THE IMPACT OF TEACHER SENSEMAKING AND ATTRIBUTION THEORY ON

INSTRUCTIONAL DECISION-MAKING

by

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ABSTRACT

This dissertation discusses the relationship between teacher sensemaking, attributions, and instructional adjustments prompted in response to student performance data. Through this qualitative observation study, this paper explores the varying perspectives of teachers, including their level of assessment literacy, and the dynamics of their Professional Learning Community (PLC) teams, and how they impact the teachers' perceptions of student performance data. Furthermore, this research examines how leaders in the field can leverage the insights gained from teachers' sensemaking processes to better support them in the context of a PLC. This dissertation aims to contribute to the research surrounding teacher sensemaking and attribution theory to gain a deeper understanding of factors that influence instructional decision-making.

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LIST OF TERMS/ABBREVIATIONS

Professional Learning Community (PLC) - A PLC is defined as a group of educators committed to working collaboratively in ongoing processes of collective inquiry and action research to better results for the students they serve (DuFour et al., 2020).

Student Performance Data – data relating to student performance in the form of student work samples, formative assessments, or summative assessments.

Sensemaking - a sequence in which people with identity in the social context of other actors engage ongoing circumstances from which they extract cues and make plausible sense retrospectively, while enacting more or less order into those ongoing circumstances (Weick, et. Al, 2005, p. 409

Attribution – explanations that allow creation of new understanding or reason.

Assessment Literacy - an individual's understandings of the fundamental assessment concepts and procedures deemed likely to influence educational decisions (Popham, 2011, p. 267)

Instructional Decision-Making – informed choices concerning methods of instruction

Organizational Context – characteristics of an organization such as routines, access to data, leadership, time, norms, and power relations (Coburn & Turner, 2011).

Overview

Sensemaking is described as "a sequence in which people with identity in the social context of other actors engage ongoing circumstances from which they extract cues and make plausible sense retrospectively, while enacting more or less order into those ongoing circumstances" (Weick, et. Al, 2005, p. 409). In other words, a person's web of beliefs, prior experiences, cultural backgrounds are all factors that impact a person's ability to make sense of the world around them (Orman & Ullian, 1970). When we think about this in the context of teaching, how a teacher makes sense of student performance, behavior, or the content they are teaching could have an impact on their instruction and therefore, student outcomes (Bertrand & Marsh, 2015). Teacher sensemaking is not often something we necessarily consider when we view a teacher's effectiveness, but understanding sensemaking can help us to determine the link between teacher instruction and student performance (Coburn, 2001).

Therefore, as we determine a teacher's level of assessment literacy – their ability to know what assessments to apply to acquire knowledge about what their students can and cannot do – we must consider factors that could guide their sensemaking. For example, without having strong assessment literacy, teachers may make incorrect inferences about student understanding when looking at data or student work. Educators' ability to make sense of the performance of their students relies heavily on their level of assessment literacy, or "an individual's understandings of the fundamental assessment concepts and procedures deemed likely to influence educational decisions" (Popham, 2011, p. 267).

If teachers are assessment literate, odds are that their classroom assessments will be better, because those teachers will know not only what it is that constitutes defensible versus an

indefensible assessment, but also what represents an accurate versus an inaccurate interpretation of assessment-elicited data. (Popham, 2009, p. 6).

This study builds on Bertrand and Marsh (2015). In their study, like the design of this study, they observed teacher interactions in their professional learning communities (PLCs) to get an idea of how teachers were making sense of student performance. It was through these observations they discovered the phenomenon of attribution theory. That is, as teachers were going through the process of sensemaking, they were attributing student performance to different factors; some in which they felt they had control, others they did not. We cannot always visualize how teachers make sense of areas that influence student performance but can get an idea through observing their social interactions with colleagues through formal and informal conversations (Coburn, 2001).

Attribution theory is a result of teacher sensemaking (Bertrand & Marsh, 2015). When a teacher can attribute a student's score to a given reason, this allows them to create new understanding or reason about the performance, which could impact how they respond to student performance (Bertrand & Marsh, 2015). Sometimes, these attributions cause the teacher to act and adjust their instruction, other times they serve as a reasonable explanation to the student's performance. The idea of attribution theory helps link teacher sensemaking to their response to student performance. The purpose of this study is to determine if that response to student performance, driven by sensemaking and the formation of attributions, has an impact on the instructional decisions teachers make. This study is driven by the work of Bertrand and Marsh (2015) in which they researched how teachers make sense of student learning and attributed the results they observed and adds to their work by examining how the sensemaking process and attributions formed impact instructional decisions.

Context

      The goal of this study was to determine in what ways teacher sensemaking and the attributions found through sensemaking impacted teachers' decisions to make instructional adjustments in response to student performance data. One facet of teacher sensemaking was observed through conversations in PLC meetings.

      The research took place in the Fall semester of the 2023-2024 school year at Mountain Oak High School. Mountain Oak High School is a large comprehensive high school in the fourth largest school district in its state. The school district serves over 50,000 students and is made up of 51 schools included elementary, middle, high, alternative, and one virtual school. The Algebra 1 and English 1 teams at Mountain Oak High School were the focus of this study. Each team met formally once per week to discuss the most recent student performance data. Team meetings were attended by all team members, an instructional coach, an administrator, and the lead interventionist. These meetings took place during the team's common planning time in the PLC leader's classroom. Each team had a designated start time and had up to ninety minutes to complete this meeting. In these meetings, team members discussed student performance data on the most recent common formative assessments given to their students, and how they responded instructionally to the student data. Team members also used this time to talk about pacing and plan out their instruction for the coming weeks. Each team created a list of norms, or expectations, that all team members agreed to abide by to ensure the meeting ran in an efficient manner.

Statement of the Problem

      So much accountability is placed on schools and specifically teachers to impact positive student outcomes. When student outcomes do not meet expectations, reform efforts are created and used to

improve student outcomes. Teachers who teach a content area that has a required, state mandated end-of-course exam face the added pressures of students scoring in a range that is considered proficient by the state or in a range that meets or exceeds their students' state projection. State projections are created based on a student's historical data on standardized tests. If students meet or exceed their state projection, the state recognizes this student as growing academically. A percentage of an average of all students' growth is factored into an accountability grade for the classroom teacher, their school, and school district. These accountability grades can be used to decide about teacher retention and public perception of schools and school districts. With these pressures, teachers are more incentivized to analyze and make sense of student work to adjust their instruction and meet the academic needs of their students. Understanding how teachers make sense of student work and use this sensemaking to adjust their instruction is important for understanding the everyday work of teaching in the modern system.

Purpose of Study

The research of this study allows decision-makers to gain insight into the processes affecting student outcomes that might be overlooked. School leaders can often misunderstand the perspectives of teachers and what factors could influence their instructional decisions due to their differing vantage points. Understanding what factors influence teachers' sensemaking could shape the way their building is run, the emphasis they place on PLCs, the culture of their school and conversations around student performance, and how they support teachers instructionally.

One purpose of school leaders is to support teachers through an environment of collaboration and instructional growth, both of which involve teacher sensemaking. Understanding that conversations in PLCs could play a key role in the sensemaking process, and in turn the response to student performance, could aid school leaders in understanding the importance of facilitating a productive PLC meeting.

There are a variety of factors that influence teacher sensemaking, both inside and outside of the school building. This research could inform teachers on common teams, so they understand the significance of working relationships with their colleagues. The conversations held around student work, how they hold one another accountable, and ways they support each other through conversations could all impact the sensemaking process. Teacher sensemaking, the attributions formed through the sensemaking process, and the conversations that foster sensemaking could allow all parties to identify key factors within their domain that influence instruction, and therefore produce student outcomes.

Research Questions

The purpose of this qualitative observation study was to analyze the role teacher sensemaking played in teacher response to student performance data in Algebra 1 and English 1 teachers at Mountain Oak High School. With this purpose in mind, my research questions are:

RQ1: How do teachers engage in sensemaking through their interactions in a PLC?

RQ2: How do teachers form attributions through their interactions in a PLC?

RQ3: In what ways does the sensemaking process and formation of attributions influence PLC plans for future lessons?

Summary

Teacher sensemaking and formation of attributions are incredibly important for understanding how teachers choose to respond to student performance. The more we understand about this process, the more we can understand why teachers make certain instructional decisions. This will allow leaders to better support teachers instructionally as they work to meet the needs of their students in the ever-evolving changes in education. The next section of this dissertation discusses teacher sensemaking and

attributions formed through the sensemaking process, elements of assessment literacy that inform the

sensemaking process, teachers use of assessments, teacher use of student performance data, and teacher

response to student performance data.

CHAPTER II: REVIEW OF LITERATURE

Introduction

The purpose of chapter two of this dissertation is to explore research that has examined assessment literacy as well as review research which considers how teacher use of assessments and teacher use of assessment data both individually and in the context of a PLC have an impact on the sensemaking process. Additionally, this chapter reviews the literature on teacher sensemaking, and attributions formed through the sensemaking process. This literature review provides context for my study by providing an overview of teacher sensemaking, including how a teacher's level of assessment literacy can influence the process of sensemaking and the attributions formed. Figure 1 demonstrates how this literature informed my research. This chapter also sets up chapter three of this dissertation, which establishes the theoretical framework that guided my data collection and analysis. Finally, this chapter grounds this dissertation in research that will help establish the results of this work in the current literature on how sensemaking impacts teacher response to student performance. Part one of this literature review examines assessment literacy as it pertains to teacher sensemaking and how attributions can be formed through the sensemaking process as teachers respond to student performance data. The second part of this literature review focuses on the role of the PLC and the part it plays in the teacher sensemaking process. Additionally, this final part of the literature review explores the organizational contexts of a PLC and how these contexts can frame conversations among team members during the sensemaking process.

