No Excuses: How One District Made Sure Students Thrived Mathematically Through The Pandemic

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Abstract

The global pandemic left many schools across the country content with low expectations regarding student achievement (Gross & Opalka, 2020). It seemed as though learning loss and academic struggles would become the norm for students throughout the country, particularly in mathematics. Though few states could maintain or improve math performance on their respective standardized testing, there were examples where individual schools could prevent a learning loss and improve academically from where they were from 2019 to 2022. Out of 3700 school systems, seven of the top ten systems with the highest gains were from the state of Alabama (Crain, 2022). A case study was designed around one of these school systems, referred to in this paper as The Martell School System. This study catalyzed fellow school district leaders to learn strategies that could be duplicated in other systems for school improvement. Through times of change and uncertainty, influential instructional leaders maintain high levels of expectation. Through interviews with school and district leadership, and data analysis, knowledge will be gained that will allow schools to learn from these instructional leaders and implement strategies with their students as we return to normalcy.

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Introduction

There is little debate that the global pandemic created unprecedented challenges for educators throughout the United States (Buda & Czekman, 2021). It seemed as though learning loss and academic struggles would become the norm for students throughout the country, particularly in mathematics. Although no state as a whole was able to maintain or improve math performance on state testing, there are examples where individual schools were able to prevent a learning loss and academically enhance from 2019 to 2022. Out of 3700 school systems, 7 of the top 10 systems with the highest gains were from the state of Alabama (Crain, 2022). One of the highest-performing school systems was the Martell City School System, a small city school system in Martell County, Alabama. Martell City Schools saw gains of .753 from 2019 to 2022. Changes in math scores were tracked from 2019 to 2022 using publicly reported assessment data (Crain, 2022). Using a framework of existing research about factors that drive student success, this study attempted to identify strategies that correlate to these factors and perhaps broaden educators' understanding of student achievement.

Pandemic Problems

At the time of publication of this article, the magnitude of academic consequences was still relatively unknown. Initial studies showed the completion of academic tasks and increased disparity among students who completed standardized testing in schools worldwide (Engzel et al., 2021). Standardized testing was not the only concern K-12 school personnel were burdened with. The ability to recruit students back into the school building and see them through completion was also a concern. Schools that housed students who struggled academically before the pandemic continued to see increased dropouts and poor academic performance as students returned to a traditional school setting (Khan & Ahmed, 2021). Mental health became a concern for guidance counselors, teachers, and administrators as students, including some who missed over a year of social interaction, returned to school. Reports showed that up to 83% of young people reported worsened mental conditions post-pandemic (Grubic et al., 2020).

Modality of instruction became a concern during the pandemic. As schools prepared to resume teaching, educational leaders had to decide how to best deliver the curriculum and instruction. Some schools shut their doors altogether, while others attempted to educate students remotely or through a hybrid model. Korhonen et al. (2021) explained, "As the autonomous implementers of the curriculum, this exceptional period calls for the ability of teachers to not just adapt to changing circumstances but also use innovation skills to create new practices" (p.170). It should come as no surprise that many teachers struggled to adapt to teaching hybrid or remote. Teachers, many of whom had little to no experience with online education, were forced to teach standards via new methods with which they were unfamiliar. Some struggled to connect with their students, while others saw a rise in academic dishonesty as they could not establish norms and expectations (Matić, 2021).

The Math Dilemma

Even before the pandemic, concerns overwhelmed the nation regarding student achievement in mathematics. All schools across the country saw math scores plummeting before the pandemic, and Alabama ranked dead last in this area by NAEP rankings in 2019. Moseley (2022) wrote the following:

In 2019, 45% of Alabama's fourth graders were proficient in math. In 2021, that number had plummeted to just 24% proficient. In 2022, that number had climbed to just 32%. Only 32% of students who mastered fourth-grade math by the end of the fourth grade will have lifetime consequences for those who failed to grasp basic math concepts. However, the collapse in math proficiency was much worse in other states, so the state jumped in the NAEP rankings from 52nd place nationally to 40th" (para. 4).

Although initially, one may conclude schools to be on the right path, the jump in rankings had more to do with other states failing to progress during the pandemic and Alabama holding steady or regressing at a lower rate during the pandemic (Mosely, 2022). Some researchers believe the key to improving student achievement is increasing the competency of teachers through high-quality professional development. They feel that the most effective professional development requires teachers to attend an initial professional development session followed by mini-workshops to reflect on and enhance their practices (Gersten et al., 2014). Plenty of data and educational theories claim answers to increasing educational outcomes. One would be remiss not to consider the work of Hattie, who has dedicated his research to analyzing factors that most impact student achievement. Hattie (2017) identified over 250 influences and their respective effect sizes through research involving millions of students. The top seven factors include collective teacher efficacy, self-reported grades, teacher estimates of achievement, cognitive task analysis, response to intervention, Piagetian Programs, and the Jigsaw Method.

