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### Elementary teachers' use of data-driven instructional practices

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#### Abstract

A school in South Carolina developed a strategic plan to implement a professional learning community structure in the school, where teachers work together to evaluate student data to improve instruction. However, teachers at the school did not understand how to use data-driven instructional practices to drive classroom instruction. The purpose of this study was to explore why elementary teachers at this school in South Carolina did not understand how to use data-driven instructional practices. The framework for this study was the learning target theory of action, focusing on researching the data-driven instructional practices teachers used when

working with data. I developed the research questions to explore the data-driven instructional practices teachers at this school in South Carolina used and how they perceived the practices in their classrooms. A basic qualitative research design was conducted using ten semi structured interviews with kindergarten through fifth-grade teachers. The interviews were transcribed, and open coding was used to identify common themes. Teachers at the study site used a variety of formative assessments to drive instruction, but few teachers could provide a clear account regarding their data collection methods.

**Keywords:** Direct Instruction, Curriculum, Mathematics, Elementary Instruction, Lesson Planning

#### 1. Introduction

Data-driven instruction (DDI) is instruction in which teachers collect and analyze data to design instruction and facilitate performance improvement (Walker *et al.*, 2018) <sup>[13]</sup>. When using DDI, teachers must change assessments into instructional practices by collecting, analyzing, and interpreting all types of data (Reeves & Chiang, 2019) <sup>[12]</sup>. Teachers begin with a goal, then collect appropriate data, analyze the data, and then interpret the results to make instructional changes (Mandinach & Schildkamp, 2021) <sup>[9]</sup>. For example, in DDI, teachers use test scores, classroom observations, and teacher-created assessments to determine student weaknesses in content areas (Prenger & Schildkamp, 2018) <sup>[11]</sup>. When teachers can understand and use all of the above data types appropriately, data literacy is achieved because these teachers can interpret and use data to make instructional decisions (Kippers *et al.*, 2018) <sup>[8]</sup>.

Data literacy is understanding and using data to inform decisions and identify, collect, organize, analyze, summarize, and prioritize data (Fontichiaro & Johnston, 2020) <sup>[5]</sup>. Data literate teachers can increase student achievement and contribute to school improvement. Teachers and administrators can use data to identify what students know and how best to teach students based on their areas of need (Vanlommel & Schildkamp, 2019). Data literate teachers are valuable to schools because these teachers can understand how to interpret and use the available data to inform instructional changes (Bolhuis *et al.*, 2019) <sup>[3]</sup>. Across the United States (U.S.), districts have depended on data-literate teachers using data to improve student success and inform instructional decisions (Abrams *et al.*, 2020) <sup>[1]</sup>. The problem is that elementary teachers in South Carolina do not understand how to use DDI to guide classroom practices.

Research studies have shown that teachers may not understand using assessment data to drive instruction (Hubers *et al.*, 2017). Harshman and Yeziarski (2017) <sup>[6]</sup> completed a literature review of 83 resources focused on teachers' processes to guide instruction and the limitations and gaps in how teachers should use data to drive instruction. The authors discovered that data-driven decision-making was used generally and not to help teachers in the daily instructional process. Detailed guidance in subject matter and pedagogical content knowledge are needed for successful data-driven decision-making. With an improved understanding of how to analyze data from assessments, teachers may be better able to guide instruction and provide students with optimal feedback to achieve mastery of required skills (Harshman & Yeziarski, 2017) <sup>[6]</sup>. When teachers can use data from

assessments, formative and summative, student learning improves (Blumenthal *et al.*, 2012) [2]. However, the gap in practice exists between teachers' use of DDI and administrators' expectations of how DDI should be used in the classroom.

**2. Problem and research question**

DDI has become a strategy that districts use to improve education in our country (Prenger & Schildkamp, 2018) [11]. Data is gathered from various assessments, including benchmark, interim, teacher-created, common, and norm-referenced assessments (Park, 2018) [10]. However, the problem in schools is that it is difficult for teachers to take examinations and turn the data into usable information to improve instruction and student learning.

The following research questions were used to guide this study:

**Research Question 1:** What experiences do elementary teachers at a local southern public school have when working with data-driven instructional practices?

**Research Question 2:** How do elementary teachers in a local southern public school perceive the use of data-driven instructional practices in their classroom?

