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Data-Driven Decision Making: Improving Student Achievement

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A Literature Review Presented in
Partial Fulfillment of the Requirements
For the Degree of Master of Education

Table of Contents

Abstract.....3

Introduction.....4

Literature Review.....6

 Effects of Data-Driven Decision Making.....6

 Training in Data-Driven Decision Making.....7

 School Wide Adoption of Data-Driven Decision Making.....10

 Data Analysis.....15

 Professional Learning Communities.....18

 Sources of Data.....20

 Using Data to Differentiate Instruction.....22

 Best Practices in Implementing Data-Driven Decision Making.....23

 Future Research.....25

Conclusion.....27

References.....28

Abstract

The overall purpose of this literature review was to explore what it truly means to be a data-driven school. While researching, three common themes were identified. First, there is a lack of training for professionals in education in the area of data-driven decision making. This makes it difficult for teachers to successfully use data to alter instruction in a manner that would increase student achievement. Second, in order for schools to successfully implement data-driven decision making it must be a school-wide effort with every stakeholder involved in the process. This means from the top administrator down to the teachers, everyone must believe that using data to make informed decisions will increase student achievement. Finally, the third recurring theme involved analyzing data as a team in professional learning communities to increase both student academic achievement and educator confidence in working with data. The research shows that schools who implement data-driven decision making with these three themes in mind will most likely see an increase in student achievement.

Data-Driven Decision Making: Improving Student Achievement

Raising student achievement is the goal of educational practices. A growing trend in education improvement is data-driven decision making. Data-driven decision making occurs when educators, both administrators and teachers alike, use student data to influence many aspects of education, such as curriculum mapping, intervention strategies, and school-wide policies (Atkinson, 2015). However, with its rise in popularity, data-driven decision making has frailty in its fidelity. First, many education training programs and schools do not provide the necessary training for staff to be data literate. By not providing such trainings or professional development, most data-driven schools are only operating at a surface-level of understanding the data they collect. Therefore, these districts are not effectively using data collected to alter instruction (Billen, 2009). Another area of fidelity of data-driven decision making is in regards to school-wide implementation. In order for a school to truly be successful in improving student achievement, all stakeholders must be involved and willing to do the work necessary (James, 2010). Finally, a key component of data-driven decision making is the analysis of data. Data can be analyzed at all levels of the education system. Research shows that schools implementing data-driven decision making are most successful when their staff works in professional learning communities, or PLCs, when analyzing data from their students (Pelusi, 2015).

While it sounds easy to use data to inform decisions, there are a lot of moving parts to implement this in a school district successfully. This literature review will synthesize existing literature surrounding three main components in data-driven

decision making: a lack of training for educators to become data literate, the impact of schoolwide implementation, and the importance of analyzing data efficiently and accurately while collaborating with colleagues in professional learning communities.

Review of the Literature

Data-driven decision making is the process of using data to inform the course of action for policy or procedure (James, 2010). In education of the 21st century, data-driven instruction is essential (Billen, 2009). There are five major elements of data-driven decision making. These elements are quality baseline data, measurable instructional goals, frequent formative assessment, professional learning communities, and focused interventions (Data driven teachers, 2009). Different kinds of data are collected and used to help make decisions aimed at the goals and strategies for school improvement. Data-driven decision-making helps determine groups of students who are improving and groups of students who are not, which then gives insight to the factors behind their progress or lack of progress (James, 2010). "All students deserve access to a high-quality educational experience where teachers are using data to adjust instruction for the students in their classrooms (Immen, 2016, p. 144)." A data-driven school is one that uses student data to drive daily instructional practices. By using data to drive these decision-making processes, educators can ensure that every student's individual needs and learning styles are addressed (Terrill, 2018).