Collective teacher efficacy, self-reported grading, and teacher estimates of achievement

A learning organization comprises many players with individual beliefs, perceptions, and mental models. Research shows a positive impact on student achievement when there is alignment among faculty. Hattie's number one factor that he identified as an influencer of student achievement is collective teacher efficacy—the belief of a school's faculty that the collaborative efforts of teachers will positively impact student achievement Hattie (2011). Collective teacher efficacy is a marriage between personal convictions and institutional belief. Goddard et al. (2000) explained, "Collective teacher efficacy is a way of conceptualizing the normative environment of a school and its influences on both personal and organizational behavior…teachers' beliefs about their faculty's capability to educate students constitute a norm that influences the actions and achievements of schools" (p. 502).

Self-reported grading refers to the ability of students to assess their mastery of standards and objectives and anticipate how they will perform on assessments (Hattie, 2011). Having students self-assess and set attainable goals for themselves can occur informally through one-on-one conversations with the teacher or through strategic events such as student-led conferences. Bailey and Guskey (2001) argued that "student-led conferences require students to take most responsibility for reporting what they have learned. To prepare for this responsibility, students must evaluate on reflecting upon their work regularly…In short, students must be actively involved in learning" (p. 6).

The third highest influencer of student achievement is teacher estimates of achievement, with an effect size of 1.29 (Hattie, 2011). The potential for research on the impact of relationships between teachers and students is vast regarding teacher practices and student response to instruction. Fredriksen and Rhodes (2004) suggested that "supportive relationships with teachers may augment students' motivation to learn and actively participate in subject domains that have traditionally held little interest for them" (p. 45).

The benefits of supportive relationships between students and teachers are not mutually exclusive. Just as students are shown to excel academically, teachers have experienced an improvement in their mental health when they intentionally develop interpersonal skills and bonds with their students (Spilt et al., 2011). There are questions to be answered regarding the effect size of teachers' mental well-being related to burnout and the number of teachers retiring. In a time when we see teachers leave the profession faster than they are entering, this is no small detail and is worthy of further investigation.

Cognitive Task Analysis and Response to Intervention

Cognitive task analysis means that the student does not simply learn the content but deeply understands the learning objective and outcome and can apply it to other concepts (Hattie, 2011). This concept has similarities to Bloom's taxonomy, where learning occurs on different levels, and teachers strive to expand content from simple to complex ideas. The main difference is that Hattie emphasizes that the teacher makes excellent efforts to assess the student's learning level and gradually builds. Hattie (2011) pointed out that "teachers must know at what phase of learning the student is best invested in learning more surface ideas and moving from the surface to a deeper relating and extending of these ideas. The aim is to work at, or +1 beyond, where the student works now" (p. 107).

Schools across Alabama and the United States use Response to Intervention (RTI). School district leaders have invested time and money into implementing what they feel are best practices in addressing deficiencies among students in reading and math. Efforts in Alabama have been amplified since adopting the Literacy Act (Schuyler, 2022). This law, delayed a year due to the pandemic, requires third-grade students to be on the reading level before being promoted to the next level. RTI models are typically multi-tiered approaches to intervention that usually start with adjustments to whole group instruction, progress to small group instruction, and in cases of students with the most significant deficiencies, individualized support outside of the classroom setting with specialized education. Progress monitoring during intervention is a critical component of RTI models and varies from school to school. "The primary goal of RTI models is the prevention and remediation of academic and behavioral difficulties through effective classroom instruction and increasingly intense interventions…districts that successfully implement RTI models may improve achievement and behavioral outcomes in all students, especially those most at risk for academic difficulties" (Fletcher & Vaughn, 2009. p. 35).

Piagetian Programs and the Jigsaw Method

Discovery-based, hands-on learning theories are certainly familiar concepts, although the idea was considerably challenged during the pandemic with doors shuttered. The central timeless theme of Piagetian programs is that before teachers attempt to deliver content to their students, they must first understand how children think (Hattie, 2011). This requires them to be cognizant of students' different academic abilities and intelligence levels on their roster. Kaplan (2018) found that Piagetian theories "describe how humans construct and adapt understanding through processes of sensory and intellectual development through experience in the environment (p. 831). Understanding that students learn and acquire knowledge at different stages is vital to teaching and student achievement.

