inclusion in the U.S. Public School Context

Over 40 years ago, the Individuals with Disabilities Education Act (IDEA) mandated that SWD in U.S. elementary and secondary schools be educated alongside their peers in inclusive environments. A synthesis of research concludes that the most common environmental barriers to student participation and inclusion were attitudes, physical environment, transportation, policies and lack of staff support (Anaby et al., 2013). In discussing the inclusion of students, Graham and Slee (2007) raise the lingering question of what exactly students should be included in and what they should be excluded from and why. This sticky question extends beyond SWD to other groups of students (e.g. socioeconomically, ethnically, and linguistically diverse) and has been approached in the U.S. as a major social justice issue (Messiou et al, 2016). Nonetheless, many teachers still are not adequately prepared to work with diverse populations, including SWD, in inclusive environments (Allday, Neilsen-Gatti, & Hudson, 2013). Wilson (2017) characterizes the regular education classroom as "constructed for a mythical, 'able-bodied' neurotypical norm that neither reflects nor accommodates the wide range of diverse learners within it" (Unpacking Inclusive Education, para. 8). As a result, SWD are frequently not offered access to the general curriculum in a way that is meaningful and appropriate to their needs. For example, SWD are often placed in learning environments that promote drill and practice and suppress meaningful learning experiences, which in turn have the potential to stifle intellectual and social and emotional growth (Gallagher, 2004).

Some scholars have noted that the ability for SWD to receive instruction from content area specialists in mainstream classroom settings increases their successes with academic and social tasks (Katz & Mirenda, 2002; Hunt & Goetz, 1997; Feldman, Carter & Asmus, 2016). In alignment with this research, IDEA mandates that SWD have access to and progress in the general education curriculum (United States Department of Education, 2015). However, both "access to the general education curriculum" and "progress" are loosely defined terms open to a number of interpretations (Hollingshead, Carnahan, Lowrey & Snyder, 2017). Agran, Alper and Wehmeyer (2002) surveyed teachers who expressed little clarity about the policies and procedures for ensuring "access". Teachers reported not having clear direction on how to involve students in general education curriculum and activities (Agran, Alper & Wehmeyer, 2002). Additionally, the appropriateness of skills targeted in the general education classrooms were a source of contention between special and general education teachers (Agran, Alper & Wehmeyer, 2002). The term access also takes into account where instruction is taking place. Access to the general education classroom and curriculum by SWD alone does not provide the same educational experience as it does for students without disabilities (Dymond, Renzaglia, Gilson & Slagor, 2007). Additionally, special education teachers may provide access to the general education curriculum, but in self-contained programs where the special education teacher is the primary instructor, they may not have the formal training and content knowledge of their general education peers creating confusion especially for students with significant cognitive delays (Petersen, 2016). Clarity is needed about the definition of access and how to ensure this access for SWD (Petersen, 2016). This raises the question of whether attending the same schools

as non-disabled students and physically attending general education classes in those schools is truly "access" (Ryndack, Jackson & Billingsley, 2000).

The term "progress" is also not clearly defined and translated into procedures and practices. While, the general education curriculum is ostensibly based on CCSS that delineate the content that is to be learned, for SWD opportunities are needed to develop social and vocational skills as well. These divergences in the conceptualizations of what a general education curriculum should set as aims are problematic. As some scholars have pointed out (Turnbull, Turnbull, Wehmeyer & Park, 2003), teaching a curriculum that is strictly academic or one that offers a combination of academic and life skills that include social involvement, achievement of personal attention and a sense of well-being, have important implications for how the "progress" of and for SWD is monitored.

Conceptual Framework: Universal Design for Instruction

One way of conceptualizing the ways curriculum and instruction can be informed by students' differences is Universal Design for Instruction (UDI). The UDI framework is increasingly being promoted via federal legislation in the United States (Ferri & Ashby, 2017). UDI branched off of the work of Mace (1998), who used the term Universal Design (UD) to characterize how community environments could be designed to meet the variety of physical needs of its citizens (McGuire, Scott & Shaw, 2006; Edyburn, 2005) and the Universal Design for Learning (UDL) principles (Edyburn, 2005), which sought to apply UD to educational contexts. UDL principles, listed as 1-7 (see Table 1), include: equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort and size and space for approach and use. UDI consists of these same principles, and include two more listed as 8 and 9 (see Table 1): instructional climate and community of learners. These nine principles have been identified in research to help reduce barriers and increase access to learning environments and broaden the scope of teaching practices and assessments to representations, expressions, and engagement with the content, for both student and teacher (Scott, McGuire & Shaw, 2006; Edyburn, 2005).