Effects of Data-Driven Decision Making

A dramatic increase in student achievement has been seen in schools that use data consistently and effectively (Terrill, 2018). Rebecca James, a researcher, conducted a study to investigate how principals could build and sustain successful data-driven instructional systems within their own schools. The goal of this study was to improve student achievement (James, 2010). James used a multi-case study approach,

collecting data using six different methods: documentation, archival records, interviews, direct observation, participant observation, and physical artifacts. During her research, James (2010) established that there must be a sense of importance in the data for teachers to take a personal interest and want to use it, otherwise educators will not find it valuable. Additionally, James (2010) found teachers needed to be given time to collect and analyze their data to make informed decisions. Overall, James (2010) found that data-driven instructional practices positively impacted student achievement in the four Virginia schools she included in her study. She measured this success in the means of student performance on Virginia's Standards of Learning assessment. The four schools in her study were able to sustain a level of full accreditation for three years at the time the study was conducted, due to the implementation of data-driven decision making.

Training in Data-Driven Decision Making

Data-driven decision making has been a trend in education since the 1990s, and if used correctly, it could contribute to school improvement. Even so, schools, and especially teachers, can be overwhelmed with the extent of data collected on students (James, 2010). This is partly due to the fact that there is a lack of training in data analysis for educators. Administrators, such as superintendents and principals, and teachers are being held more accountable for academic achievement growth of their students (Root, 2010).

Educators should be skilled and knowledgeable enough to be able to transform data into information that can then be used in action in the classroom (Terrill, 2018). Terrill (2018) used data collected from both administrators and teachers through

interviews and meeting agendas to code information to find reoccurring themes in both their roles of implementation. From this research, Terrill (2018) concluded professional development opportunities must be offered to both administrators and teachers in order to successfully implement a data-driven decision making school culture.

In a study conducted by LaShinda Hughes (2016), information was gathered through diagnostic surveys and state assessment data. Hughes (2016) included responses from 15 elementary principals in Mississippi. Based on Hughes' findings, she concluded that even principals need additional support in regards to data-driven decision making methods. Furthermore, educators should be trained to maximize time by identifying relevant data rather than spending valuable time filtering through irrelevant data (Hughes, 2016). These results further support the claim that training is an essential component of data-driven decision making.

Without proper training, a majority of teachers involved in a study conducted by Linton Atkinson (2015) were unable to make connections between instructional practices and student results. This study by Atkinson (2015) was a qualitative case study conducted to understand elementary teachers' experiences with classroom assessment within the data-driven decision-making process. The school chosen for this study was unique in that the educators participated in bi-weekly data chats prior to the study being implemented. Data was collected through interviews and observations with teachers ranging in grades third through fifth (Atkinson, 2015).

Although some professional development exists for educators already working in the field, there are few formal courses for those going through educational programs at

the university level (Terrill, 2018). When interviewed, a group of superintendents indicated they received minimal training on analyzing data throughout their administration programs, and, alternatively, learned most of their knowledge through on-the-job experience (Root, 2010). Root (2010) conducted his research in the area of superintendents and how they use data to make decisions related to student achievement. In the study, he collected data from 23 superintendents in urban districts throughout Southern California. Through surveys and interviews, Root (2010) was able to determine superintendents require a wide range of skills and knowledge in order to effectively make decisions about student achievement. Additionally, the lack of training for educators results in a surface level understanding, therefore resulting in surface level changes.

Lack of training and understanding often results in actions that have no true impact on student learning according to Billen (2009). Billen (2009) came to this conclusion after conducting a study where 32 educator participants were introduced to and implemented the strategy of using data-driven instruction. Through document reviews, field notes, interviews, and journals, evidence was presented that supported the idea that without adequate training in reading data, educators may incorrectly identify areas of strengths and weaknesses in students. Educators need to be able to identify and use data that will be sufficient in improving student achievement in the classroom (Billen, 2009).

James suggests it is imperative school districts supply teachers with the training and tools necessary to analyze and reflect on data collection and decision making with

data in mind. She also states schools are good at collecting data but don't know what to do with it after it has been collected (James, 2010). School districts should develop a plan to provide training to not only current staff, but also for new staff that join after the initial trainings have been completed (Terrill, 2018).