The last effect identified by Hattie that I will discuss is the Jigsaw Method. The Jigsaw Method is an instructional cooperative learning technique in which students are placed in home groups and rotated to other stations where they become experts on topics. Students eventually

return to their home groups, disseminating information to their classmates (Hattie, 2011). The unique concept of the Jigsaw Method is not that it allows students to take the role of the teacher, but it encourages collaboration, team building, and learning. Teachers who utilize the Jigsaw Method effectively see improvements in reading comprehension, as students are motivated by the technique that allows interaction with their peers (Salahi, 2019).

Research Questions

This study aimed to analyze the perceptions of district and school-level educators' perceptions of their student's academic success during the height of the pandemic. While other schools across the nation struggled with learning loss, Martell City Schools saw the third highest gains in the state of Alabama in math at .75 growth (Crain, 2022). While several themes emerged throughout the study that gave rise to other questions, two main research questions drove the interviews and follow-up questions:

1. What do educators in the school district attribute their mathematical success related to other schools during the pandemic?

2. What strategies will the district continue beyond the pandemic that can be of value to other schools and districts?

By appropriately answering these two questions, one is likely to take lessons learned and apply them to classrooms throughout the state and nation as we seek a return to normalcy in public education.

Methods

Student achievement and school accountability are educational buzzwords that were in place long before the pandemic hit. The general public now has more access than ever to school data, and rankings and comparisons are available for criticism and commentary online twenty-four hours, seven days a week. While many schools struggled to educate students during the pandemic for many reasons effectively, instructional leaders find themselves in a situation where they can look at schools and districts that saw success and learn from them. This study focuses on decisions that impacted student achievement at the district and school levels.

Research Design

The design most appropriate for this study was qualitative. The researcher provided unique access and perspective of stakeholders within the district who had firsthand knowledge of what made them successful. This study allowed the researcher to examine the individual experiences and perspectives of educators within the school district, learn what they believe drove student achievement, and compare it to existing literature that explicitly cites factors to which student success can be attributed. The researcher wanted a study that allowed the participants' stories to be told and to determine if they corresponded to existing educational theory. Interviews allowed for follow-up questions, and participants could express themselves freely as pseudonyms were given to protect their identity. Participants were also invited to submit artifacts for consideration and evidence to be included in data analysis.

The research was conducted in a bounded case where district and school-level educational leaders utilized various strategies and techniques to limit mathematical learning loss during the pandemic. This study's case was a small city school system comprising five schools. Multiple data sources were analyzed, including formal and informal interviews, documents, and

observations. The case study design was chosen as it was most appropriate for helping to answer the research questions of this study, and asking open-ended interview questions allowed for a free-flowing conversation and understanding of the case on a deeper level, as opposed to survey questions which would limit the responses. This study was designed around understanding factors that have been proven to impact student learning positively. One of the goals of this study was to understand how strategies utilized by educational leaders in the school system corresponded with techniques that we already know impact student achievement. Another goal was to understand the uniqueness of the methods employed in this particular system.

Sampling and Data Collection

Martell City School System is a public city school system in rural Alabama. It is comprised of five schools. Last year, the district served about 2,300 students, with more than 12% having limited English proficiency, 60% economically disadvantaged, and 7% homeless. Students with disabilities comprise about 12% (Alabama State Department of Education, 2022). Participants in this study included employees who have either previously served or currently serve as central office administration, teachers, principals, and assistant principals within the district. Participants were recruited through an email forwarded by the superintendent, and interviews were set up at the convenience of the participants. Purposeful sampling was used to gain multiple perspectives on what strategies could be mainly attributed to success within the district. Interviews were conducted and flowed in a way that allowed unique stories and attitudes to be shared based on the participant's role.

Formal and informal qualitative data collection methods were utilized during this study. Along with formal interviews, data was collected through recorded field notes, artifacts made available by the participants for the study, and public information from the schools' websites. These documents were used to compare themes from participant responses and general field notes. Structured interviews focused on the research questions at hand. Interviews were arranged with participants through recruitment emails facilitated by the superintendent, referred to in this paper as Dr. T. For the sake of protecting identification, all participants, including Dr. T, will be given pseudonyms in discussing their responses in the data analysis and conclusion session when direct quotes are included. Measures were taken to keep the position of those responding to questions. This allowed participants to answer freely without fear or detriment to their posts within the district. Participation was voluntary, and participants were informed of their opt-out rights. Although interviews were semi-structured, a list of several themes was kept with each interview, and notes were made as the interview took place. These themes included the strategies proven to positively affect student achievement discussed in the literature review (Hattie, 2011). Interviews were recorded and transcribed. After transcribing the interviews, key points from each question were summarized. Interview summaries and clarifying questions, if applicable, were sent to participants who were given the opportunity for review and input. Participants were also provided with contact information to clarify any of their points. One of the participants was unavailable for an interview and elected to send the responses to the questions in written form. The interview was later followed up with a discussion via telephone conversation.