Table 1
Universal Design for Instruction Principles

UDI Element	Definition
1. Equitable Use	Instruction designed to be useful and successful for diverse students
2. Flexibility in Use	Provide choice and method for use
3. Simple and intuitive Use	Straightforward instruction
4. Perceptible Information	Information communicated effectively despite ambient conditions
5. Tolerance for Error	Instruction anticipates variation in learning pace and prerequisite skills
6. Low Physical Effort	Instruction designed to illuminate nonessential physical effort
7. Size and Space for Approach and Use	Instruction is designed regardless of students' physical needs
8. Instructional Climate	Inclusive and high expectations for all students
9. Community of Learners	Instruction and communication between teachers, students facilitated and promoted

Few studies have empirically examined the use and effectiveness of UDI. One study by Scott, McGuire and Shaw (2006) is based on a qualitative analysis examining the effectiveness of UDI from the perspective of postsecondary students. The attention of the focus groups was on the qualities of good teaching and methods that promote learning (Roberts, Park, Brown & Cook, 2011). The report of student's perceptions of good teaching aligned with UDI elements, particularly instructional climate, community of learners, equitable use and flexibility in use (Embry, Parker, McGuire & Scott, 2005; McGuire and Scott 2006).

UDI has been used as a planning tool in the form of professional development to increase teachers' awareness about obstacles to students' learning (Roberts, Park, Brown & Cook, 2011). Spooner, Baker, Harris, Ahlgrim-Delzell and Browder (2007) analyzed teachers' lesson plans before and after a one-hour training session on UDI and found that lessons plans were more accessible post training. Researchers who have analyzed the use of UDI as a tool for pre-service teachers and in-service teachers found that the use of UDI holds the potential to expand teachers' knowledge of students' abilities, to assist in teachers' incorporation of that knowledge into lesson design, and to increase the inclusiveness and success of all students (McGuire-Schwartz & Arndt, 2007; Roberts, Park, Brown & Cook, 2011; Spooner, Baker, Harris, Ahlgrim-Delzell & Browder, 2007; Zhang, 2005)**.** Additionally, researchers have noted a recent surge in the use of UDI/UDL as a framework to create and evaluate online courses in meeting the diverse needs of the student population in online learning communities (Robinson & Wizer, 2016; van Rooij & Zirkle, 2016; Proceedings from Dalton & Berquist, 2016).

The possibilities of UDI to inform policy, future research, and practice with regard to SWD is a relatively under-investigated area of research in middle schools. Thus, with the following

research questions, we introduce the methods employed to make just such a contribution: (1) What UDI elements do teachers in odds-beating middle schools express are of import as they plan and implement instruction in the context of college and career ready standards (i.e., CCSS)? (2) What UDI elements are evidenced in these odds-beating middle school classrooms?

Method

The larger mixed-method multiple case study, from which this embedded study emerged, was conducted by the NYKids project[2] at the University at Albany's School of Education. It was intended to investigate the impacts of RttT reform implementation (i.e. CCSS, DDI, and APPR) in a variety of schools with different student performance outcomes. For the larger study, a statistical method called regression analysis (Levine, Stephan, & Szabat, 2013) that facilitates the identification of a sample of schools based upon a set of achievement and demographic criteria was used. The results of regression analyses are displayed in Table 2. The Z scores illustrate that the odds-beating schools' students scored significantly better (>1 standard deviation above the mean) on ELA and mathematics CCSS assessments in comparison to students in other public schools taking into account such student demographic factors as poverty and diversity (both highly correlated to student outcomes) (Goldsmith, 2011). Notably, these schools fell into the typical range for the percentages of SWDs served (between 10 and 15% of the overall population in comparison to the NY average of 13%).

Table 2
Characteristics of Participating Middle Schools

Odds Beating Schools	% of Students with IEP's in district	% Economically Disadvantaged Students	% White Students	Total Enrollment	Per-pupil Spending	Average Z Residual Range
Hutch Hill[3]	10-15%[4]	17-40%	>90%	>770	<$18K	< 1.00
Julesberg	10-15%	17-40%	<75%	>770	$18-22K	1.00-1.50
Laribee	10-15%	<17%	75-90%	770-450	<$18K	2.00<
Roaring Gap	10-15%	17-40%	<75%	770-450	$18-22K	1.50-1.99
Ruby	10-15%	>40%	>90%	<450	<$18K	2.00<
Sage City	10-15%	>40%	<75%	770-450	>$22K	<1.00
Average for NYS	13%	30%	79%	650	$20K	

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[2] Details about this publically-funded project as well as other research results can be found at:

https://www.albany.edu/nykids/

[3] *All school names are pseudonyms to protect the identities of participants*

[4] *All numbers are provided in ranges to ensure anonymity*

In deciding the sample of schools, the research team also took into account performances on the state's high stakes exams prior to the implementation of the CCSS. Thus, all of the odds-beating schools selected also satisfied the criteria of having met Annual Yearly Progress (AYP) achievement targets (a New York State measure of performance) for all populations of students including SWDs over a three year period leading up to the implementation of the CCSS.

With concern for contextual variance among schools, this sample was purposefully balanced with schools in urban, suburban, and rural settings as well as those with larger and smaller populations of diverse students. Detailed descriptions of each of these schools are available publically on the NYKids website (see https://www.albany.edu/nykids/64499.php.) and in Wilcox, Lawson, and Angelis (2017).