A study was conducted by Toni Lehman (2018) with the main objective being to determine whether participation in professional development in a module covering data-driven decision making had a significant impact on participating teachers' perceived abilities to disaggregate data in order to make informed decisions. In this study, the professional development used by the district being evaluated was "Stepping Stones: The Effective Use of Data to Chart Student Needs and Progress" (Lehman, 2015). Participants in Lehman's study disclosed an increase in perceived abilities to analyze data and make data-driven decisions at the conclusion of the module. As a result, Lehman recommended districts provide their educators professional development designed to help teachers develop data literacy skills, especially in the area of standardized test scores, to enhance instructional practices in the classroom (Lehman, 2015). In this study, it is suggested these opportunities for professional development include in-service training with breakaway sessions according to grade-level or content areas. The utilization of professional development training would address the obstacle of teachers' inability to effectively use data in their classrooms, ultimately making a stronger data-driven school (Lehman, 2015).

School Wide Adoption of Data-Driven Decision Making

In order for a school to be truly successful in improving student outcomes using data, it needs to be a school-wide effort, which may be a challenge according to some superintendents (Root, 2010). The effort should be made with the idea that data-driven instruction is used to identify areas of weakness before the student falls further behind their peers (Billen, 2009). School leaders should seek to create a climate of conversation about data. These conversations should be free from fear of being judged by superiors, such as administrators. These discussions should be honest and authentic (Atkinson, 2015). School leaders should clarify if the role of using data to make decisions in the district is data-driven, data-based, or data-informed (Murray, 2014).

Education lacks tools that are readily and easily accessible to district leaders and teachers that allows users to examine educator perceptions in the area of data-informed practice. Research done by Jo Beth Jimerson (2016) sought to describe the process used in the development, testing, and validation of one particular survey, as well as aid in the development of tools utilized by superintendents that would allow educators to gain insight into their own needs. Four superintendents, four principals, and four teachers were selected to partake in a review process of the Survey of Data Use and Professional Learning (S-DUPL). The S-DUPL was developed to support district leaders in their attempts to improve data-informed practices within their districts (Jimerson, 2016). From the 12 reviewers, eight different districts were represented. Jimerson (2016) found that appropriate use of the S-DUPL may help district leaders identify barriers so that processes involving data usage could be strengthened. By strengthening this process, students benefit from educators' abilities to identify and

meet their needs. The S-DUPL gauges teachers' perceptions of skills and knowledge needed for data analyzing and whether teachers thought these needs were met by policies already present in their districts (Jimerson, 2016). The survey may be used as a first step in assessing attitudes and perceptions educators in a district have towards data usage. It could also be used in a district new to data-driven decision making to provide baseline data before the implementation of new policies, procedures, or supports, during implementation, and after implementation has been established (Jimerson, 2016). Understanding staff perceptions and skill levels with data analysis is an important step to school wide implementation.

It should be noted that using data-driven instruction to improve student achievement requires commitment from all stakeholders involved, and the data needed may vary from person to person (Root, 2010). For instance, a superintendent requires different data when he or she is evaluating a principal compared to the data a teacher needs to determine the effectiveness of his or her teaching for the performance of his or her students. It should also be noted that the "trust level" of data varies in relation to the position of the person using that data. Through data Root (2010) collected in his research, teachers' responses in surveys reflected that the higher the position, the more he or she trusts data. Additionally, the more skilled a person is with data, the more he or she trusts it. Thus, more training for educators means they will be more confident in their data and what they do with it (Root, 2010). Teachers in Immen's (2016) study reported that they felt most confident using data from formative and summative assessments, while feeling the least confident when using data from standardized

assessments. This study obtained data from 80 K-12 teachers through surveys. Immen (2016) sought to examine the values, confidence, and actions of teachers as well as their perceptions of what factors they believed supported and inhibited effective data usage. Teachers in this study believed the following inhibited their ability to effectively use data: too much data, inadequate technology, no time, lack of access to data, inconsistent support, and lack of understanding. However, these same educators held strong beliefs that analyzing data could result in student growth. They also felt strongly about the benefits of collaborating with colleagues while analyzing data (Immen, 2016).