Data Analysis

Data transcriptions were analyzed, looking for repetitions, metaphors and analogies, transitions, similarities and differences, linguistic connectors, missing data, and theory-related material (Bernard & Ryan, 2010). Data were also coded using a priori code correlating to the

Table 1

Codebook

Category	Code	Operational Definition	Data Exemplar
Analysis of multiple forms of data	AMFD	Reports of analyzing multiple forms of student data	We very much were. Data-driven, and we I know people talk about this and don't really do it. But I'm telling you we did it where we actually adjusted our instruction based on our data.
Vertical alignment of math instruction	VA	Reports of aligning math curriculum	I know if I push vertical progression, what happens in the midst of that is that horizontal grade level, shared planning. ownership has to happen for it to go up and down vertically.
Teacher goal setting for students and progress monitoring	GS	Reports of teacher goal setting and monitoring student progress/adjusting	We do a phenomenal job of individual student goal-setting in our lower elementary grades. Our students have learned to identify their strengths and weaknesses and can communicate that to their parents in our student-led conferences at our elementary schools. We are beginning to implement those same strategies at our high grade levels.
Servant leadership	SL	Reports of servant leadership/leading by example	The kindergarten teacher, all the way up through that principal through Central Office is, we believe in mission work. So what is our mission? What is our field? Where are we? Where do we do it? And we try to get our kids to do it. And that's one thing I think when kids realize we care about them and others.
Relationships	R	Reports of addressing student need beyond academics	In our district, we try to do various things to ensure that our students have someone they can trust and go to in the event of need.
Strategic professional development	PD	Descriptions of professional development	Over the last 5-6 years, our school district has invested significant time and resources into professional learning for our teachers. Our teachers have become more confident in their abilities to teach mathematics using proven strategies for enhancing student learning during that time frame. This has played a major role in the successes we have recently experienced.
Individualized student needs	ISN	Reports of Addressing individualized student needs	We utilize our "Pirate Period" as a form of advisement in which students are assigned to a particular teacher, and that teacher mentors those students each week.
Continued academic efforts during the pandemic	CAE	Reports of continuing work done before the pandemic began	We felt it was extremely important to continue delivering good quality instruction to meet the collective and individual needs of our students.
Reviewing previous academic content	RPC	Reports of curriculum/academic review	For 50 minutes a week, I've got a math teacher to teach them at a 3rd grade level, or whatever level they are at.
Hattie identified actions.	HA	Reports of actions identified by Hattie (included in interview questions and lit review)	(Responses to interview questions were all Hattie Based)

actions identified by Hattie as having a significant impact on student achievement. Utilizing multiple techniques allowed me to see patterns and reduce data into distinct categories. As themes were created, I created a codebook to include a list of codes, identification of principles, operational definitions, and data exemplars. (See Table 1).

Warrants and assertions were made while seeking out disconfirming evidence for each warrant. Warrants and reports were included as part of member checks, and participants were allowed to respond to or refute any warrant and assertion that they declined.

Results

This study aimed to determine what strategies educators in Martell utilized to limit the learning loss of students in their district at the start of the pandemic. At the same time, other schools across the country saw significant learning loss. Research questions addressed during the study included the following:

1. What do educators in the school district attribute their mathematical success related to other schools during the pandemic?

2. What strategies will the district continue beyond the pandemic that can be of value to other schools and communities?

To help answer these questions, I interviewed educators and examined artifacts and field notes. Rather than discuss each research question individually, I will discuss the major themes that emerged from this study, including analysis of multiple forms of data, vertical alignment of math instruction, teacher goal setting for students and progress monitoring, servant leadership, relationships, strategic professional development, individualized student needs, continued academic efforts during the pandemic, higher order thinking activities, and Hattie identified actions. Because there was much overlap in the data, some of these themes can be combined as findings are discussed. Because interview questions included the top actions identified by Hattie, discussions of this theme will be included in each debate.