Data Collection
In site visits to the six odds-beating middle schools we collected documentary evidence (e.g. lesson plans), conducted semi-structured focus groups with district and school leaders and teachers, and conducted classroom observations. In this embedded study, we focused specifically on teacher focus group data and the observations since we were interested in how teachers described their practices, the reasons for engaging in those practices, and how those practices were enacted in classrooms.

In the focus groups, participants were offered opportunities to describe their practices and also express challenges they face in meeting SWD needs. The semi-structured focus group protocol included such questions as: *To what extent do you feel you have enough and appropriate resources to achieve success for your students?; What would you consider to be high-quality classroom instruction? How are these instructional strategies aligned with CCSS?; How do you plan for instruction?; How do you monitor students' performance; What kinds of opportunities do you have for collaboration in this school?; How is this collaboration supported and sustained?*

The observation protocol (see Appendix A) was designed to yield thick descriptions of instructional practices, particularly as they related to CCSS. To do this, the protocol included open-ended field notes, a debriefing section wherein teachers were prompted to share reflections after their lesson had been observed, as well as sections to record classroom interactions and summaries of such things as types of activities, assessments, and materials used (Adler & Adler, 1988).

Data Analysis
Data analysis for this study occurred in phases.

Phase 1
Analyses for the larger study began onsite as each team member contributed to interpretive memos during and immediately after data collection. Next, all data were loaded into the qualitative software program NVivo (QSR International) at which time analysts, who were trained in the use of the a priori codes informed by the literature, coded the data. For example, one set of a priori codes centered on instructional practices; others included student social-

emotional health, organizational adaptations to student population, and student engagement strategies.

After all data from the larger study were coded and the summary reports and case studies crafted, the case studies were shared with superintendents and principals, who were asked to check the reports for accuracy and the credibility of the interpretations. Upon the review of feedback that in most cases included only minor adjustments to such things as acronyms, the case study and cross-case reports were finalized.

Phase 2
In the current study, focus group transcripts, encompasing the voices of a total of 153 participants, were again analyzed to respond to research question one and classroom observation field notes were analyzed to respond to research question two. In alignment with our objective to identify UDI practices in these odds-beating schools, after initial review of the observation data, we focused a second cycle of coding on eight classroom observations in two of the odds-beating middle schools (Hutch Hill and Ruby) that were exemplary in their evidence of attention to three UDI principles: community of learners; flexibility in use; and tolerance for error (Meyer & Rose, 2000; McGuire, Scott & Shaw, 2006; Karger, 2005; Wehmeyer, Lance & Bashinski, 2002) (see Appendix B for codebook). Finally, the UDI-coded observation data, case study, and cross-case reports were reviewed to identify patterns across cases (Miles, Huberman, & Saldaña, 2014).

In sum, interpretive memoing (i.e. recording interpretations throughout data collection and analysis), member checking (i.e. confirming accuracy of evidence and interpretations with participants), and source triangulation (examining multiple data sources intra- and cross-case) methods (see Maxwell, 1996; Patton, 2001) recommended for multiple case studies were employed to ensure the credibility of findings (Creswell, 2014; Yin, 2013).

Findings

As a preview to our findings, while we identified characteristics of all nine UDI elements in the schools studied, in only two schools (Ruby and Hutch Hill), did we find the following UDI elements salient in classroom observations: (1) facilitation of a community of learners; (2) flexibility in use; and (3) tolerance for error. These particular elements reflect the proactive design of instructional activities and environments to create inclusive learning environments that are particularly salient for SWD and hold implications for policy, future research, and practice, as we will discuss in the conclusion.

Instructional Climate
Educators strongly emphasized instructional climate as characterized by inclusivity and high expectations for all students. For example, in every focus group, we identified data wherein teachers referred to the import of all students meeting their goals and reaching their potentials. Teachers also addressed characteristics of the instructional climate when discussing their district's goals. For example, a teacher from Ruby stated, "Success is really when we are able to deliver an education that results in high levels of achievement for all students." In these discussions responses to questions regarding district goals for student success included statements pointing to the import of "providing services to all students, centered and focused on

students and the needs of all students". Teachers also expressed that the overarching goal of their districts' work is to provide a set of clear expectations for achievement for all students without exclusion. A special education teacher from Laribee explained, "We want every student to be successful in the classroom and in any classroom that they're in and in any program that they are in. So we work with the regular education teachers to see that happen".

A positive instructional climate was exemplified in observations as well as described in focus groups. For instance, teachers at Ruby and Hutch Hill were observed using a variety of strategies (playing cards, tossing a ball, and using electronic devices) to ensure full participation of all students in classroom conversations. In most instances the teachers were observed praising students for their participation. In one particular classroom in Hutch Hill, the teacher was observed supporting broad student participation by targeting specific students with a supportive conversation before the students were asked to respond.

The focus group data provided evidence that teachers in these odds-beating schools held high expectations of students. Furthermore, they express the belief that they hold responsibility to craft a positive instructional climate for all students to meet their potentials.