**3. Materials and methods**

A basic qualitative study was used to explore how elementary teachers in South Carolina used DDI to guide classroom practices. Since interviews were the primary data collection method, audio recordings were used for accuracy and notetaking during the interviews. Interviews were transcribed, and open coding was used to identify common themes

**3.1 Participant sampling**

The participant pool for this study included ten current elementary teachers in grades kindergarten through fifth grade in South Carolina. Therefore, the purposeful sampling strategy was appropriate to select participants who teach in grades kindergarten through fifth grade. In addition, participants were teachers with at least three years of teaching experience in kindergarten through fifth grade to account for different teacher experience levels.

**3.2 Data collection**

Data were collected using semi structured, one-on-one interviews with each participant. Each interview lasted 30 to 45 minutes. Interviews are discussions with participants where the researcher gathers information related to the research questions about the participant (Blumenthal *et al.*, 2012) [2]. The data collection instruments and sources included audio recordings of the interview, interview schedule and questions, interview notes and transcripts, and text coding of the transcripts.

A published recording-to-text application was used to transcribe the interviews. Open coding was used after interviewing the participants, identifying common themes that emerged from the interviews. For example, open coding can help identify potential types of assessments, potential tools that teachers use to evaluate assessments, and school organizational characteristics that support data-driven instruction. Also, there was the ability to identify the classroom's lack of assessments, tools, and school organizational characteristics when using open coding.

An automated transcription service was used to code the

audio recordings of the interviews. These tools helped to organize systems for keeping track of data. A secure data management system was used to keep all research material. Word documents were used to transcribe interviews and a user-friendly system for easy access to data, including numbering each transcript, numbering each page of every transcript, and numbering each line of every page.

**3.3 Data analysis**

Audio recordings helped ensure accurate analysis when gathering data during interviews. First, audio recordings were transcribed using current software and coded the transcripts using relevant software. Once the interviews were coded, themes were identified. Analyzing studies involves describing the emergence of findings and comparing themes (Burkholder *et al.*, 2016) [4]. The emergence of findings is the formation of themes or categories identified in the raw data. Finally, comparisons across themes were identified.

The interview consisted of 14 open-ended questions, allowing the participants to share experiences and perspectives on data-driven instruction. Each interview was recorded and transcribed using the Otter software. As the interviews were being recorded, notes were also being taken. Each interview was one hour or less in length.

Interview transcriptions were evaluated and cleaned up for accuracy. Participants were allowed to read over the transcripts and make any corrections. Through member checks, the accuracy of data quality was achieved. Printed transcripts were used to highlight repeated words and phrases. NVivo software was used to create codes and develop themes. The terms and phrases were placed on notecards and sorted based on commonality. These words and phrases were used to create themes. The themes were then matched to the research question; Table 1 shows how the themes and codes were compared to RQ 1.

**Table 1:** RQ1: What Experiences Do Elementary Teachers at a Local Southern Public School Have When Working with Data-Driven Instructional Practices?

Themes	Codes
Theme 1: Teachers have experience collecting a wide range of data when assessing student performance on grade-level material.	Anecdotal notes (Kid-Watching) Tests Quizzes Checklists
Theme 2: Teachers have experiences using data collected to drive classroom instruction.	Small Groups Pacing of lessons Remediation Reteaching
Theme 3: Teachers have experiences determining instructional strategies after gathering data.	MAP learning continuum Collaboration with other teachers Using various modalities Retest using a different tool PLCs
Theme 4: Teachers have experiences meeting the needs of students to improve student learning with data that was collected.	Grading in front of students to correct misconceptions Clarify questions Pretests Various modalities

Table 2 shows the themes and codes related to RQ 2. This research question focused on teachers' perceptions of data-driven instructional practices in their classrooms and their feelings about the helpfulness of administration. Each

interviewed teacher described how helpful administration was when working with teachers and their use of data-driven instruction.

**Table 2: RQ2: How Do Elementary Teachers at a Local Southern Public School Perceive the Use of Data-Driven Instructional Practices in Their Classrooms?**

Themes	Codes
Theme 1: Teachers perceive challenges when working with data-driven instruction.	Inaccuracies Beyond grade-level standards Not a quick turn around Accountability
Theme 2: Teachers perceive the administration's support to be helpful when using data to drive instruction.	Provide resources Supportive Collaboration

**4. Results**

Six themes were identified with 23 codes. Each theme was matched to the research questions. The findings of each research question are summarized, and examples from the interviews are provided. A total of ten interviews were conducted, with each participant numbered according to the order of the interview.