As data were analyzed, it became apparent that although the participants had different actions for which they credited their success, some were accepted across the board as significant influences over the positive student achievement they saw. Multiple participants spoke passionately about how when schools shut down during the pandemic, Martell City School system leaders doubled down on continuing to do what they needed for student success. This theme emerged more so than any other theme throughout the data analysis. Participant 1 stated, "Some people were surprised at some of the things we continued doing. We continued progress monitoring. We continued intervention with students who needed it". Participant 2 talked about continuing a high level of instruction. Participant 3 agreed that while it was an event like nothing anyone had gone through, the teachers did an excellent job of keeping things as normal as possible. Principal and central office participants quickly credited teachers with maintaining the course. Hattie's action of collective teacher efficacy resonated with participants. Participant 4 stated, "Throughout the pandemic, our organizational goal was to focus on the processes rather than the eventual outcomes. We felt it was essential to continue delivering good quality instruction to meet our students' collective and individual needs".

Participants were asked to describe their response to intervention models, self-reported grading examples, and what role both actions played in the success. While most participants did not specifically identify self-reported grading as a factor that led to winning, all participants spoke about the benefits of goal setting. Participants credited teachers with taking data from progress monitoring and setting goals for students. Some schools in the system utilized student-led conferences to connect with parents and explain their child's academic progress. Participant 4 stated, "We do a phenomenal job of individual student goal setting at our lower elementary grades. Our students have learned to identify their strengths and weaknesses and can communicate that to their parents in our student-led conferences at our elementary schools. We are beginning to implement those same strategies at our high-grade levels". Participant 2 was very confident that anyone could "walk into a 5th-grade classroom, and ask a student his or her math goal, and get a quick response." One participant who served as a teacher described the process. "We were given autonomy as to how we did it, but we were expected by our administration to meet with our students one on one and set those goals."

Interviews of this study included a specific question regarding teacher efficacy of achievement and, specifically, the power of relationships. However, it was surprising to hear participants discuss the power of district-wide relationships between employees and students. There would appear to exist a district-wide commitment to serving as a positive influence on students. Further evidence of district-wide service was provided through a continuous improvement presentation, as one of the district's core values explicitly states, "All persons bear responsibility for contributing positively to the community." One participant (not the superintendent) gave an example. "We are small enough and close enough that our students know that if they need Dr. T, it does not matter that he is the superintendent. They can go to him. We have that open door". Another participant described one of the tenants of Martell as "We believe in mission work. We want our kids to be servant leaders. When kids realize we care about them and others, we start seeing a change."

The theme of vertical math planning and curriculum alignment emerged throughout the data analysis. This is true from both interviews as well as document analysis. In a public presentation, the superintendent cites the vertical alignment of the math curriculum as a notable achievement for Martell City Schools. Participants identified this as a source of their success as well. One participant explained a conversation between math teachers from different grade levels. The lower grade level teacher had shown some frustration at not seeing students having success at a particular skill. After dissecting the associated standard, they realized there was some out-of-sequence teaching going on, and they were able to make some adjustments to their instruction. Another participant cited vertical planning as an example of collective teacher efficacy. The participant stated, "The big thing for me is vertical progression, being aligned K-12. That is how we check on teacher efficacy."

The final themes that emerged throughout the interviews and document analysis were individualized student needs and reviewing previous academic content. These themes commonly emerged through questions about responses to intervention programs, Piagetian Models, and the Jigsaw Method. One participant stated, "We have started focusing on preparing kids for success here in our community, focusing on skills may be that they do not know they even have…We want our kids to be critical thinkers". Another participant described a jigsaw session that evolved into a regular flipped classroom. The participant pointed out, "I watched a student create a model for multiplication. It was the coolest thing that he created, representing a three-digit addition. All

it was place value, but he came up with it, or so I thought. After talking to him, another student came up with the strategy and taught him, who then taught the class."

Discussions and Implications

Several lessons are to be learned from educators in Martell City Schools System. The first evident lesson is that vision and direction must be communicated. Many school systems were shell-shocked and unprepared to shut their doors at the pandemic's start. Those schools that were grounded in what they did at least had the advantage of knowing what they were trying to maintain. Vertical alignment requires excellent cooperation and communication among school and central office administrators and teachers. Shared teacher efficacy is critical to everyone buying into the same beliefs. Most teachers believe students can learn. It is also fair to say that everyone has a set of ideas about what must be done. Martell Schools was successful mainly because the leaders of the systems could get principals and teachers in different buildings to work together under standard guidelines and a common purpose. Unsurprisingly, many of the district's educators' actions mirrored those identified by Hattie (2011) as having a meaningful effect on student achievement. Opportunities for future research in casting a shared vision and how to instill buy-in from all educators would be most enjoyable.

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