Equitable Use
Equitable use, as described by McGuire, Scott and Shaw (2006), pertains to instructional practices designed to be useful and equivalent for all students with diverse needs. The CCSS, as a set of disciplinary standards with cross-cutting themes, naturally invites opportunities for all teachers to share common language, methods, and instructional strategies, and provides a starting point to provide equal content to students through means that address individual's needs (McGuire, Scott & Shaw, 2003).

With regard to equitable use defined in this way, the teachers in this study discussed activities that "excited and engaged" learners. They used activities that would promote student engagement including those that included hands-on elements and technology such as Chrome books and iPads. In Roaring Gap, for example, an administrator explained, "I think as I'm sure you've noticed we have students from various backgrounds and I think teachers at this district have really developed a fine craft in being able to develop instruction for all of the different types of learners." As an example, we observed English Second Language (ESL) and mainstream classroom teachers in an ELA class at Julesberg middle school presenting a lesson on craft and structure in writing using a variety of texts and technologies. These teachers tasked students with accessing their iPads to listen to a popular pop song and through this engaged them in identifying literary elements, such as character. The teachers were able to connect this accessible activity to a poem in order to teach literary elements. They provided what was observed as an engaging instructional activity while differentiating the instruction to meet the needs of all students. When asked how the CCSS implementation impacted teaching practices, overall teachers, such as this one from Hutch Hill, responded, "that it's allowed me to diversify my teaching a bit to different levels of kids."

In general, teachers at Ruby described a consequence of aligning their instruction to the CCSS as facilitating "diversified teaching", as exemplified in the use of hands on and technology-enriched

instruction, and raised accountability of "lower functioning kids…asked to achieve at the same level as the general education kids."

Flexible Use

Flexibility in use focuses on the design of instruction taking into account the needs of a diverse population of students with a wide range of individual abilities. This UDI principle focuses attention on the qualities of the learning environment including the way curriculum is accessed, how students engage with that curriculum, and how their learning is assessed.

With regard to flexibility in use, teachers described how they modify instructional resources and instruction and this was, importantly, supported by administrators. General education teachers, for example, discussed the use of modules (a set of CCSS-aligned lessons made available online through the New York State Education Department) noting their usefulness, but also the need to modify them: "What we do is when we get the units, we use them, we implement them and then we analyze them and look at which aspects of these units do we think help our kids become more successful and then we incorporate them into our district curriculum".

Administrators' encouragement of teachers to modify CCSS materials contributed to a tailored approach to instruction. A teacher from Sage City explained, "We don't follow step by step the Common Core, but we definitely refer to it and look at it and we have made some adjustments." This example illustrates a larger pattern that teachers were encouraged by administrators to tailor their instruction to meet the needs of their student population as they adapted their instruction to align to the CCSS. A teacher in Ruby reported that the school principal had given teachers the freedom to tailor their instruction to best meet the students' needs: "You don't have to teach these modules. I trust you to teach this the way that you need to teach this." This measured accountability was set within school environments where teachers expressed understanding the import of making meaningful connections between the curriculum and their students . In discussing the benefits of flexibility in achieving this aim, a teacher from Hutch Hill described a shared philosophy about instruction at her school: "They key is to make it interesting, to make it fun and to make it relatable … to bring in real life and to make it interesting and current."

Another consideration with regard to flexibility of use evident in the schools studied was with regard to assessment strategies utilizing multiple measures. In a grade 6-math lesson at Hutch Hill, for example, a teacher asked students to compare rates and quantities. The teacher utilized a small group activity to walk around the classroom and informally assess the understanding of the content for each student. Likewside, in a grade eight math lesson at Ruby a teacher utilized questioning to probe students thinking and provided individualized feedback in the assessment of their work.

In sum, administrators' encouragement of teachers to not follow CCSS materials "step by step" and to create "engaging and relatable" student activities allowed teachers to adapt to their students' needs. Overall, these school contexts afforded teachers the opportunities to design instruction and materials, and assess what students know in flexible ways.

Community of Learners
The UDI principle regarding communities of learners focuses attention on instruction and curriculum designed to encourage and promote student-to-student and student-to-teacher interactions. In the odds-beating schools in this study, we noted a number of instances where teachers encouraged student-to-student interactions within classrooms, but also encouraged students to engage in after school activities and clubs as well.

In promoting student-to-student interactions within the classroom teachers described instructional strategies that encouraged partner or group interactions. As an example, a teacher from Laribee stated, "When they [students] are in groups their peers are self-checking them, and the more talk you hear you go over and maybe intervene a little bit to make sure that they're explaining and helping each other. I feel like they do such a great job helping each other to stay on task and keeping each other informed." In Roaring Gap a teacher provided further evidence of the import of student-student interactions in the classroom:

> *Within their [students'] learning partnership, they become comfortable in working with the same person and they feel comfortable in sharing. And it's not about being right or wrong. It's about being an active listener and hearing what that person has to say and relating it to the task at hand.*

Interactions between students and teachers were also reported to be an important element to teaching. A teacher in Roaring Gap explained, for instance,

> *We kind of loop with our kids. So, you know we follow them throughout the middle school. We know what their needs are before the year even starts.*

Hutch Hill teachers also emphasized the import of nurturing student-teacher connections. For instance one teacher explained how important it is to " …really getting to know our students and identifying any barriers or obstacles that may be impeding their success and collaboratively partnering with parents… with all stakeholders, and the student – himself or herself".