Figure 1:

Visual of Literature Review
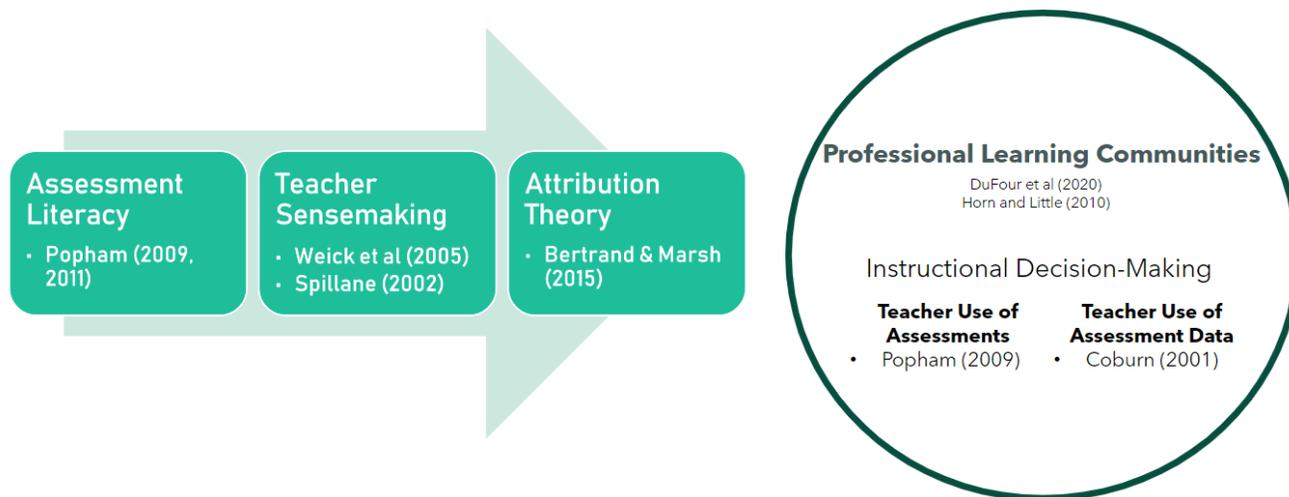
Assessment Literacy

James Popham defines assessment literacy as "an individual's understandings of the fundamental assessment concepts and procedures deemed likely to influence educational decisions" (Popham, 2011, p. 267). The concepts and procedures that influence the educational process include knowing what to assess, ensuring the reliability and validity of the assessment being administered, knowing what to do for students who have met or exceeded the expectations of the standard, and knowing how to intervene for students who have not (Popham, 2009). Teachers who are assessment literate use assessments in a proactive manner in their classroom. That is, they use assessments to gain information of their students' progress in real-time to inform their instructional decision-making as opposed to waiting to view summative assessment data before intervening (Popham, 2009). Not only is assessment literacy essential to teachers for the purpose of evaluating student performance and making well-informed instructional decisions, but their level of assessment literacy also allows them to understand the accountability measures placed on them as educators.

Popham (2009) places assessments in two categories: classroom assessments and accountability assessments. Classroom assessments are described as assessments used informally to gain understanding of what students know and can do, and accountability assessments are described as standardized tests that are used to determine teacher effectiveness. Popham (2009) explains that two types of decisions are formed by teachers through these types of assessments: classroom assessments inform teachers' instructional decisions by understanding what types of assessments to administer during instruction and how they should be used, and accountability tests have a direct or indirect impact on the instruction teachers give in their classroom. This study will focus on teacher sensemaking, driven by the teacher's level of assessment literacy including the use of classroom assessments, and the instructional decisions made from performance data from those assessments.

The ability to become assessment literate is not always controlled solely by teachers. There are other influences which could impact the way teachers process data and use it to inform their instructional decision-making.

Teacher Sensemaking

Sensemaking can be defined as "a sequence in which people identify in the social context of other actors engage ongoing circumstances from which they extract cues and make plausible sense retrospectively, while enacting more or less order into those ongoing circumstances" (Weick et al., 2005, p. 409). Through a combination of social interaction and prior experiences, people make sense of the world around them. Sensemaking is influenced by a variety of social factors including family dynamics, interactions with peers, socio-economic status, or level of education. The process asks two questions, "What is going on?" "What do I do next?" (Weick, et al., 2005, p. 412). For example, when studying

student performance data, teachers first make sense of the student work based on students' responses, and then formulate a plan on how to respond instructionally to the student work (Bertrand & Marsh, 2015). How teachers make sense of the student responses can be influenced by their prior experiences with other students or even their experiences as a student themselves. Their reactions can also be influenced by the make-up of their teaching teams and the conversations centered around student performance.

How we make sense of the world shapes everything we do, every decision we make. Understanding how the mind organizes and makes sense of the information it is receiving is the first step to determining motivation for change to occur. The next phase of understanding when change in action will take place (Spillane et al., 2002). Educators are faced with multiple decisions each day when teaching students. Many factors, both internal and external, impact the instructional decisions teachers make and how they respond to student data. The process of sensemaking is unique to other processes that people engage in to understand their context. Spillane, et al. (2002) explains, "We emphasize "sense-making," rather than referring simply to "information coding" or "interpretation," to focus on the active attempt to bring one's past organization of knowledge and beliefs to bear in the construction of meaning from present to stimuli." (p. 394). Sensemaking is two parts: it is collective in that it is grounded in one's beliefs and prior experiences and how these factors influence interactions among people, and it is situated in the norms and routines that are established in an organization (Coburn, 2001).

Throughout her research with teachers at a California elementary school, Coburn (2001) found their conversations with colleagues weighed heavily on their motivation to adopt a new reading policy presented to them. She noted their conversations were either in-facing or out-facing. In-facing

conversations occurred when teachers could make the connection between the mandate from the school and district leaders to the teachers' practice. Out-facing conversations were more superficial. That is, teachers did not see a connection between the mandate and their practice but were meeting the requirements of the mandate to follow their school and district leaders (Coburn, 2001). The conversations they had around the new reading policy shaped both their sensemaking process and their motivation to adopt the policy, whether that motivation was because they believed in the new policy (in-facing) or because they wanted to be compliant (out-facing).

In his research of organizational science, Karl Weick (2005) focused particularly on the organizational processes of sensemaking. He explained the concept of sensemaking through an organizational theory called noticing and bracketing. He describes noticing through the questions "what is happening?" and bracketing through the question "what should I do?". Through deductive reasoning, the mind uses noticing and bracketing as a method to make sense of the information it is receiving:

> Here, a combination of retrospective attention, mental modeling, and articulation performs a narrative reduction of the bracketed material and generates a locally plausible story. Though plausible, the story that is selected is also tentative and provisional. It gains further solidity in the organizing process of retention. When a plausible story is retained, it tends to become more substantial because it is related to a past experience, to significant identities, and used as a source of guidance for further action and interpretation (Weick, et al., 2005, p. 414).

In their study of teacher response to professional development through sensemaking, Allen and Penuel (2014) explain how teachers at one school juggled the responsibilities of meeting the curriculum

standards, adjusting to their district mandates of a new behavior intervention program, while responding to the professional development provided to them at their school. The study noted the three most prevalent sources of ambiguity teachers faced: limited resources, absence of measures, and conflicting goals. For the two schools studied, each encountered a different conflicting goal. One school noted a conflict between the building administration and the goals of the professional development and the other school experienced conflicts around the instructional pacing demands. Both conflicts influenced the way teachers made sense of the professional development and planned to implement the strategies presented in their classrooms. Through their process of sensemaking, including in-facing and out-facing conversations, each teacher approached these problems differently to achieve the goal of meeting the expectations of their administrators and district leaders.

How teachers take in this new information and make sense of student data can have both positive and negative consequences on student outcomes (Bertrand & Marsh, 2015). Therefore, it is imperative for instructional leaders to understand the many factors that govern a teacher's sensemaking and what might influence their instructional decisions. In their study about teacher sensemaking, Bertrand & Marsh (2015) found a phenomenon they described as attribution theory. As they observed teachers engaged in the process of sensemaking, they noticed throughout this process that they were attributing the student thinking and errors in thinking to certain factors which allowed teachers to accept the student performance.

Attribution Theory

Attribution theory relates to how we explain certain outcomes (Bertrand & Marsh, 2015). In the context of education, an example of attribution theory is when teachers analyze and make sense of student work, and the attributions they make to explain student work influence their motivation to act

and adjust instructionally. "Attribution theory, then, provides insights into the nature of teachers' attributions of data and their potential influence on motivation to take action in response to the data" (Bertrand & Marsh, 2015, p. 864). Through the attributions teachers formed, they were able to accept the student performance data and decide to respond instructionally.

Teachers' attributions are contingent upon the locus of causality. That is, they perceive student outcomes as within or outside the realm of their control (Bertrand & Marsh, 2015). If teachers attribute student performance to factors within their control, they might be more motivated to make instructional adjustments, but if they attribute the student performance to factors outside of their control, they might be less likely to make instructional adjustments. In the research conducted in the Netherlands on use of student data, one teacher cited having "good or bad kids" as a determining factor of positive student achievement on summative test data. (Schildkamp & Teddlie, 2008). This would be considered an external locus of causality because teachers may not view student behavior as a factor within their influence. We see the link between attribution theory when we examine how teachers select assessments for their students and their response to student performance on those assessments.

Teacher Use of Assessments

Teachers' use of assessments is the driving force of their instructional decision-making. "If we could magically track a given teacher's total career in the classroom, we would surely encounter innumerable instances in which educational assessments impinged directly on the decisions this teacher needed to make" (Popham, 2009, p. 5). The types of assessments teachers use are essential because they ultimately determine the way the student is taught (Popham, 2009). Popham (2009) argues that the more emphasis a teacher places on assessments, the greater the impact these assessments will have on daily activities in the classroom. "Because their impact on the education process can range from modest to

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major, classroom assessments ought to be as good as they can be" (Popham, 2009, p. 7). Not only are effective classroom assessments essential for student success, ultimately the strength of classroom assessments used throughout the year will have an impact on a teacher's instructional effectiveness.

As the education field continues to evolve, the reasons behind assessments do as well. First, test results influence public perception of the effectiveness of schools. Schools and school districts are assigned grades which represent how well or how poor they are performing. All teachers serving a particular school take ownership of the grade assigned. Therefore, classroom assessments used eventually have an impact on the overall ranking of the school, thus influencing public perception (Popham, 2009). Second, student assessment performances are often included in the evaluation process of teachers. Last, assessments help to clarify instructional intentions (Popham, 2009). The more teachers understand about the expectations of all forms of testing, the more effectively they can clarify what is to be taught in their classrooms.