Another study was conducted to see how teachers and principals were using the data they collected. Militello, Bass, Jackson, & Wang (2013) conducted a study using Q-methodology. Q-methodology studies the perceptions of its participants by having them sort through a collection of statements and ordering them from most important to least important, or in this study, the statements they most agreed with to the least. Militello et al. (2013) asked 34 teachers and 28 principals to sort through 23 card statements and complete a questionnaire when finished. The 23 card statements were in regards to data perceptions in their environments. The principals in this study ranked the following as the statements they agreed with most (Militello et al., 2013, p. 108):

1. "As a principal, I have easy access to school data."
2. "As a principal, I collect, analyze, and use school data in our school improvement plans."
3. "As a principal, I collect, analyze, and use school data to evaluate school programs."

4. "As a principal, I model how teachers can use school data to inform their practice."

After sorting the statements and conducting surveys, researchers in this study concluded the following were the statements that principal participants least agreed with (Militello et al., 2013):

1. "As a principal, I ensure that assessments (other than state assessments) have been aligned with state standards."
2. "As a principal, I designate a data specialist who assists teachers in the use of data to inform instruction."

Results from the principal portion of this study indicated principals use data to make school improvements as well as model best practices of data use for teachers in their district. This study also supports the statement that most principals do not have data specialists readily available in their districts to assist them or their teachers (Militello et al., 2013).

The same study was conducted with 34 teachers and 23 card statements in regards to teacher perceptions of data usage in their schools. Overall, this study concluded that teachers use data to focus on improving their own individual instructional practices (Militello et al., 2013). Information gained from data analysis is used to modify lesson plans, instructional strategies, or to reteach. Teachers also stated they used data as evidence in student feedback or meetings. The top ranked cards were as follows (Militello et al., 2013, p. 110):

1. "I regularly use school data to develop and modify lesson plans."

2. "I regularly use school data to modify my instructional strategies (e.g. differentiate my instruction)."
3. "I regularly use school data as evidence at meetings (e.g. pre-referral, 504, IEP)."

At the end of the lists of 23 statement cards, when ranked from most agreed to least, the two statements that ranked 22nd and 23rd were "I regularly use school data to compare my students with my colleagues' students?" and "I regularly use school data to form flexible student groups with other teachers during the school day."

Through several different studies, it has been shown that every person in a school district uses data in some capacity. Administrators use data to inform decisions on school-wide policies and procedures while teachers use data to influence daily teaching practices. With data being such a large part of every aspect in education, it's crucial to data-driven decision-making success that all stakeholders are included with implementation as well as involved in professional development to strengthen data knowledge and skills.

Data Analysis

Data is analyzed on many levels in education, and interpreting data is an acquired skill. School districts should provide opportunities for educators to become efficient in data literacy. Data literacy is the ability to read, understand, and use data effectively to inform decisions (Terrill, 2018). Data is used in the school improvement process to help guide goal setting (Hughes, 2016). Starting at the top, administrators analyze data to make district-wide decisions. In addition to assessment data,

demographic data is also analyzed (Root, 2010). In order for data analysis to be purposeful, educators should take into consideration student demographic data, classroom instruction, and data gained from state assessments. By doing so, school leaders and teachers can successfully develop strategies to improve instruction. Using formal and informal student data as early in the beginning of the year as possible, student achievement can be optimized throughout the whole year, and teachers can be confident in making informed decisions about the effectiveness of their instruction (Billens, 2009).

However, educators are coming into the field of education with a lack of data literacy training in their teacher education programs. A study conducted by Dunlap and Piro (2016) researched a teacher preparation program. The study explored pre-service teacher education programs and the data literacy concepts addressed. A total of 54 participants were included in this study (Dunlap & Piro, 2016). Data Chats were used as an instructional intervention to increase students' abilities to take data and effectively use it to inform instruction. These Data Chats lasted five weeks and following each session, surveys were conducted with the participants. In these Data Chats, participants collaborated to try to comprehend, desegregate, and interpret sets of real standardized test scores (Dunlap & Piro). Prior to the start of Data Chats, every participant involved stated there was a discomfort when it came to understanding and analyzing data. By the end of the study, students had stated their comfort and knowledge of analyzing data and what to do with it had increased significantly (Dunland & Piro, 2016). The study concluded that interventions in teacher education programs should be established to

relate data analysis with instructional practices. Self-efficacy in data usage will only increase the chances education students will take the skills learned and apply them to real-life situations after they complete the program (Dunlap & Piro). Educators and instructors should continue providing opportunities for data literacy to develop.