The importance of nurturing a community of learners was exemplified in the observations as well. Students were observed working collaboratively in groups and interacting with teachers to expand their understanding of content. Observations of a grade eight mathematics lesson in Ruby Hill, for instance, provided evidence of student-to-student engagement. Students sat in pairs and used their partners to check for understanding of comparing numbers in scientific notation. The teacher presented the students with a problem and then instructed students to "confer with your partners." When a solution to a problem was presented the teacher again instructed the students to, "check and compare with your partner." In Hutch Hill students were observed working collaboratively in seventh grade ELA class about writing character sketches utilizing the specifically taught method. The students participated in a round robin writing activity whereby every two minutes a timer would sound and students would pass their work to a peer. The teacher set a goal of 100% participation and on task behavior.

Teachers also pointed to the importance of after school activities in promoting student-student and also teacher-student relationships. A Hutch Hill teacher explained,

> *They're more connected to school, more invested, and they'll feel more important, more likely to do …and sometimes I think it's a motivational piece for a student whether its sports or a club; if they're involved in that sport they're probably more likely to be invested in academics.*

The UDI principle of community of learners emphasizes the importance of relationships of student to peer, student to teacher, and student to content. A community of learners was supported in the odds-beating schools through the facilitation of conversations between peers, making personal connections with students and teacher, and in providing motivation for students to connect to the teachers and each other outside the classroom.

Size and Space for Approach
This principle takes into consideration the appropriate size and space for approach, reach, manipulations and use that are accessible to a variety of physical, mobility and communication needs (McGuire, Scott & Shaw, 2006). Teachers reported designing instructional activities to promote group collaboration, hands on activities and address real world problems. Learning activities in Hutch Hill incorporated collaboration and hands on activities,

> *I have to say that the [modules] do have a lot of hands-on that we adapted today as an example; instead of a typical review sheet we might have done in the past, we have them at the board and we're making pumpkin relays…We make up some of our own games.*

Laribee also discussed a shift in instructional activities,

> *When we were doing that unit … we had a space that we were able to accommodate both classes. So it was differentiated in that sense to kind of make sure that all students' learning objectives were being met, we were also available to provide support for students that needed it.*

Evidence of size and space was observed during classroom instruction. The integration of technology, small group instruction, station work and visuals to support seemed to provide variation in physical space for instruction and a variety of manipulative resources to support the needs of the learners. One teacher at Hutch Hill was observed using timed sessions to work in groups to solve rate problems. The teacher used collaborative grouping to reduce the size of the group and to shift the lesson from a teacher centered approach to a student-centered approach. The timed sessions created a sense of focus and the group work promoted collaboration and shared understanding and mastery of content

These conversations and observations display the teacher's abilities to address the CCSS through meaningful activities that were able to meet the diverse needs of the learners. The design of meaningful activities through size and space for approach allows for engagement with content promoting intellectual growth.

Low Physical Effort
The principle of low physical effort refers to instruction that is designed to maximize attention and learning by minimizing nonessential physical effort (McGuire, Scott & Shaw, 2006). This principle, discussed by McGuire, Scott and Shaw (2006), is in reference to assistive technology and time for learning, with discussions specifically centered on iPads, smartphones and other devices that aided in student learning.

Focus groups at Hutch Hill mentioned the use of technology in research stating, "They are doing their projects, investigating what they need to investigate using the Chrome books." There was a discussion about assistive technology having the ability to "level the playing field" for some students. In Ruby there was discussion about a field sound system: "The field sound systems we've had on some of the students' IEPs. For some with auditory processing issues, all students benefit from this." In observations at Roaring Gap, Julesberg, and Ruby teachers used the assistance of technology in lessons. Devices such as an Elmo, Chromebooks, iPads and Smartboards were used to display visual supports, goals for the class and modeling of tasks to be completed. The use of technology was beneficial support for all students because it provided supports for multi-modal presentations without the need for extensive physical effort.

The principle of low physical effort accommodates SWD but may have positive outcomes for all students. The use of technology with intention can provide the students the tools that they need to engage with content instead of dealing with the barrier to the content. The use of a word processing program, for example, will help a student engage in the writing process instead of being held back by the physical ability to write.

Simple and Intuitive Use
Simple and intuitive use refers to instruction that provides clear directions and expectations. (Wehmeyer, Lance & Bashinski, 2002). For example, the use of study guides may help all students understand the content to be covered and the expectation of knowledge to be attained (Wehmeyer et al., 2002). Such guides were discussed by teachers in helping students acquire strategies for organization and to meet the demands of a lesson. Teachers at Ruby, for instance, discussed the importance of providing good models for organization.