**RQ1**

Teachers were asked what experiences they have when working with data-driven instructional practices through the interview questions related to RQ1. These questions relate to the conceptual framework for this study, the learning target theory of action. Teachers described their instructional decisions based on an assessment process used in their classrooms. Four themes were developed from these interview questions to answer the research question. Each theme highlighted teachers' various experiences when using data in their classrooms.

**Theme 1: Experiences When Collecting Assessment Data on Grade-Level Material**

For Theme 1, teachers have experiences collecting assessment data on grade-level material; the most occurring codes included chapter tests, quizzes, formal assessments, and observations. Participant 1 described how she uses pre-assessments to gauge her students and where they need to go. She said, "Usually, I'll do some sort of pre-assessment to gauge where the knowledge my kids have to see how far back, we need to go. And then that will kind of guide where I need to start." Participant 2 described how she uses observations as her primary data collection form. She starts with a checklist with the students' names listed. She then puts a check beside the student's name if they mastered the skill, a check minus if they seem to be struggling, and a minus if they just do not get it. She uses this checklist to determine how she will proceed with her instruction. The lower-level teachers used running record data, guided reading group notes, and small group observations to assess students. The upper-level teachers described using more classroom assessments to evaluate student performance. For example, participant 2 said, "I will use data from assessments like our chapter tests or our quizzes that we do." Participant 9 said, "We assess, usually at the end of the week, with a formative quiz and our homework." Through the questions related to this particular theme, only three of the ten participants had a formal way of keeping up

with data collected through observations. Participants 2, 8, and 10 showed me how they collected and used their data to drive instruction. The other seven participants said that they kept their information in their heads. However, they could not show evidence of how they kept up with information collected while observing students. Communicating effectively with administrators and parents may not be as detailed and helpful for driving instruction without appropriate documentation of student progress.

**Theme 2: Data is used to Drive Classroom Instruction**

The main codes found in Theme 2, data used to drive classroom instruction, are small groups, the pacing of lessons, reteaching, and remediation. Participants 1, 2, and 9 stated that they like to go over tests with the students right after they are taken. Participant 1 said she likes to go over assessments, discuss questions that most students missed, and correct any misconceptions. Participant 2 grades assessments, puts them in order by score and pulls students one-on-one to clear up misconceptions. Participant 3 said, "You have to look at their data to where they are and pick up from there and move them to where they need to be. I use data all the time to differentiate instruction." Participant 10 stated that once tests are given, graded, and recorded in the gradebook; the tests are aggregated to see which problems are missed most and by who. This information is used to pull small groups during workshop time. Participant 4 said, "Data helps me make sure that I'm not just always teaching to those mid kids. I'm looking at my lower kids, then my higher kids, those kids that always get left out." Participant 5 described how she uses data once students have completed them. She said, "First, I review them and see what I have taught well and not taught well because if everyone missed it, then it's not the content; it's me."

**Theme 3: Determining Instructional Strategies after Gathering Data**

The main codes in Theme 3 include MAP learning continuum, collaboration, modalities, PLCs, and retesting. Several participants said that they use different approaches to teaching material. For example, they may need to switch up activities between visual, auditory, and tactile means. Participant 7 stated that when determining teaching strategies, "it might just be different approaches needed to teach something. Sometimes it might be just more exposure to it, that it's maybe a concept that's a little more difficult. Sometimes it might be kind of more of a spiral that it might be something I'll review over the next few days." Participant 3 discussed the importance of using the MAP learning continuum when deciding what to teach her students. She said the school had spent many meetings discussing using MAP data to teach students. She said, "It has really hit home with me about looking at those MAP scores and seeing where they are, what their lowest score is, and what I need to cover to bring them up to grade level."

**Theme 4: Meeting the Needs of Students to Improve Student Learning**

Theme 4 uncovered codes, such as grading in front of students, correcting misconceptions, clarifying questions, pretests, and modalities. Participant five teaches second grade, and she said:

The main goal is to just give them what they need, like find where there is a hole and fill it. That's done with one-on-one instruction, small group instruction, and peer instruction. A whole lot of scaffolding is needed to meet them where they are. We don't expect fish to climb trees. Just let everybody be where they are and grow them from there.