Rachele Wagaman (2015) conducted a study to provide a narrative description of how teachers perceive and conceptualize the data-drive decision making process. The 20 participants in this study were from private elementary schools in California. Wagaman (2015) presented a scenario observed in her study of how teachers analyzed data to inform instruction. During a 6th grade team meeting, teachers in the study analyzed data from a unit pretest, as well as previous assessments. They used this data to determine student understanding of multiplying and dividing decimals. Students were then sorted it into 3 groups of understanding: complete understanding, partial understanding, and no understanding. After the students had been sorted, the teachers used the data to form math groups for the next lesson covering decimals. At the end of the unit, the teachers met and analyzed student data from the post assessment (Wagaman, 2015). Through formative and summative assessments, as well as observations by Wagaman, the teachers involved in this scenario reported an increase in student understanding and student achievement evident through the data and teacher use of data to make decisions regarding student grouping and instruction.

Due to the reports of beginning teachers feeling unprepared to use data in their classrooms, teacher programs should explicitly teach data literacy concepts. Data Chats

are one intervention that can be used to enhance self-efficacy in understanding and analyzing data to inform instructional practices.

Professional Learning Communities in Data-Driven Decision Making

Professional learning communities (PLCs) are a type of professional development that may be used in a district. Lyndsey Pelusi (2015) conducted a study to find out if PLCs positively impacted teacher instruction as well as student achievement. In her study, 30 teachers in an urban North Carolina district were surveyed and observed throughout a six-month training program over the implementation of PLCs. The results of this study showed that data-driven instruction contributes largely to the success of PLCs, and, in return, PLCs increase data-driven instruction (Pelusi, 2015). In a PLC, teachers work collaboratively with one another with a specific goal in mind. PLC groups may have a goal of analyzing data as a team to develop a strategy or plan to close achievement gaps in their grade-levels or schools (Root, 2010).

An increase in data-driven instruction can be seen with the implementation of PLCs within a school district (Pelusi, 2015). The data-driven decision-making process is a collaborative approach to education. By working together, teachers and administrators are able to make intentional changes within the classroom, schools, and district (Terrill, 2018). Structured time, collaboration with colleagues, and interpreting data with a building administrator or coach are the strongest supports a school can provide their teachers when becoming a data-driven school (Immen, 2016).

Kathleen Immen (2016) conducted a study that reported on teacher beliefs when using data to make informed decisions. In this study, teachers reported they felt most

successful interpreting student data when they were collaborating with colleagues within PLC groups. Participants of this study also felt strongly that analyzing student data could lead to increased student achievement. (Immen, 2016).

Marcie Wilson conducted a study on the impact of data-driven teams, such as PLCs, on student learning, collaborative practice, and school culture (Wilson, 2018). In her study, a data-driven team was defined as a group of educators dedicated to an ongoing collaborative process of recurring cycles of analysis and action research to achieve better student outcomes. With 36 participants from four different middle schools in North Carolina, these teams were designed to ensure all students were making progress towards proficiency levels. Using mixed-methods of quantitative and qualitative data, such as surveys, interviews, and focus groups, Wilson found that such teams do have a positive impact on collaborative practices and school culture. However, she found data-driven teams had the greatest impact on student learning (Wilson, 2018).

The idea of data teams can be further supported by a study done by Schildkamp, Poortman, Ebbeler, & Pieters (2019). In this analysis, researchers studied data teams in 14 districts. These data teams were composed of 3-6 teachers and 1-2 school leaders. There was a total of 14 teams. Interviews and observations of audio recordings obtained from data team meetings resulted in the conclusion that there are five building blocks to build effective data teams (Schildkamp et al., 2019). In order to create sustainable data use and data teams, block one states school leaders should initiate and identify the vision, norms, and goals of the group. In block two, school leaders should provide individualized support to members of the data team. Block three states that leaders

should also provide intellectual stimulation (Schildkamp et al., 2019). There should be a climate for data use created by the school leader in the fourth block. Finally, school leaders should provide opportunities for networking. In order for a school leader to successfully create sustainable data use and data team practices, he or she should implement these five building blocks (Schildkamp et al., 2019).