"Teachers who are genuinely assessment literate will not only know how to create more suitable assessments but will also be conversant with a wide array of potential assessment options" (Popham, 2009, p. 7). Assessment literate teachers do not need to know everything related to assessments. "On the contrary, what assessment literacy requires is that an educator understands only those concepts and procedures thought likely to influence educational decisions" (Popham, 2011, p. 268). Once a teacher understands the types of assessments to issue to obtain the appropriate information about student learning, the next step to the process is to understand how to disseminate the data gathered from these assessments.

Teacher Use of Data from Assessments

When teachers are making decisions on what assessments to assign to their students and then analyzing that data to make sense of the information, they use two theories: sensemaking theory and attribution theory. Sensemaking theory is described as how individuals make meaning of their experiences (Bertrand & Marsh, 2015). Attribution theory is explained as one's motivation to act based on their perception of causes (Bertrand & Marsh, 2015). When we think about the issues that could potentially hinder teachers' ability to clearly interpret data from assessments, we must consider these two theories. Figure 1 represents the conceptual framework Bertrand & Marsh (2015) drew upon when analyzing their findings. The diagram in figure 1 illustrates both sensemaking and attribution theory. Teachers receive data from their assessments and from this data they gather information about their performance as well as their students' understanding of what has been taught. They use this information to gain knowledge and respond to it. Teachers' sensemaking may impact the way they understand data and use it to make informed instructional decisions. Attribution theory allows us to understand what teachers may attribute these results to and their motivation to act.

While evaluating teachers' process of sensemaking and attribution, Bertrand and Marsh's study (2015) found teachers could be classified into one of the four models of sensemaking when analyzing student performance: the instruction given to the student, the student understanding of the concept being taught and assessed, the nature of the test given to the student, and the characteristics of the student, such as socioeconomic status or demographic characteristics. If a teacher attributed student outcomes to the instruction given to the student, such as the method in which the content was presented or the scaffolding of the content throughout the unit, this would be considered an internal locus of causality, meaning the teacher had control over that outcome, thus motivating them to adjust their instruction. If a

teacher attributed student outcomes to student characteristics, such as students with learning disabilities or English language learners, depending on the characteristics of that student, the teacher may consider that to be a fixed characteristic, therefore giving that an external locus of causality and not motivating the teacher to act as swiftly to adjust their instruction. Negative student outcomes can also be perceived as a failure on the part of the teacher, depending on how the data is presented.

The perception of student failure, in conjunction with a locus of causality, can have an impact on a teacher's motivation to act. "Furthermore, the magnitude or likelihood of the perceived determinants of success differ from those failure – evidence of personal enhancement is pervasive so that success more than failure elicits the beliefs that the self-played a role, whereas failure more than success gives rise to external causal beliefs" (Weiner, 2010, p. 30).

Once teachers were able to make sense of the data received, they then were able to make predictions about student performance which was the motivating factor in their desire to make instructional decisions based on this data.

Coburn & Turner (2011) use Figure 2 to illustrate the role outside influences play in how teachers process data and use it to inform their instructional decision-making. The center of the figure, processes of data use, is a general description of the behaviors that might take place when teachers are analyzing and collecting data. However, as noted by Figure 2, these processes are influenced by the larger circle of organizational and political context. Factors such as a teacher's access to the data needed, the norms building leaders create and abide by when analyzing data, and the time given to teachers to properly examine data or the time it takes to receive data to make real-time adjustments are just a few factors that could influence how teachers use data for instructional decision-making. Features of the interventions to promote data use interact with the organizational and political factors depending on the

context. Finally, the potential outcomes of processing data such as: how the organization collects and analyzes data, the changes in instructional practices, or the student learning taking place, are all contingent upon these levels.

Interventions can shape the way teachers make sense of data which ultimately drives the possible outcomes, but these interventions are all based on the structures put in place at both a building and district level. One structure that could impact this process at the building level is the structure of the professional learning community (PLC).

Figure 2:

Conceptual Framework from Bertrand and Marsh (2015)
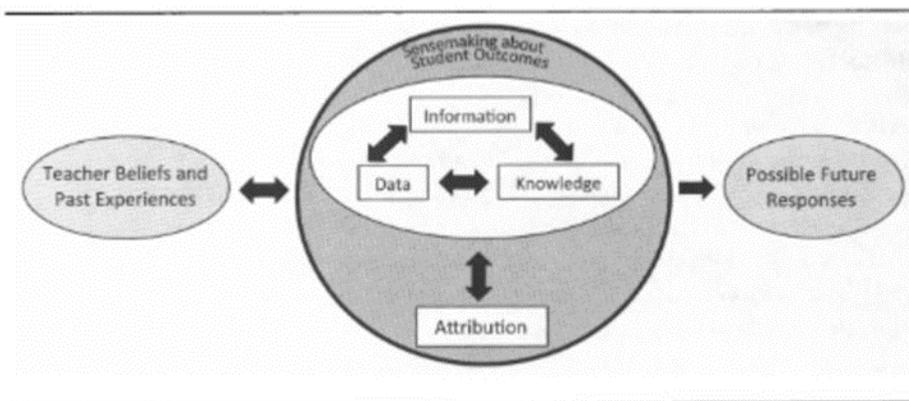
Figure 3:

Conceptual Framework from Coburn & Turner (2011)

**Interventions to
promote data use**

- tools
- comprehensive data initiatives
- accountability policy

**Organizational and
political context**

- routines
- access to data
- leadership
- time
- norms
- power relations

**Processes of
data use**

- noticing
- interpreting
- constructing
  implications

Potential outcomes

- organizational change
- change in practice
- student learning
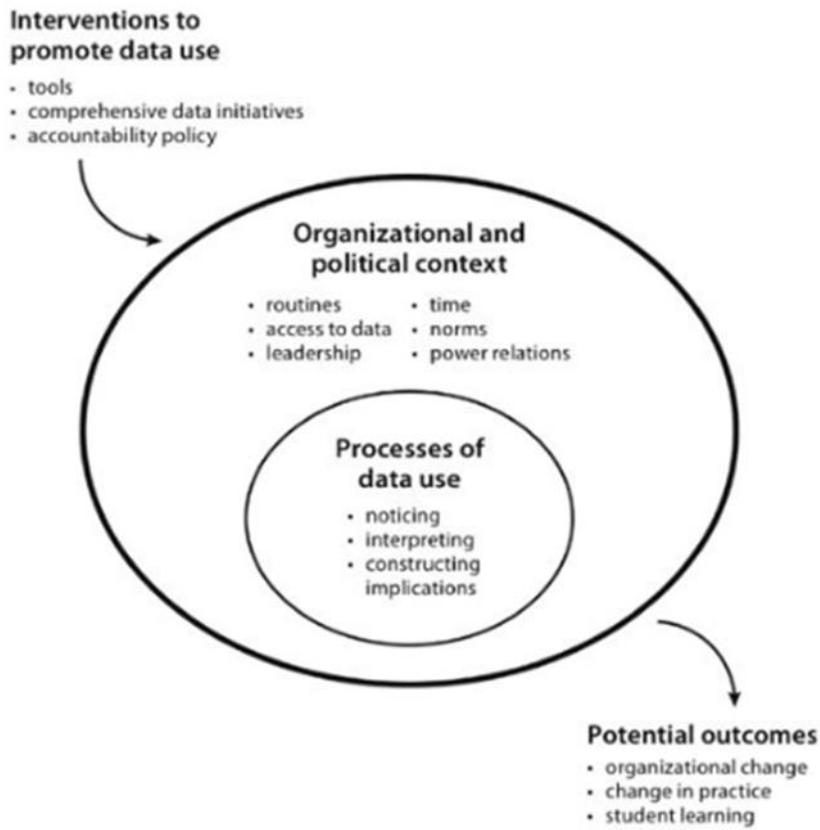
Professional Learning Communities (PLCs)

Teachers can make sense of their curricular expectations through their interactions with their colleagues (Coburn, 2001). In professional learning communities (PLCs), educators can take information and make sense of it to determine the next steps in instruction with members of their PLCs. A PLC is defined as a group of educators committed to working collaboratively in ongoing processes of collective inquiry and action research to better results for the students they serve (DuFour et al., 2020).

In a study with a California elementary school, Coburn (2001) noted the behaviors of teachers when making sense of a new reading policy through a series of observations of their PLCs. She identified three subprocesses teachers engage in a they work with their PLCs to understand new reading policy and how it altered their instruction: constructing understandings, gatekeeping, and technical and practical details (Coburn, 2001). Each teacher in the group had their own beliefs and past experiences which influenced the way they understood the policy. For example, teachers who had been in the field for a while more than likely experienced policy implementation before and relied on that experience to make sense of this experience, whereas teachers who were early in their careers might rely on their experience at the pre-service level to make sense of the policy implementation. After they constructed understandings, they went through the process of gatekeeping. That is, they either adapted the new understanding or they dismissed the idea altogether. Finally, they worked as a unit to work out the details of the new initiative, discussing what it would look like in practice. Through the collaborations of each member's unique experiences and beliefs, the teachers of this PLC were able to make sense of the policy implementation.

PLCs and specifically the teacher relationships within the PLC can have an impact on how teachers perceive student data. Horn and Little (2010) examined two groups of teachers: a group of

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Algebra and English teachers. They observed the way their relationships impacted how they perceived student data. The authors noted two key ideas that impacted the way teachers understood their students' responses to their instruction: normalizing and linking. When teachers conveyed their challenges in the classroom, they were met with a response researched described as "normalizing". That is, normalizing that these kinds of occurrences happen in the classroom (p. 190-193). They used the term "linking" to describe situations in which teachers related their own personal experiences to another teacher. Linking "positions teachers in alliance with one another, creating a sense of membership and affiliation" (p. 197). Through these conversations in PLCs involving normalizing behaviors, teachers can collaborate as they make sense of student performance data and use these conversations as an incentive to make instructional adjustments.

Conceptual Framework

The purpose of this study is to examine the factors that influence a teacher's instructional decision-making, such as their sensemaking process and the attributions created throughout that process. Teachers begin by analyzing student work in the form of practice activities or assessments. Often this analyzation of student work is done while collaborating in PLCs.

As shown in Figure 3, when analyzing student data, teachers first make sense of the student work based on students' responses, then formulate a plan on how to respond instructionally to the student work. There are two parts to the sensemaking process: collective and individual. How teachers make sense of the student work can be influenced by their prior experiences with other students or even their experience as a student themselves (individual). Their reactions to student work can also be influenced by the make-up of their teaching teams and conversations centered around student performance (collective).