Participant 6 said she believes in using a variety of activities and is a firm believer in learning styles. She said, "I try to have a variety of activities that pinpoint all of those different needs."

Participant 9 said that meeting the needs of all students is probably one of the hardest things to do because there are so many different levels in one classroom. She explained how she would pull individual students and ask them questions they missed on a test to see what the misunderstanding could have been and see if that clears up misconceptions. She also said that she has to be aware of how the students react to the lesson and change her teaching strategy so students can understand.

## RQ2

RQ2 focused on determining how teachers perceived the use of data-driven instruction in their classrooms. Two themes were developed from the interview questions to answer the research question. These themes relate to teachers' perceptions of challenges in the classroom and administration support when using data in the classroom.

### ***Theme 5: Perceived Challenges When Working with Data***

Theme 5 uncovered four codes: inaccuracies, accountability, delayed information, and beyond grade-level standards. Participant 8 said she does not like that some test results take so long to get back to the teacher. She said, "Sometimes the results don't come back until the next school year, and that is not helpful at all." Two participants expressed concerns about students who struggle with testing in general and do not do well on required assessments, like MAP. Participant 5 said, "The only challenge I've ever experienced is when you know that a child isn't getting it, but you can't figure out where the gap is coming in." She stated that some of her students understand the material one day, but then do not perform well on assessments or do not know the material a day or two later. She also said, "The children who aren't here often miss assessments, and you don't know if it's because they genuinely don't know or because they haven't been to school enough days to actually get the content."

Participant 9 also said that one challenge she faces is the accuracy of the test.

Five of the ten participants said their challenges made them not want to use data in their classrooms. Participant 7 noted that it was discouraging because teachers are held accountable for student performance on one piece of data. Participant 5 said she sees the value of using data but using data for job security makes her not want to use it sometimes. She described how one student took the MAP test in 12 minutes. The student had 54 questions to answer, and she felt this child's score was not a true reflection of what the child knew. Participant 9 said that the challenges she described make her not want to use data. She did say that not all data is bad and that her classroom assessments are

more valuable than state or district-mandated assessments. Participant 8 noted that state and district requirements put too much pressure on students, and she does not like using those assessments for that reason. She also felt that MAP testing was unreliable because it tested students outside their grade level and held them accountable for making unrealistic gains.

The other five participants did not feel that the challenges they presented had caused them to discredit the value of using data in their classrooms. Participant 2 said that she would never stop gathering data and looking at it to improve student learning, but she does not like the pressure teachers, and students feel when district and state assessments are given to students. She said that these types of evaluations are never going away.

Participant 3 enjoys using the data. She said she likes comparing data gathered and seeing how students have grown. She said, "Looking at data tells you many stories." Participant 4 said that her challenges do not affect her using data. She said that she knows her students and what they can do. Participant 10 described how data was very effective in her classroom, no matter the challenges. She would still use data daily.

### ***Theme 6: Perceptions of Administration Support***

Theme 6 uncovered codes including helpful, supportive, and collaboration. The questions used to address this theme searched for teachers' perceptions of the administration's support of data-driven instruction. All ten participants felt that the current administration provides support and tools needed to use data in the classroom.

Participant 9 said, "We have PLC meetings where we talk about data, and I feel like it's a non-threatening environment." Participant 1 said that she feels like teachers in our school get a lot of support from the administration.

Participant 2 said the support is fantastic. She shared:

I can't even put it into words because I have experienced it both ways. You know, where you were not trusted, and you were made to feel like you couldn't make those decisions on your own. Now, they're like; you do you. Do what you feel is best for your students. That really means a lot to me, it makes me want to work harder, and it makes me want to just be the best that I can be.

## **5. Conclusion**

This qualitative study was conducted to determine the data-driven instructional practices of teachers at the study site. Based on the study findings, teachers used various formative assessment data to drive classroom instruction. However, many teachers did not have a system for documenting their data. These findings indicated a need for developing a 3-day professional development (PD) workshop focusing on how best to collect, record, and use data from formative assessments.

Future research could focus on implementing effective Professional Learning Communities (PLC), a type of Professional Development (PD). The formative assessment data collection tools created in the PD are a start to constructive conversations among all stakeholders at the study site. Once this type of information is consistently collected and used in the classroom, a deeper understanding



of the PLCs at the study site could be evaluated. Effective PLCs could relate to positive school improvement of student data.

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