> *I feel that our job is to help get organized so that by the time they get into high school that they have good working habits and find the materials that they need and complete their work, we're like their building block too because of the skills that they need to have, the knowledge they need to have to go in, so then they can be on the right track, they can graduate on time, find a good job, enter the college they want or whatever path they find.*

Another teacher at Ruby stated, "We try to use strategies in the classroom that will be useful for them and if it's going to benefit them, it's going to benefit everyone" demonstrating the benefits that simple and intuitive practices have for all students. An observation in a seventh grade technology class in Laribee provides an example of how simple and intuitive practices can benefit all students. The technology teacher provided the students with an overview of the class and prepared the students with the equation needed to calculate the efficiency of the bridges they built. The teacher also provided a set of steps the students needed to engage in to be successful

for the lesson. A definition of success and check-ins with the students by the teacher ensured students understanding of what they need to do and how they would achieve their goals.

Designing instructional practices and environments to embrace simple and intuitive elements may lead to increased independence and competence for all students. The use of study guides and helping students organize materials provides students with an opportunity to engage in classroom activities instead of being hindered by a lack of preparedness to engage in classroom activities and assessments.

Tolerance for Error
Tolerance for error accounts for student's prerequisite skills and pacing for learning (McGuire, Scott & Shaw, 2006), and provides feedback for students while also allowing time and space for practice. There were a variety of programs discussed in the interviews and focus groups in each school that allotted for extra time in the school day or beyond the school day to assist with students understanding of content in classes where they needed additional assistance. These extended opportunities are allowing for teachers to provide students with feedback to increase understanding and mastery of content. These odds-beating schools used "failure" as an opportunity to teach. For example, in Roaring Gap, educators developed opportunities for students to come before or after school to receive support in all academic areas. Tolerance for error is also demonstrated in the movement and engagement of teachers in the observations, with students to provide them guidance and feedback on content. In classroom observations there were many similarities in lesson structure that included a "bell ringer" (also known as a warm up activity), guided practice, and independent practice that each provided the teacher opportunities for feedback on the students' work. The teachers at Roaring Gap were observed moving around the room, checking student's work and conferencing with students. Observations in both Ruby and Hutch Hill noted students working as a whole group to engage in content and then individual work to practice the content, while each teacher provided students with feedback on engagement with content.

Tolerance for error makes failure a positive experience for all students to learn through feedback and opportunities to practice. SWD need these spaces and opportunities to engage with content through meaningful learning activities with opportunities to explore and learn from errors.

Perceptible Use
Instructional design that that takes into account the principle of "perceptible use" offers a variety of formats and presentations to meet the learner's needs (Wehmeyer, Lance & Bashinski, 2002). The utilization of visual, auditory and tactile presentations of information that is easily consumed will meet the needs of a variety of learners.

Academic Intervention Services (AIS), services that supplement general curriculum or provide services needed to confront barriers to improve academic performance (New York State Education Department, 2016), is format of delivery of instruction being used in odds-beating schools to help more diverse learners achieve higher levels of performance in the classroom and on state assessments. "We don't let anyone fall between the cracks. We go through every single child that we can," said a teacher in the AIS Laribee focus group. In addition to AIS, differentiation is often used to help meet diverse learners' needs. In Hutch Hill, for example, a

math teacher discussed using different presentations of materials to differentiate the lesson stating, "In one station there was a video…they talked to us in the hall about their understanding…we read about it and the third station was, as I said, and interactive field trip through Google Field Trips." Another math teacher discussed differentiating by "infusing eighth grade topics into the 7th grade topics" to expose students to different ways of thinking about math. A teacher from Hutch Hill discussed their approach to teaching that creates a more student-centered approach which better meets the individual learners needs, and offers a variety of formats and presentations,

> *When they need me, we go to question, stop and mini-lesson on a topic. At that point they're engaged, they want to know at that point, so they're more likely to listen rather than me lecturing about something. So I find tying to be a facilitator whenever I can, step   back and not be the center of attention in the room, being the resource that's kind of roaming around to say "What do you need from me?"*

Students have different levels of knowledge experiences, and sensory perceptions that benefit from different modalities of presentation addressed through the element of perceptible use. The use of Chromebooks in a math lesson at Roaring Gap middle school is an example of how different modes of presentations can benefit the learners. The teacher engaged the students in a lesson about distance and range using the Chromebooks to practice the utilization of operations and strategies to solve problems. The students worked in groups to solve math problems and share what they had learned. The variety in format (Chromebooks) and presentation (group work) provided a lesson that was easily consumed by the learners.

Perceptible use demonstrates the teacher's ability to use different modes of presentation through differentiation and support services to meet the learner's needs that may lead to greater access to the curriculum for all students.

Limitations

It is important to note that the schools selected in this study are not meant to represent all middle schools where RttT reforms were implemented in the United States, but rather were selected in order to highlight the kinds of practices that are related to different performance outcomes on Common Core assessments in one state and in a set of schools that represent relatively better-case scenarios for student outcomes taking into account demographic factors. If we used different selection criteria we may have have found evidence of different emphases in UDI practices. In addition, some of our findings are based on focus groups, and rest on the assumption that educators answered questions accurately and honestly. Finally, as the larger study in which this one is embedded did not focus specifically on instructional strategies for special education students, more detailed descriptions of practice are not available and will require additional research.