Through conversations drawing on what they are analyzing, teachers make sense of student work. Their ability to make sense of the work is influenced by internal factors such as the dynamics of the PLC, the content being discussed, and the roles of the members of the PLC. It is also influenced by external factors that teachers bring into the PLC with them such as their prior experiences, innate biases, years of teaching experience, and comfortability with the social contexts of the PLC. As teachers make sense of the student work, they create attributions to understand why students performed the way they did. These attributions can be due to what teachers perceive as fixed or alterable, which in turn will influence the instructional decisions they make in response to student performance.

Figure 4:

Conceptual Framework
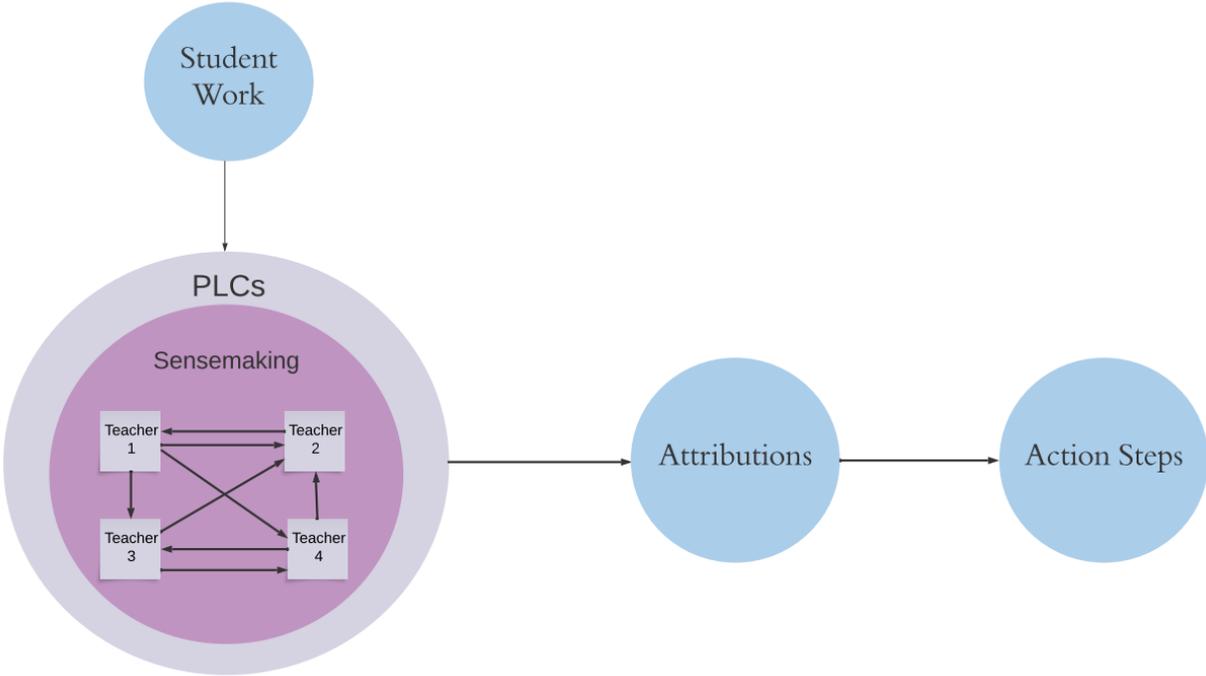
Summary

There are a variety of factors that could influence the sensemaking process and attributions formed from that process. The overall assessment literacy of the teacher will influence the instructional decisions that take place as well as the types of assessments used in the classroom (Popham, 2009). While the sensemaking process occurs in how a teacher determines the types of assessments to use to gain information about their students, the sensemaking process and attributions formed can also be seen in how teachers analyze student data from these assessments. The sensemaking process can be impacted further by the social constructs of the school and the design of the PLC (Coburn, 2001).

The emphasis on accountability in teachers and schools has continued to increase in education, based heavily on student performance data (Popham, 2009). Educational leaders in all positions can be better informed and more equipped to meet the needs of teachers and students with more understanding around the sensemaking process and factors that influence it.

In the next chapter, the research design will allow us to compare two PLC teams who serve the same group of students at the same school and how each team's unique sensemaking process and attributions created throughout this process have a direct impact on their response to student performance data.

CHAPTER III: METHODOLOGY

Introduction

This chapter gives a detailed description of the research methodology applied in this qualitative observation study regarding how teachers engage in sensemaking, form attributions through the sensemaking process, and how this process influences their instructional decision-making. This method of data collection and analysis allowed for synthesizing the factors that could influence future instructional plans through the sensemaking process in the context of a professional learning community (PLC). This chapter includes information about the study's purpose, the researcher's positionality statement, details of the research design, the research site, participant selection, data collection and analysis, and limitations to the research conducted.

Restatement of the Problem and Research Questions

The purpose of this qualitative observation study was to discover the role teacher sensemaking played in response to student performance data within the context of a PLC for Algebra 1 and English 1 teachers at Mountain Oak High School.

Sensemaking can be defined as "a sequence in which people identify in the social context of other actors engage ongoing circumstances from which they extract cues and make plausible sense retrospectively, while enacting more or less order into those ongoing circumstances" (Weick, et. Al., 2005, p. 409). With this purpose in mind, my research questions are:

RQ1: How do teachers engage in sensemaking through their interactions in a PLC?

RQ2: How do teachers form attributions through their interactions in a PLC?

RQ3: In what ways does the sensemaking process and formation of attributions influence PLC plans for future lessons?

Positionality Statement

As the observer in these series of observations, my role was to maintain objectivity while considering my own biases and experiences. I am a 31-year-old white female living in the United States. I hold a bachelor's degree in interdisciplinary studies with a concentration in mathematics and a master's degree in administration and supervision. I have been working in education for the past eight years. During that time, I have held the position as a classroom math teacher, head girls' basketball coach, and an instructional coach. My ontological approach as an idealist means that I believe in the existence of abstract concepts, such as ideas and values, that shape our reality. As an interpretivist, my epistemological approach was focused on understanding the subjective experiences and perspectives of the individuals I observed. As a researcher, I can access the necessary resources to conduct my research, yet I know of the biases I may bring due to my positionality as an instructional coach, not in the classroom. By taking these approaches, I aimed to provide an analysis of my observations while acknowledging the potential limitations and biases that may have arisen, discussed later in this chapter.

Research Design

My dissertation focused on discovering the role teacher sensemaking played in teacher responses to student performance data for Algebra 1 and English 1 teachers at Mountain Oak High School. More specifically, I examined each PLC's sensemaking process, the attributions formed throughout this process, and how this process impacted teacher instructional practices and student learning, and finally

the differences in instructional practices between teachers who expressed their attributions through the sensemaking process and those who did not.

The type of research design most appropriate for this was a qualitative observation study. As outlined by J. Amos Hatch (2002), "For qualitative researchers, the lived experiences of real people in real settings are the objects of study." The teachers involved in each of these PLCs and their responses to student performance data were the focal point of this study in determining the answers to the research questions above.

Observation is a suitable research design for allowing the researcher "...to understand culture, setting, or social phenomenon being studied from the perspectives of the participants" (Hatch, 2002). Through my series of observations, I was able to determine how the dynamics of the PLC played an important role in how teachers were responding to student performance data. Observations are most appropriate for contexts where the researcher is open to inductive discovery of how participants understand the setting and allows the researcher to uncover underlying meanings that may not be apparent through other research methods (Hatch, 2002). I used findings from these observations conducted to determine how teachers responded instructionally and what influence these interactions had on teachers' instructional decision-making during the sensemaking process. These findings may not have been as obvious had I conducted other research methods such as interviews or surveys, where conversational moves and immediate responses to student performance data would not have been noticed.

I modeled my data collection and analysis through this research design after Bertrand and Marsh (2015) as I determined the factors that influenced a teacher's instructional decision-making, including the role of the PLC. In their study, they found that teachers activated four distinct models of

sensemaking when attributing student outcome data (Bertrand & Marsh, 2015). Each of these mental models that emerged through the sensemaking process were connected to dimensions of attributions: locus of causality, stability, and controllability. In my research design, dimensions of attributions were not a focus as much as patterns of attributions and how they impacted future instructional plans were. This qualitative observation study took place during the fall semester of the 2023-2024 school year and involved an Algebra 1 PLC and an English 1 PLC within the same high school. The data teachers focused on in these PLCs included student work, common formative assessment results, and summative assessment results. During this qualitative study I visited each PLC six times throughout the fall semester of the school year. Like the research design of Bertrand & Marsh (2015), I categorized my findings by common phrases or key words that were used and determined if there were common attributions formed in relation to these words.

Research Site

The research site was at Mountain Oak High School. Mountain Oak High school is a large comprehensive suburban high school located in a fast-growing community in the southeastern region of the United States. When the research was conducted, the school had approximately 2000 students enrolled, and 200 faculty and staff members employed. The school served grades 9-12. The demographics of the school included White (56.6%), African American (23.5%), Hispanic (12.6%), other/not specified (7.3%). The average student/teacher ratio was 15.8 and the average percentage of students who qualify for free/discounted lunch was 32.7%.

Participant Selection

Participants of this study were members of the Algebra 1 and English 1 PLC at Mountain Oak High School. The members of these PLCs all served the same students, just in different content areas. I

gained access to them through my role as an instructional coach at the school. The Algebra 1 team was

made up of four females: all of which are White. Their experience levels ranged from one year to eight

years of experience. The English 1 team was made up of four females: three White and one African

American. Their experience levels ranged from one year to eight years of experience. Each team had

approximately ninety minutes of common planning time on the day designated for a formal PLC

meeting. All members met in the PLC leader's classroom with the instructional coach, assistant

principal, and lead interventionist present.