In order for these teams to be successful, the support and participation of the administrator is crucial. Without the support from the administrator, the impact data-driven teams have on education is lessened. When professional learning communities are developed with a specific goal in mind, not only do the educators benefit, but so do the students they serve.

Sources of Data

Data-driven decision making is used to plan instruction and activities in the classroom. Administrators and teachers use data to develop classroom and school plans such as curriculum maps, common assessment schedules, and common assessments (Terrill, 2018). Data used to inform decisions should be related to learning standards, curriculum goals, and the needs of individual programs and students. The data should be from a variety of sources as well as a variety of types of data.

Demographic data, student performance data, and observation data are just a few examples of types of data that should be used (Gullo, 2013). Other examples include formative, summative, observational, standardized, and online assessments (Wagaman, 2015). Challenges school districts and schools face is how to provide data in easy-to-use forms so that it can be used to improve curriculum development, instruction, and

programming (Murray, 2014). Also, technology is an important aspect of data analysis. It can be used to store, organize, and display data so that teachers and principals can spend their time analyzing instead. However, technology can be expensive (Murray, 2014).

Data can come from many sources. One source of data collected and used in the process of data-driven decision-making is formative assessments. The intention of formative assessments is to monitor student learning. By monitoring learning with assessment data, opportunities to provide ongoing feedback that can be used by instructors to improve their teaching, and by students to improve their learning present themselves (Terrill, 2018). Formal and informal data should also be considered when using data to inform decisions (Gullo 2013). Formal data allows student achievement of one student to be compared to another student with similar characteristics, such as grade level. Types of formal data collection methods include screening tests, achievement tests, readiness tests, diagnostic assessments, or classroom tests created by the teacher (Gullo, 2013). Informal data is data that is not used to compare students to one another. Examples of informal data include performance tests, academic or developmental checklists, or anecdotal and running records (Gullo).

Teachers and principals both should be able to enlist in effective data-driven decision making that influences classroom instruction (Root, 2010). However, teachers may be unsure of how to use the data (Mertler, 2002).

Classroom-level reports are often available to teachers. Reports from standardized tests can provide two types of scoring, norm-referenced and criterion-

referenced. Norm-referenced test results allow performance comparisons with other groups of students taking the same test. Criterion-referenced information provides insight such as how many questions were attempted and how many correct answers were given for each category (Mertler, 2002). These reports are full of valuable information that may result in revising curriculum or instruction, even if that group of students has moved onto the next grade-level. For example, if a test reveals content areas or subtests where a majority of students are performing below average, this would indicate areas of deficiency (Mertler, 2002). If such deficiencies are discovered, the teacher should ask him or herself the following questions (Mertler, 2002):

- Where is the content addressed in the district's curriculum?
- In what part of the school year are these concepts or skills addressed?
- How are these concepts or skills taught to the students?
- How do students demonstrate they have mastered the concepts or skills

Using Data to Differentiate Instruction

In addition to using standardized testing data to make data-driven decisions for the whole class, the same data can be used to make decisions regarding individual intervention plans (Mertler, 2002). Data-driven instruction allows educators to identify students who are at-risk (Billen, 2009). For instance, using data-driven instruction practices to monitor at-risk students in the early development stages of reading can allow educators to make appropriate instructional intervention plans before the student experiences an even bigger deficit in skills by the time he or she reaches mid-elementary age (Billen, 2009). The process for selecting intervention strategies for an

individual student is very similar to that of the whole class. First, the teacher identifies the content areas the student scored below average. Second, the teacher creates priorities among areas of improvement, selecting a reasonable amount of content areas to serve as the center of an intervention. Third, the teacher identifies new or different instructional materials, methods of delivering instruction, reinforcement of instruction, and/or assessment in order to meet the needs of the student (Mertler, 2002). Assessing student learning and making adjustments based on data is a constant part of teaching, and teachers in Wagaman's (2015) case study felt that data-driven decision making in classrooms was a necessary component of instruction in order to meet the needs of all students while also increasing student achievement (Wagaman, 2015).