Discussion

In alignment with the UDI framework, this study sought to contribute insight into the elements of UDI in schools with odds-beating student outcomes with potential implications for policy, future research, and practice. To do this, we examined how educators meet the needs of a growing population of SWD in the face of increasing demands for student and teacher performance vis-à-

vis college and career-ready standards. The UDI framework was beneficial in characterizing teaching practices that meet a heterogeneous student population. Further, our findings suggest that it is not the CCSS curriculum or DDI and APPR policies that drive instructional practices, but the understandings about what is important in the design of instruction and instructional spaces in classrooms and schools to push all students to achieve.

Investigation of the nine elements of UDI leads us to further question how educational practices are promoting a learning environment that embraces the abilities of all students. The presence of UDI practices, specifically flexibility in use, equitable use, instructional climate and community of learners, noted in lesson design and instructional practice of teachers suggests the possibility that the labels of abled versus disabled can shift to an idea of enabled for all students, leading to a positive response to student diversity (Messiou et al., 2016). UDI may promote the enablement of students to equally access the curriculum through environmental adaptations and teaching practices that are proactive. These elements are all seen as having potentially a positive impact on promoting higher achievement on assessments and overall outcomes for students (Scott, McGuire & Shaw, 2006; Edyburn, 2005).

Examples of the integration of the Common Core Learning Standards with instructional practices and instructional spaces suggest that the standards may act as a guide for academic achievement, but educational practices and strategies used at the district, school and classroom level - such as differentiation of instruction through the nine elements of UDI (Embry, Parker, McGuire & Scott, 2005) - may have a stronger impact on student achievement than federal and state mandated policy. Designing classrooms and learning environments to meet the diversity of our student population with intention to instructional strategies, integrated services, and engaging activities (Zigmond, 2003) may benefit all students. Intention or purpose of design to environmental spaces, instructional strategies and how we service students increase access to education for the widest range of students possible, which is a goal of universal design (Mace, 1998). With increased expectations and access for SWD, use of UDI principles has the potential to increase quality of life for all students.

Although it is important to discuss the elements gleaned from the observational data, it is also important to discuss what was missing from our observations. While there were three elements of UDI (community of learners, flexibility in use and tolerance for error) prominent in our observations, the other six elements of UDI (instructional climate, size and space for approach, equitable use, simple and intuitive, perceptible information, and low physical effort) were less notable. This invites further inquiry to address the awareness of UDI by teachers and administrators, and the potential of UDI as a framework to inform practice. Broderick, Mehta-Parkh and Reid (2005) suggest that responsive lessons designed to meet learner diversity, as opposed to the modification of lessons to meet individual needs, can open up classroom activities to engage students in meaningful learning experiences. This engagement can be achieved through the use of reflection, awareness of current practices, examination of physical and social-emotional spaces, and exploration of teacher attitudes (Broderick, Mehta-Parkh & Reid, 2005; Roberts, Park, Brown & Cook, 2011).

Future research should focus on how teachers and school districts promote and design school spaces for collaboration and planning to design learning environments that meet the diversity of

learners. Stepping into the role of the student through interviews and focus groups and considering variation in teaching strategies to meet the diverse needs of learners from the user's perspective, versus that of the designer's, may lead to more positive learning practices for both teachers and students (Altay, Ballice, Bengisu, Alkan-Korkmaz & Paykoc, 2016). Future research should also examine how collaborative efforts (e.g., co-teaching) and teacher roles have an impact on planning and preparation utilizing a UDI framework.

Exploration of UDI as an intervention in diverse and lower achieving classrooms may provide support on how to mediate learning environments to meet the diversity of learning populations; specifically, how the use of UDI and other elements of universal design can remediate classrooms in which teaching practices and learning environments are not meeting the needs of special education students. Increased qualitative studies that offer intentional observation data on elements of UD may provide insights on how classroom environments may be proactive or reactive in mediating classroom diversity. This research would aid in the reforming of educational design to meet the growing needs of the growing diversity of students.

In conclusion, the increased awareness of student diversity has the potential to positively inform our instructional practices and establish educational environments that are tolerant and accessible. UDI can inform our reform initiatives and policy to not just push high performance on assessments, but to create an equitable educational system that enables all students, allowing them to achieve their fullest potential academically, socially and emotionally.