Table 1

Algebra 1 and English 1 PLC Members

Teacher Name	PLC	Gender	Race/Ethnicity	Years of Experience	Years in the PLC
Carol Dawn	Algebra 1	Female	White	4	4
Karen Smith	Algebra 1	Female	White	2	2
Heather Kruz	Algebra 1	Female	White	2	1
Alyssa Mathis	Algebra 1	Female	White	8	1
Lisa Smith	English 1	Female	White	8	2
Ashley Kirk	English 1	Female	White	3	2
Agatha Green	English 1	Female	White	2	2
Ariel Crews	English 1	Female	African American	3	2

Data Collection

I started my data collection with observations of PLCs. The observations took place twice in September, October, and November. All PLC meetings were recorded through zoom meetings, and the camera showed the data the teachers were viewing at the time. The computer was placed in a position where all members of the PLC could be heard clearly. As an observer, my role was to record and transcribe events as they occurred, without interfering in any way. Hatch (2002) describes the levels of involvement of the observer as varying in qualitative research but clarifies that "if the goal is to capture naturally occurring activity, then a complete participant will have a more obvious impact on a social setting than a complete observer" (Hatch, 2002, p. 73). The purpose of my research was to understand the factors that influence teachers' instructional decision-making; therefore, I took on the role of a complete observer. Each observation lasted for the entirety of the PLC meeting; some meetings were as short as just under thirty minutes and some as long as almost an hour.

Table 2:

Algebra 1 and English 1 PLC Meeting Observations

Observation Date	Team Observed	Data Examined	Length of Meeting
Wednesday, September 20	Algebra 1	Inequalities	27:04
Wednesday, September 27	Algebra 1	Compound Inequalities	30:48
Wednesday, October 18	Algebra 1	Planning Meeting	31:05

Wednesday, October 25	Algebra 1	Inequalities Remediation and Systems of Equations	29:14
Wednesday, November 1	Algebra 1	Systems of Equations	30:18
Wednesday, November 15	Algebra 1	Writing Linear Equations	28:49
Tuesday, September 19	English 1	Parallel Structure	37:07
Tuesday, September 26	English 1	Characterization	58:02
Tuesday, October 17	English 1	Planning Meeting	46:18
Tuesday, October 24	English 1	Rhetoric	26:31
Thursday, November 2	English 1	Essay Prompts	29:33
Thursday, November 16	English 1	Parallel Structure and Vocabulary	32:48

Data Analysis

Each observation was recorded and then transcribed using the platform, Otter. As I reviewed the transcriptions of the observations, I started the process of coding. Codes are described as "efficient data-labeling and data retrieval devices. They empower and speed up analysis" (Miles & Huberman, 1994, p. 65). For the beginning of the coding process, I engaged in open coding, examining the transcripts to identify important concepts and ideas that related to my research questions. I organized these concepts into excerpts for the first round of this process. As my coding progressed, I began the process of pattern

coding. These codes are even more conclusive and explanatory and should include a word that details

the inferred theme or pattern that emerges (Miles & Huberman, 2002).

During the coding process, it was important to avoid data overload, which can come from causal

observations and leave the researcher feeling as if they must "get it all". Miles and Huberman (1994)

emphasize the importance of being selective during the coding process and call for researchers to allow

conceptual frameworks and research questions to be the defense against data overload. Keeping my

conceptual framework and research questions in mind during the pattern coding phase of data analysis, I

compiled my information into a cross-case comparison table that described what team I was observing,

which observation these codes came from, and the codes that emerged. I formatted the table in a way

that allowed me to view the codes from each team's observations that took place within the same week

so I could determine if common codes surfaced at the same point in the school year.

Figure 4:

Algebra 1 Cross-Case Comparison Table

	Meeting 1			
	Focus of Meeting	Materials Examined	Sensemaking	Attributions Made
Algebra PLC	Planning - making sure everyone is teaching the same topic	testing platform - trying to determine which gives the best data report	type of math (2) - describing the type of math problem	instruction (1) - something about the instruction or lack thereof prohibited them from performing well.
	This group really focuses on the WHY behind students answers		student understanding (3) - describing the misunderstanding students have	time limit (2) - students do not have sufficient time to complete the test
			student error (5) - describing the minor errors students make in their work	student understanding (2) - student's understanding (or misunderstandings) prohibited them from performing well on the test
			student apathy (2) - describing the apathetic behaviors seen in...	

Figure 5:

English 1 Cross-Case Comparison Table

English PLC	Data	Test results, calendar for the quarter	topics (2) - teacher is seeing a pattern in student data pertaining to the topics on the test	nature of the test (2) - something about the test prohibited students from performing well
		This team focuses a lot on the topics that are being covered because in English, the standards are the same, the text just increases in complexity	test results (2) - describing the test results	student action (2) - something about the student's action prohibited them from performing well
			question type (2) - describing the question type that students are missing	instruction (3) - something about the instruction or lack thereof prohibited them from performing well.
			class type (3) - describing the class type	time limit (1) - students do not have sufficient time to complete the test
				scheduling (2) - The schedule of the school calendar is impeding on instruction, therefore prohibiting students from performing well

Limitations

Several issues limit my analyses and must be acknowledged. First, the findings of this research are specific to one school and two teams that serve a particular age group of students. It is possible that teachers in different communities might have factors that affect their instructional decisions, which may not be accounted for in this study. The data collected through this research was done solely through observations. "Observation is also selective: The researcher is constantly making choices about what to register and what to leave out, without necessarily realizing that – or why – one exchange or incident is being noted but another is not" (Miles & Huberman, 1994, p. 56). Next, the data collected was limited to one academic semester, which may not be representative of the entire school year. Finally, as an instructional coach at the school, while my role in the research design was that of a complete observer, my role in the day-to-day operations of the school day involving members of each team could have influenced the results found. While efforts were made to minimize this bias, it is important to recognize the potential impact of my position on the study's findings. Future research should aim to replicate these findings in a larger sample size and across multiple school years to further validate the results.

CHAPTER IV: RESULTS

Introduction

The purpose of this study was to examine the factors that influence a teacher's instructional decision-making, such as their sensemaking process and the attributions created through that process. In this chapter, we will explore how two PLC (Professional Learning Communities) teams, English 1 and Algebra 1, engaged in sensemaking and formation of attributions in approaches that were similar and different from one another. The purpose was steered by the following questions:

RQ1: How do teachers engage in sensemaking through their interactions in a PLC?

RQ2: How do teachers form attributions through their interactions in a PLC?

RQ3: In what ways does the sensemaking process and formation of attributions influence PLC plans for future lessons?

Typical PLC Meetings

Each team was involved in one weekly formal PLC meeting. These meetings took place for 90 minutes when all members had common planning. Both teams had established norms and agendas that supported the structure of the meeting time. For English, the one norm the team referenced often was the protocol for tasks. Anytime the team created a task requiring the collaboration of all members, the PLC lead would start by stating "We agree to" and would list the task and the deadline for when the task was to be completed. The PLC lead sent the agenda to her team before each meeting, and the agendas for English PLCs were typically lengthier than the agendas for Algebra PLCs. The English PLC meeting would not end until the team worked through each item on the agenda. The Algebra PLCs were similar in structure in that they had agreed upon norms and the PLC lead would set an agenda. They were different in that the PLC lead wanted each member to answer the four driving questions: What do we

want our students to know and be able to do?, How will we know when they have learned it?, What will

do for students to remediate content they did not learn?, and What will we do for students to extend their

thinking?. The PLC lead for the Algebra team was diligent in having her team stick to the agenda items

and wanted her meetings to end on time as opposed to lingering due to off topic conversations. While

both teams used platforms that allowed them to view student performance data in a supportive way in

data analyzation, the platforms each team used differed.

English 1 PLC

The English 1 team was entering their second school year together with the same group of

teachers in which there were four members. Their meetings were efficient, with humor embedded in

their interactions throughout the meeting time. This team had an overall sense of collegiality, they

enjoyed one another's company and their PLCs (Professional Learning Communities) felt more like

friends catching up with one another than it did a formal PLC meeting. They would refer to each other

by nicknames, for example, when addressing one of her colleagues about locating a document, Ms.

Crews stated "Oh, Queen, we gotta, we gotta find this!". When Ms. Smith was writing something on the

team's shared calendar, the team had a laugh at her handwriting, "and my crooked little hand drawing".

Ms. Kirk, stated sarcastically, "I well, I also feel like if we wanted to keep our instruction data driven,

we will first need to see our data from CFA 1." Ms. Crews, laughing, replied, "come on, I know thats

right!" and Ms. Green stated, "okay, data driven." as the team shared a laugh.

In a typical meeting, when viewing student performance data, they would look at an item

analysis document provided by the testing vendor that allowed them to see how many students answered

each question correctly and how many students answered incorrectly. This document showed each

question on the test and the number of students who chose each answer on the test (see Figure 6). When

they viewed student performance data that indicated students did not have a clear understanding of the content, they would pull up the question and discuss student understanding. For example, when viewing the item analysis, the team noticed that their students struggled with question number ten. Ms. Smith stated, "Yeah. Um, some of my students missed question number ten. I don't remember which one that is". After pulling up the test to look at number ten, the team was able to determine what might have caused students to miss that question. Whether the student performance data was something of concern or something to be celebrated, the team shared an overwhelming sense of calmness throughout the sensemaking process. For example, when viewing the item analysis, the team noticed their students missed two questions pertaining to central idea. Ms. Smith stated, "Literally, that's the standard we talked about most so far" to which Ms. Kirk replied, "I agree". The team immediately decided on a plan to address the misconception. Ms. Kirk shared, "I plan on using that as a bellwork question for this week" and later stated, "So, I think we just need to hammer in like, hey, this is paragraph seven, you need to only focus on that paragraph". The Algebra 1 team would often share their frustrations, but the English 1 team created a plan and acted accordingly.