Best Practices in Implementing Data-Driven Decision Making

Schools use data for academic decisions. Data is used in decision making in areas of aligning instruction to standards, identifying objectives, progress monitoring, identifying low-performing students, and planning instruction. Data can also influence policies and school resources (Hughes, 2016). Because data-driven decision making can influence so many aspects of education, it's important that it's done with fidelity. Based on findings in the study conducted by James (2010), a ten-step action plan for administrators to follow when implementing the data-driven decision-making process in their schools is recommended. The ten steps are as follows (James, 2010, p. 86-89):

1. Involve all stakeholders with the goal of becoming a data-driven school.
2. Decide on the routine procedures stakeholders will use in the data-driven process.

3. Select a data warehouse and data mining method that is user-friendly and not time-consuming for teachers.
4. Provide professional development training on the process of data-driven instruction.
5. Use the data-driven process to identify learning goals at the beginning of a new school year.
6. Devote time on a regular basis to collaboratively discuss school data with stakeholders.
7. Make data visible, tangible, and easily accessible.
8. Once students' individual strengths and weaknesses are identified, plans for intervention can be implemented.
9. Make a commitment to seeing the data-driven process through.
10. Start the data-driven process over again making adjustments with lessons learned.

Educators are not the only ones who should have access and knowledge of data. Educators should make data relevant and accessible to parents and students. This can be done through newsletters, notes, flyers, websites, or emails (Data driven teachers, 2009).

Professional development should not only be about how to use data, but data should be used to guide professional development. Data can be used to target specific professional development needs according to Gullo (2013). By analyzing student performance, teachers ought to be able to identify instructional strategies that are most effective and for which students, and alternatively, which ones are not effective (Gullo,

2013). This analysis should also provide insight into where there is a disconnect between curriculum or instructional practices and student learning. Through collecting and analyzing data, school districts can determine when specific types of professional development need to be implemented. Additionally, data should not only reflect a program's curriculum, but it should be used to improve the curriculum (Gullo, 2013). Data can be used to improve the quality of education in a district in several ways. Data can inform curriculum design and development. By using data to identify holistic problems, administrators, curriculum developers, or teachers can make changes to the curriculum as a whole, rather than addressing each problem individually (Gullo, 2013).

Future Research

While there is research that suggests the benefits of implementing data-driven decision making within a school district, research examining decision-making methods that will improve student achievement are limited (Hughes, 2016). This means that research supports data-driven decision making, but the methods used have not been explored to their full extent yet.

While there seems to be a plethora of research conducted on educator perceptions of data usage, research is light in other areas. Future research could be done on the best practices educators can use analyzing data to improve student achievement. Research could also be done on effective data-literacy training programs for educators. Is there a correlation between educators receiving professional training and an increase in student achievement?

Another area research could be further conducted is in district leaders and their fidelity in data usage. It has been presented in many studies that there is a lack of

training for professionals, so how are these professionals using data to make decisions if they have not been taught how to do so? Many professionals state they learn through on-the-job experience, so research could be conducted on inexperienced teachers' effectiveness to use data to inform instruction compared to that of a veteran teacher.

Perhaps the most important recommendation for future research is in the area of specific effective strategies of analyzing data to increase student achievement. As educators, the goal is to improve student academic achievement.

Conclusion

A data-driven school is one that uses student data to drive daily instructional practices (Terrill, 2018). In order for data-driven decision making to be effective, teachers ought to use a variety of data, such as formative, summative, observational, standardized, and online assessments (Wagaman, 2015). Administrators and teachers use data to develop classroom and school plans such as curriculum maps, common assessment schedules, and common assessments (Terrill, 2018). Throughout this literature review, three common themes presented themselves. First, data-driven instruction can only be successful if teachers are given the opportunity to attend training on data literacy. Secondly, implementation must be a school-wide effort from the top administrator down to the teachers. Without the involvement of all stakeholders, data-driven decision making will not be successful. Finally, in addition to training and time to analyze data, teachers are most successful in data-driven decision making when working with a team of their peers in professional learning communities. When all of these items come together, data-driven decision making can be used to increase student achievement in schools.

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