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Appendix A. Observation Protocol

Observer:
Date:
School:
Grade: /# of students:
Time:

Notes: (Inclusion, ESL push in):

Part 1: Field notes on the lesson:

A NOTE TO THE OBSERVER: Please keep in mind that this study has a keen interest in evidence of CCLS-aligned instruction. Do not limit yourself to only noting the emphases of the shifts; however, do keep these in mind as you are taking your notes. The shifts for ELA are:

1. Balancing Informational and Literary Text
2. Building Knowledge in the Disciplines
3. Staircase of Complexity
4. Text-Based Answers
5. Writing from Sources
6. Academic Vocabulary

As clearly and accurately as possible…
Take as much space as needed and provide as much detail as you can. Do not note your perceptions here, but rather what you actually see and hear. Make sure that you use consistent symbols for who is speaking (no names, but T-Teacher, T2: second teacher; S- student; X – a student called on). Also keep times at each major change of activity (t led; student-student interaction, etc.. Please indicate if the beginning and/or end of the lesson is missed.)

Part 2: Summary of practice
The summary a –j below may be done after the lesson if necessary.

   a) *Describe the topic and apparent purpose of the lesson*

   b) *Describe how the teacher makes connections (prior knowledge requested, KWL, text-to-text; personal experience; visuals)*

   c) *Describe the types of activities/tasks (individual, small group, choral reading; student discussion of text; practice using academic vocabulary, conventions, foundational skills (e.g. print concepts, phonological awareness);higher-order; student presentation; discussion groups, group response; turn/pair/share*

d) *Describe how writing is integrated into this lesson (writing process, writers' workshop, reader/writer response, modeling/authentic displays, purpose of the writing activity, kinds of sources used, evaluation of writing)*

e) *Describe the materials/resources (e.g. fiction or nonfiction texts, textbooks, worksheets, overheads, smart boards, videos, any other technologies etc.) Describe range of and levels of complexity of materials*

f) *Describe supports offered (e.g. any ways instruction homework, or questioning was differentiated, modeling, other adults/resources/aids/assistants, centers)*

g) *Describe feedback and any ways student learning was assessed during this lesson(call on another student, probe, solicit others to assist, conference, multiple choice test or quiz, written response – short answer, essay, other assessment)*

h) *Describe the climate of the classroom (e.g. emotional support, teacher sensitivity, regard for student perspectives)*

i) *Describe how the teacher managed behavior*

Part 3: DEBRIEFING (After class)

1. What were your goals and objectives for this lesson? (if not stated explicitly during class)

2. How did you plan this lesson?
What kinds of materials were available to you?
Who decided on materials that you could use?
What information about your students did you use to inform this lesson?
Did you plan in alone or in collaboration?
What kind of support are you provided around lesson planning?

3. What CCLS were you attempting to teach in this lesson?
Describe any challenges you encountered teaching this lesson.
What do you attribute those challenges to?

4. How did this lesson fit into prior and future lessons?
Please describe your planning process

5. How did you assess students' learning during this class?

6. Is there anything else about this lesson that you would like to share?

END

Appendix B. Codebook

Code	Definition	Example
Equitable Use • Alternative materials	Instruction is designed to be useful and successful for diverse students	All of our Special Ed students in the consultant and resource room are expected to take that Regents Exam. They are taught by myself and a teaching assistant in a 15 to 1 setting. So we have a 15 to 1 Math 7, and we have a 15 to 1 Algebra Regents.
Flexibility in Use • Assessments • Materials	Instruction is designed to provide choice and method for use	We've viewed all the recommended texts by the common core, to compare what we have versus what they say we should have and then to us, if it's not high interest for kids, then we're not putting it in front of them. So do we use the modules…no. Do we use anything that we think helps…anything I've used in the module, I think is beneficial or that we're missing in our curriculum.
Simple and Intuitive Use • Directions • Guides	Instruction is designed to be straightforward	We make up a review sheet. You know we give a review sheet and we go over the review sheet, and we try to be there as much as we can
Perceptible Information • Different Modes of presentation	Information is communicated effectively despite ambient conditions	I'm sure you've noticed we have students from various backgrounds and different socio-economic status. And I think teachers at this district have really developed a fine craft in being able to develop

		instruction for all of the different types of learners.
Tolerance for Error • Feedback • Practice and extended opportunities	Instruction is designed in anticipation of variation in learning pace and prerequisite skills	So say a kid's struggling with this at night at home, they may come in early and go to that and get some extra help, or say kids just don't pull it off at home.
Low Physical Effort • Assistive technology • Time for learning	Instruction is designed to take into account nonessential physical effort	That system was put into 6 years ago. It's been a labour of love K-12. The field sound systems we've had on some of the students' IEPs. For some with auditory processing issues, we've had all students benefit from this.
Size and Space for Approach and Use	Instruction is designed to take into account students' physical needs	I've also found that it's allowed me to diversify my teaching a bit to different levels of kids. I can have a group working on one thing. When they get done, if they get done, go on to this, and meanwhile I can be working on part of the period who need some remediation.
Community of Learners • Student-student engagement • Student-teacher engagement	Communication between teachers and students is facilitated and promoted	What they really encourage us to do something new in the past several years is to pair our students. Students are not sitting in single rows anymore. They have partners. 4: partners and groups.
Instructional Climate	Instruction is designed to be inclusive and with high expectations for all students	I'd say one of the goals, that we're all doing, to have the kids become college and career ready and I think that in every single class the teachers and students are aiming for that goal.