Figure 6:

Data Analyzation Used in English 1 PLC

Question 1 9-10.RL.KID.2		Question 2 9-10.RL.KID.1		Question 3 9-10.L.VAU.5	
A: 54, B: 83, C: 25, D: 154		A: 116, B: 51, C: 44, D: 105		A: 26, B: 28, C: 242, D: 21	
Type	Multiple Choice Question	Type	Multiple Choice Question	Type	Multiple Choice Question
Points	1	Points	1	Points	1
DOK	2	DOK	2	DOK	3
Item	10924101012410	Item	10924101012710	Item	10924101021010
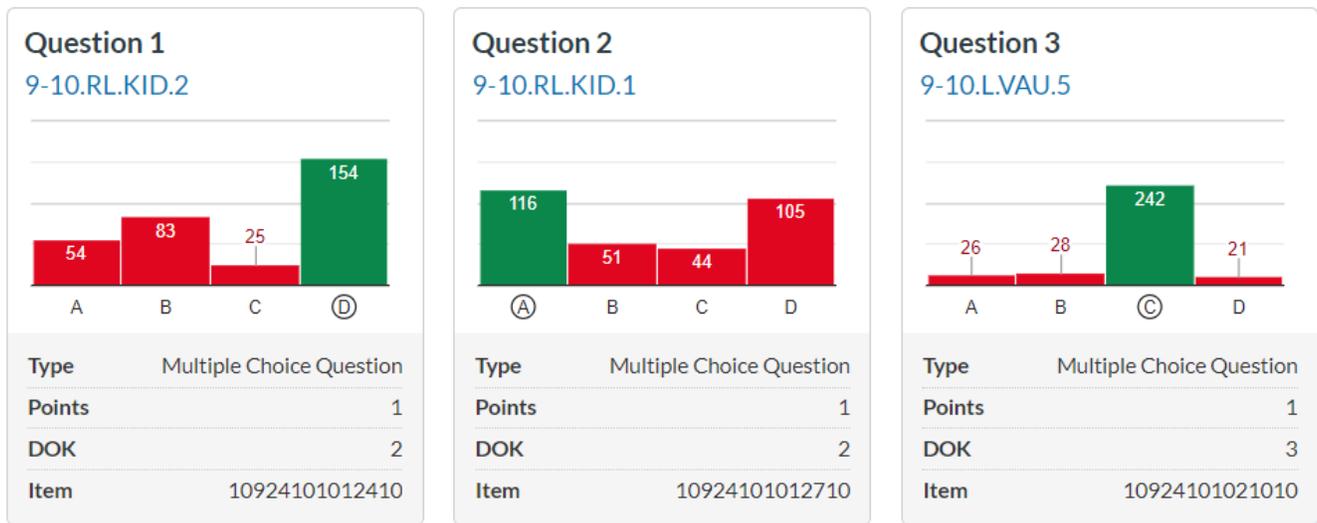
Algebra 1 PLC

The Algebra 1 team's interactions with one another were different than English 1. For one, they were in their first year together as a PLC, a characteristic that was not uncommon for their PLC lead. She was entering her fourth year at the school, and this was her fourth different team. There were four members of the team, including the lead, just as there had been every year. Because of this, it was evident the PLC lead felt the need to drive most conversations that occurred throughout the meeting, being quick to get her team on track if their conversations deviated from the given agenda topic. For example, in one meeting the team started to get off topic discussing concerns about their students that

could be perceived as negative. Carol, to get the team back on topic responded, "Okay, so let's look at some positives. And it's okay, let's look at some positives". Her desire to keep the team to the agenda for the meeting was evident through the amount of conversation time she held in each meeting, with hers being more than her colleagues at every meeting. She would begin every meeting going through the agenda and led most conversations on each portion of the agenda until the meeting ended.

On top of being a new team, this team was entering its first year with new content. Their district changed from Integrated Math 1 to Algebra 1 and adopted a new textbook. Their approach was driven by standards. When they viewed student performance data, they did so by standard. Where the English 1 team viewed the data by question, and their assessments encompassed multiple standards, the Algebra 1 team viewed the data by standard and assessed their students by individual standards to determine how their students performed. If their data indicated students were not performing as well on one given standard, they would revisit the curriculum guide created by the district to determine the cause of these results. For example, in one PLC meeting, Ms. Dawn was trying to determine what exactly the students needed to know according to the standard after reviewing data with her team. "So, here's the standards that were in the curriculum guide for topic 2. What are we trying to do here? So, within that curriculum guide, instead of the recommended sequence, I pulled this, but I want us to talk about how we want to tweak it and if we want to tweak it." This team also focused heavily on the pre-requisite skills students needed to possess to be successful with their content. In one meeting, Ms. Dawn noticed, "So, for this one, the students didn't want to bring down the negative, so they never divided by negative to get the answer that was B." In another example, Ms. Dawn noticed her students misunderstood the concept of absolute value, causing them to miss the problem requiring them to solve an equation with absolute value. "With absolute value, I think they knew they needed two equations. But the question was, when

did they split it?" If it was evident students lacked a foundational skill, remediation plans were discussed. In one meeting, the team was trying to determine if they should move on or spend more time remediating a standard. Ms. Dawn stated, "So, I think we keep pulling them into remediation time, and like you're saying, so maybe if we're remediating equations that could also be remediating inequalities because it's the same steps."

Where the English 1 team had a calm approach to re-addressing content with their students, the Algebra 1 team was always grappling with the decision to move on to the next standard or to come up with a remediation plan in detail for students whose data indicated they needed it. In one of the PLC meetings for the Algebra 1 team, the team discussed whether to continue with a topic and voiced their frustrations to one another. Ms. Dawn shared, "I don't want to keep taking days of our instruction. We're so behind. At this point, if they're failing, they need to be coming in for remediation."

Sensemaking in PLCs

Sensemaking is described as "a sequence in which people with identity in the social context of other actors engage ongoing circumstances from which they extract cues and make plausible sense retrospectively, while enacting more or less order into those ongoing circumstances" (Weick, et al, 2005, p. 409). Sensemaking in the context of this study refers to how the members of each PLC described the student performance data they were viewing. Both teams engaged in sensemaking in their formal PLCs while viewing performance data from the most recent common formative assessment. While the approaches to sensemaking and attributions formed through the sensemaking process were different for each PLC, both began the sensemaking process by viewing the most missed items on the assessment. The motive of the teams was to make sense of why students were performing in a certain way. Their

goal in the sensemaking process was to describe the trends in the student performance data, explain the trends, and form instructional plans.

Similarities in Sensemaking

Across both PLCs, teachers engaged in the sensemaking of student work in similar ways. First, both PLCs made sense of their student work by describing the standard or topic in which students were assessed. The team leads would refer to the curriculum guide provided by the district that described the standard in detail and provided learning objectives of each standard. For example, in the first Algebra 1 meeting, teachers examined student performance data over their first essential standard: multi-step equations. The standard called for students to do the following: "Solve linear and absolute value equations and inequalities in one variable. Solve linear equations and inequalities, including compound inequalities, in one variable. Represent solutions algebraically and graphically" (Tennessee Department of Education, 2023, https://www.tn.gov/education/districts/academic-standards/mathematics-standards.html). When noticing students not performing as well on a particular question, Ms. Dawn stated, "Yeah. 11 and 12 was absolute value. 12 had the fraction in it and there was a variable on both sides." Ms. Dawn made sense of student performance by observing the math involved with that standard.

In the English PLC, this sensemaking around describing the standard or topic in which students did not perform as well happened similarly. Ms. Smith noted, "But. And then, number nine, which details of the short story, helps develop the theme. Okay, so literally, our core standards, that's what they're missing. Central idea and theme." While the English PLC engaged in sensemaking by addressing the topics in which students did not perform well. Sensemaking concerning the standard or topic in

which students were assessed across both PLCs informed the potential attributions that teachers could make to explain the work. This will be explored further in the next section.

Differences in Sensemaking

Each team had a different approach to sensemaking during the PLC process. These approaches emerged as observations continued and were the driving force in how each team responded to student data.

The English 1 team also discussed elements of the prompt or question on the assessment to get a better understanding of their students' performance. When viewing the student performance data with her team, Ms. Smith stated, "Well, we also hadn't read anything with informational text yet when they took the test" when describing the prompt on the most recent common formative assessment. The Algebra 1 PLC in contrast approached sensemaking by first focusing on the standard and understanding the standard's expectation allowed the team to determine what prerequisite skills the student must possess to be proficient in the content. Because the Algebra I team was learning the new standards, they focused heavily on the expectations of the standard to determine if the students not performing well on the standard would hinder them from being successful in standards covered later in the year. In one meeting with the team, Ms. Dawn was leading her team in a discussion over the meaning of one of her team's standards. "But, I want to make sure first, they can identify the slope and y-intercept, they know what rise over run is, and they can graph and write and go back and forth. That's what the objective says."

When engaging in the sensemaking process, the English 1 team would often reference what they did instructionally leading up to the common formative assessment. For example, in one PLC in which

the English team was discussing student performance data from a common formative assessment, Ms. Kirk first described the error her students made on the assessment, "My kids did not do good with seven. But that was the question with semicolons where they had compound sentences. And a lot of my kids want to use either a comma there still or they saw the transition word and did not even pay attention to the fact that it did not work with the sentences." She went on to explain what she did instructionally before the assessment. "Well see I actually did a sample question just like the one that was on the test where I put however in here and I was like guys, why doesn't however work? And they're like, oh, because that shows a difference." In a different meeting, Ms. Smith, the PLC lead of the English 1 team took this same approach when discussing vocabulary terms that were causing her students to answer questions incorrectly. She started by explaining, "I had a couple of kids come up and ask me what it meant by placement. Which of all the words surprised me that those are the ones they are asking about." When discussing another vocabulary term that caused students to answer incorrectly with a colleague, she went on to say, "I think some of mine knew that because we had just gone over the word cynical a few days before, and I use that as a synonym. I didn't give out vocab words on this time, or on this test this time." Members of the English 1 team would reference what they did in class and how they prepared students prior to the assessment to explain the student performance data.

In contrast, when engaging in the sensemaking process, the Algebra 1 team would begin by identifying the topics within the standard in which the students were assessed. Once they identified the standard, the team would work together to describe the error in student work to determine if this misunderstanding would prohibit students from learning other standards. In one PLC, Ms. Dawn identified a misconception about solving inequalities. "With the ANDs and ORs, maybe switching those up with maybe absolute value was only like a big thing. I wouldn't say a big thing. But the only errors I

really saw were just the inequalities, minor things." The students were confusing the meaning of the inequality symbols and had further difficulty if the variable was not listed on the left side of the inequality. After describing the errors with her team, she explained that students may continue to struggle with these misconceptions in later topics. "Because we're still using the same steps when we're doing linear functions when they're having to convert forms. Like, we're still using the solving skills. So, I think we could just keep doing that through bellwork." This differs from the English 1 team because unlike Algebra 1, the English 1 team described what they did in class leading up to the assessment. The Algebra 1 team identified the standard what the misconception is and how they would address it through remediation but continue teaching new content. The English 1 team would keep re-teaching misconceptions during instruction due to the cyclical nature of their standards.

The Algebra 1 PLC differed from the English 1 PLC in the roles participants chose to undertake and the strategies they used to dig into the data. In the Algebra 1 PLC, the teacher who took on the role of the lead, Ms. Dawn, played a larger role in preparing for and leading the conversation than her counterpart in the English PLC. Ms. Dawn would begin every meeting by describing what the team would be discussing at that meeting. For example, in the first meeting the team held, she began, "Okay, well, we'll go ahead and start talking about where we're all at. And then what kind of, like, what we're planning on, just start checking in." Other times, she would read over the agenda for the day. "All right. So, here's our agenda for today. Um, I want to go ahead and start checking in with everybody." Ms. Dawn being the driver of the conversations at Algebra 1 PLCs influenced the way her team approached each meeting and began the sensemaking process. In one PLC, when describing the student performance data from a common formative assessment, Ms. Dawn began by explaining the importance of students

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needing to be successful with this topic so they could be successful in topics that would be discussed later in the course:

> Okay. Well, that's what I wanted to like, ask you guys what you think. So, Karen gave a good idea of talking about like, possibly giving them okay, because here's where I'm at. We're solving inequalities, which is the same thing as solving equations. It's the same process. And you've got to be able to do this and we've spent all this time and I'm flustered with the fact that we have a 48 average on the test with 15 questions.

Ms. Kruz, acknowledging Ms. Dawn was flustered chimed in, "Which the bigger issue too with that is maybe not that they don't know how but their test-taking skills, or when we say the word test, they're like no, I'm not doing that, you know?" Ms. Dawn responded, "Yeah, I mean, I did have some that literally just didn't want to start I had to, like, be on them the whole time." Ms. Dawn leading the conversation and openly admitting her frustration when describing the student performance data allowed her colleagues to engage in the same feelings and discuss similar frustrations.

Ms. Smith, the English 1 PLC lead, structured her PLCs in a much different manner. While her PLCs were still organized and had an agenda, she offered more opportunities for her teammates to be involved in the process by asking them questions such as, "Did y'all just want to email me whatever?" regarding reading samples to plan for students and "Is everyone gonna have all the standards covered by the benchmark next week?" instead of deciding for them. This emphasis on collaboration allowed her team to engage in the sensemaking process at their own pace and approach the student performance data without any influence from her. For example, in one PLC when the English 1 team was viewing student performance data through a testing platform that showed an item analysis for each assessment question, teachers were discussing class averages with respect to the achievement level of the class. Ms. Green

noted, "I think that my standard and honors did well, and then my inclusion were in the low 40s." Frustrated with one class's scores, Ms. Kirk responded, "I mean, one of my standard classes is low 40s. So that really should be, I mean, we can call it standard all day, but like, that's an inclusion class." While facilitating this discussion, Ms. Smith did not steer the team to describe the achievement levels of their classes or their misconceptions. She gave them the space to describe their student performance data concerning the achievement level of the class and responded by asking, "Right. Number six and nine, what were they?". She allowed her team to describe their student results compared to the class's achievement level but maintained the meeting's focus on understanding what the question was assessing.

The role of both leads weighed heavily on how each team engaged in sensemaking around student work. The English 1 team focused on the student work that was produced, discussed how they had taught the material before the assessment, and the PLC lead led the meetings in a way that allowed all members to contribute. The Algebra 1 team focused on the expectations of the standard and used this focus to identify concepts that could have led to errors in student work. The Algebra 1 PLC lead played a more active role in facilitating the meetings and keeping the team to their agenda. These factors with both teams influenced the attributions each team formed through the sensemaking process.

Attributions in PLCs

As each PLC engaged in sensemaking, or describing the student performance data, attributions emerged. These attributions, or explanations of student performance, allowed team members to explain why students performed the way they did, creating opportunities for each team to use these attributions to guide their instructional decision-making. The sensemaking included in this study involves the teacher describing what they saw. For example, a teacher might describe student performance data as

stating the student missed the author's purpose. Attributions are when they explain why they missed the author's purpose, such as an unknown vocabulary term. Some attributions were common among teams, as each team served the same group of students at the same school, while others were drastically different.

Similarities in Attributions

In both PLCs, teachers formed attributions in similar ways. First, both PLCs attributed student apathy to the student performance results around the same time in the school year. In the third Algebra 1 PLC, both Ms. Kruz and Ms. Dawn noted student apathy as an explanation for student performance. Student apathy is described as a student's overall lack of attention or care as it pertains to what is being taught. "When we say the word test, they're like no, I'm not doing that, ya know?" Ms. Kruz shared. Ms. Dawn added, "Yeah, I mean, I did have some that literally just didn't want to start. I had to, like, be on them the whole time." The Algebra 1 team shared the times their students did not want to write out any work which resulted in them missing questions on the assessment. The English PLC noticed similar tendencies in their students. Ms. Green stated, "Oh, I, I think that some of my students are just very uninterested in this quarter. So, it is hard for me and others. It is hard for me to have a great discussion between everyone" when explaining how her students responded to a topic her team had taught previously as they were analyzing student results. Student apathy, coded 16 times across observations of both PLCs, was a common explanation for student performance amongst both teams, especially around the time of the school year which was just before the first holiday break.

Both PLCs explained student understanding as another attribution to student performance data. Student understanding can be described as a misunderstanding or misconception in a process or idea that is part of the content being taught. Ms. Mathis in the Algebra 1 PLC noted, "and several that would tie

like, they wrote no solution on a paper they typed in like zero. And I'm trying to tell them, like, zero is a number, zero is not no solution." Other members of the PLC shared similar student misunderstandings as they were viewing student test results. In an Algebra 1 PLC meeting discussing student performance on an assessment of word problems, Ms. Cruz stated, "Yeah, they can't figure out the negatives and positives is what I'm working with. Like, they can understand where, and I tried to explain, like, if we're talking about spending its a positive thing, we're adding a spending together. If we're talking about saving, then you're taking your spending out of your savings, you're subtracting it." English 1 also shared student misunderstandings and attributed these to their students' performance on the previous assessment. Ms. Kirk noticed her students misunderstood a vocabulary term on an assessment. "Well, a lot of my kids were struggling with they never used the word center, like even my advanced honors, like what does it mean that it was, like, centered in the middle." She attributed their lack of understanding the vocabulary term to the reason they missed the question on the assessment.

Differences in Attributions

Each PLC formed different attributions about their students when examining their performance data. Algebra 1 attributed much of their student's mistakes to errors in foundational skills required to be successful with their content. "They aren't distributing it to both things on the other side," was an attribution Ms. Dawn made as she was examining one student's work with her team. She also added, "So, I don't know like they just miss you know, common arithmetic where they did everything else right." The distributive property was a concept in math taught in the earlier grades when the foundation of Algebra was being introduced. If Ms. Dawn were to just describe what the student missed, in this case a multi-step equation, naming this description would be considered sensemaking. Since she explained the error in the student's work, linking it to a foundational issue, this was considered an attribution.

Focusing on foundational errors was an emphasis for the Algebra 1 team because this year their district switched from Integrated 1 to Algebra 1 and the team wanted to be cognizant of what their students needed to know and be able to do as they entered this new content in ninth grade.

Understanding the expectations of the standard was a topic of conversation in most of their PLCs. When interpreting the meaning of an upcoming standard, Ms. Dawn stated:

> So, with that being said, we're going to talk about what is coming up in topic two. And so last night, I tried to put together, like, a word document with the goals. So, here's the standards that were in the curriculum guide for topic two. And I'm not going to read over those because you know, we can read that. But really, what, what are we trying to do here? I pulled a lot of this from the curriculum guide, but I wanted us to talk through how we want to tweak it if we want to tweak it."

She went on to explain, "And so, I was, like, trying to look at notes that I had because I'm like, okay, what are my objectives within the curriculum guide?". Forming these attributions allowed them to determine which foundational skills to place more emphasis on in the future.

English 1 formed attributions differently in their PLCs. Their explanations of student performance data, which guided their instructional decision-making, were centered around the achievement level of the class. When making attributions about student performance, they used class averages regarding achievement levels to justify the results. For example, in a PLC in which the English 1 team was examining writing samples, Ms. Green commented, "The only class that I really think is just not doing how I need them to do is my, my, one of my honors classes. I'm like, their paragraphs, were horrendous." Ms. Kirk, commenting on the same prompt agreed, "And then textual evidence, which is something they always struggle with is evidence. But either way, a good solid paragraph, like they'll

include a citation, but it has nothing to do with the writing. And that's even my highest advanced honors kids." In this instance, the work students were producing was not acceptable given the achievement level of the class.

Achievement Level of the Class

In other instances, their average was justified because of the achievement level of the class. Discussing a different common formative assessment, Ms. Green shared, "No, I mean, my kids actually did a lot better than I expected. Like, one of my inclusion class averages was a 47. My other inclusion was a 46. So, I'm like, go ahead. And my standard class average was a 64." Ms. Kirk responded, "My standard averaged 47. I think my other ones were in the 70s and 80s. But those are advanced honors, so." Ms. Crews stated, "My inclusion is a 39 but that's my third and I have a ton of kids that haven't taken it. My standard is a 51 and a 47. My honors are ranging from a 55 to a 64." In this conversation, and several others, the English 1 team used the averages of each leveled class to certify the results and influence their instructional decision-making.

Preparing for Future Lessons in PLCs

In each PLC, the members engaged in collective sensemaking and formed attributions about student understanding to plan for future lessons. In ways their formation of attributions informed their instructional plans similarly, such as discussing which topics they would need to re-teach or discuss with their students. In other ways, their attributions informed their instructional plans differently. In the Algebra 1 PLC, the sensemaking process informed the team's plans for remediation with the students whose performance indicated remediation was needed. For the English 1 PLC, the sensemaking process informed the team what topics needed to be taught again, which they had the flexibility to do given the way their curriculum was written.

Similarities in Preparing Future Lessons

Both the Algebra 1 and English 1 PLCs referenced class averages concerning the level of class and used this as a reference to determine instructional decisions. The method they used to determine instructional decisions was similar, but the instructional decisions themselves were different, a concept we will explore in the next section.

While reviewing student performance data, the Algebra 1 team used the student's misconceptions and the class's achievement level to determine how to support students. Ms. Dawn stated, "And it's really the standard kids we're talking about, like, you know, we saw the averages for honors and advanced, like, if they're doing, if they're solving their inequalities, they're fine. For the most part." If the average on an assessment seemed acceptable to the team for the level of class it was, the team decided to move on and would pick a few students to pull for a remediation period. The English 1 team similarly engaged in this process. Ms. Green shared with her team, "Like, yeah, so my honors was a 71. And my other honors was a 69. So that's pretty, pretty similar" when describing her students' performance data and planning to move on to the next topic. The consensus with the team was that it was acceptable to move on to new content if the class averages on the assessment were similar for each type of class. Each team appeared to have an average they deemed acceptable for their classes depending on the achievement level of the class.

Differences in Preparing for Future Lessons

While both teams described class averages as a means for moving forward with instruction, the method by which each team decided to address misconceptions during instruction varied. For Algebra 1, the team emphasized pulling students for a remediation period as the preferred method for addressing incorrect responses. In one PLC, Ms. Dawn shared with her team, "So, I think we keep pulling them into

PAT and like you're saying so maybe if we were remediating the equations that should also be remediating inequalities because it's the same steps." In this conversation, Ms. Dawn justified moving forward to the next topic, inequalities, because of the remediation plan the team had in place. In a separate discussion, remediation came up once more when discussing instructional decisions. Ms. Dawn stated, "How are we responding when learning hasn't occurred? I wanted to talk with you all about possibly a remediation and retake plan today." This team also ensured math interventionists were at all meetings since they shared the same students. The teachers collaborated on topics to remediate during intervention for the students they shared. Ms. Dawn told the two interventionists, "I was thinking if there's five goals, we could do like at least three questions or three for each one. I think as long as y'all are hitting those, and I think you're doing what you're supposed to." Algebra 1 made it a point to include interventionists in their instructional plans because they serve students who are not operating at grade level.

English 1 approached their preparation for instructional plans differently. In one PLC, the team was discussing instructional plans following a conversation they had about data over an assessment concerning colons and semi-colons. Ms. Green shared, "Pretty much every single day since the CFA I've done semi-colon bellwork, and I'm going to continue to do them, every single day." Ms. Kirk added, "See, I've been doing a lot of comma work with them to like, show them hey, this is how a comma is supposed to be used here." Ms. Crews responded, "I've been doing that, too. A colon and semi-colon builder." This conversation was in response to student performance data in which students were assessed on their ability to place appropriate colons and semi-colons. When the teachers noticed students did not have a thorough understanding of this, they continued to emphasize this skill in their instructional plans for upcoming lessons.

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Conclusion

In conclusion, the purpose of this chapter was to explore the factors that influence a teacher's instructional decision-making. Through observations of the sensemaking process and the attributions teachers formed through it, I was able to gain insight into the complex decision-making strategies employed by teachers. These findings demonstrated that each PLC engaged in sensemaking in similar and different ways, resulting in the formation of attributions that were both similar and different from one another. These findings can inform educators on the factors that can influence instructional decisions.

CHAPTER V: DISCUSSION AND CONCLUSIONS

Introduction

The purpose of this study was to examine the factors that influence a teacher's instructional decision-making, such as their sensemaking process and the attributions created through that process. This chapter includes a discussion of findings related to the literature on standards and curriculum, professional learning communities, and the process by which teachers approach student performance data. Also included is a discussion on implications for teachers, school leaders, and research. This chapter concludes with a summary highlighting the importance of this study.

This chapter contains discussion and implications for teachers, school leaders, and future research possibilities to help answer the research questions:

RQ1: How do teachers engage in sensemaking through their interactions in a PLC?

RQ2: How do teachers form attributions through their interactions in a PLC?

RQ3: In what ways does the sensemaking process and formation of attributions influence PLC plans for future lessons?

Summary of Findings

The Algebra 1 and English 1 teams engaged in sensemaking in their PLCs in ways that were similar and different. Both teams would begin the sensemaking process by describing the topic or standard being assessed. The leads of both teams used information about standards on the curriculum guides provided by the district which included descriptions of the standards and each standard's learning objectives, although their emphasis on utilizing the curriculum guides was different.

The two teams engaged in the sensemaking process differently in multiple ways. First, the Algebra 1 team relied on the explanation of the standard to determine what their students were expected to know and be able to do which allowed them to determine what prerequisite skills were necessary, whereas the English 1 team discussed elements of the writing prompt or questions included on the assessment, but did not stop to reference the standard while doing so. The English 1 team would mention what they did in class leading up to the assessment while engaging in the sensemaking process, while the Algebra 1 team focused on describing the errors in student work to determine if these misunderstandings would prevent their students from successfully learning later standards. In other words, the English 1 team focused on the teachers' instructional choices while the Algebra 1 team focused their discussions on student errors and misunderstandings. The Algebra 1 PLC lead played a larger role in preparing for and leading her PLC, as she was the driver of most discussions that took place amongst her team. The English 1 PLC lead made sure her team meetings were organized with an agenda, but she allowed more opportunities for her teammates to be involved in the meeting as they engaged in the sensemaking process together.

The Algebra 1 and English 1 teams formed attributions or explanations of certain outcomes in ways that were alike and different. Both teams cited student apathy when explaining student performance data at the same point in the school year. Both teams explained student understanding, or a misunderstanding in the process or idea that is part of the content being taught, as an attribution to student performance. While these misunderstandings were different as they related to their content, the attribution was the same. The Algebra 1 team formed attributions differently in that they focused heavily on student foundational skills preventing students from performing successfully on the assessed

standard. The English 1 team attributed their students' performance data, or class averages on an assessment, to the achievement level of the class.

The impact of the sensemaking process and attributions formed affected how each team made instructional plans in similar ways. Both teams regularly used student test averages with respect to the achievement level of the class as a measure of what was acceptable to move forward with new content. How they approached future instructional plans differed in their focus. The Algebra 1 team focused on remediation plans and the English 1 team would embed any topics that needed re-teaching in their lessons due to the nature of their standards being covered multiple times throughout the school year.

The sections below will describe the concepts that emerged through this qualitative observation study including standards and curriculum, assessment literacy and PLC sensemaking, PLC team composition and collaborative routines, and implications for teachers, school leaders, and future research possibilities. The section on standards and curriculum will discuss the role each team's standards and curriculum played in the sensemaking process and the attributions formed through that process. Assessment literacy was a factor in how each PLC engaged in sensemaking and understood their assessments and how to use them effectively, which influenced their future instructional plans. The PLC team composition and collaborative routines described relate to the social context of the PLC, norms, and roles members played in the collaboration process. Finally, the implications for teachers, school leaders, and future research possibilities describe how this research can be applied in schools and for further research. Overall, the purpose of this discussion is to provide a complete overview of the factors that impact how teachers engage in sensemaking, form attributions through the sensemaking process, and how these processes influence instructional decisions.

Standards and Curriculum

Each team has unique circumstances surrounding standards and curriculum. This is important because the student performance data each team analyzes in their PLCs is from assessments aligned with the state standards and curriculum. While the English 1 PLC engages in sensemaking by addressing the topics in which students do not perform well, they do not need to go into as much detail because they are familiar with the standards. All members of the PLC have at least two years of experience teaching the same standards, which allows them to move fluidly through student performance data without a need to reference the standards as often. This is a characteristic different from the Algebra 1 team, which is trying to learn new standards and teach them simultaneously. Not only is the math team embarking on their first year together as a PLC, but they are also learning the new math standards and how to utilize the new textbook while needing to maintain the recommended pace suggested by the district.

The English standards occur cyclically throughout the year, that is, they will be taught and assessed multiple times throughout the school year. When a specific English standard is assessed and student performance data over the standard is reviewed, the team understands this will not be the last time they will teach or assess that standard. The English curriculum guide provided by the district provides details of the expectations of the standard as well as suggested materials for teachers for instruction.

The Algebra 1 standards are presented differently throughout the school year. While there are varying skills that build upon one another, these standards are taught in more isolated ways than the English standards. For example, when a specific Algebra 1 standard is taught and assessed and the team is reviewing the student performance data over that standard, the Algebra 1 team understands that the only ways the standard can be readdressed are through review or remediation, as they have more

standards to cover and pacing requirements suggested of them. Their curriculum guide and standards do not offer opportunities to re-teach and reassess their standards like the English curriculum guide and standards unless they do not follow the suggested pacing guide.

The standards in English 1 are all covered multiple times throughout the year, unlike Algebra 1 standards which are distinct from one another. Because the English standards are covered frequently throughout the year, the English 1 team makes plans to re-teach a standard in which students did not perform well and can continue appropriate pacing. Alternatively, the Algebra 1 team is in a year where they are adopting new standards and a new textbook. Because of this difference, the Algebra 1 team uses the curriculum guide frequently as a tool to steer their instruction.

In a study of teacher sensemaking regarding adopting a new science curriculum and the professional development surrounding the implementation, Allen and Penuel (2015) found that when teachers are adopting a new curriculum, often the most significant source of ambiguity and uncertainty depends on the organizational context, or how the information is provided, the opportunities for collaboration, and the decisions in which teachers have autonomy. The organizational context, or the district support during this standard implementation, is provided to the Algebra 1 team through the curriculum guide, which gives thorough explanations of the learning objectives of each standard, as well as a series of team lead meetings that are led by district officials. The Algebra 1 team uses the curriculum guide and information gleaned from these meetings involving team leads to inform them of the expectations of the standards. Understanding the prerequisite skills is especially important to this team because this is the team's first year teaching the new standards and they want to understand what their students need to know and be able to do to become proficient with the content. The significance of the curriculum and standards is considered when discussing how teachers engage in sensemaking, or

describe the student performance data, and how they form attributions, or explanations, of these descriptions. Their understanding of the expectation of the standard allows them to explain the student performance data as well as create future instructional plans in response to the student performance data.

Assessment Literacy and PLC Sensemaking

The student performance data is collected after students take assessments evaluating the state standards. Teachers must be assessment literate or understand the assessment concepts and procedures which influence educational decisions (Popham, 2011) to focus their attention appropriately throughout the sensemaking process. In other words, they must ensure the assessment is valid and reliable and have a thorough understanding of the standard's expectation before they can engage in sensemaking and form attributions from the results of the assessments. Both teams rely on their understanding of the standards and curriculum as they engage in sensemaking with the student performance data as well as create instructional plans. If each team is not aware of the expectations of the standard, they cannot ensure their assessments are valid and measure what they are intended to. Being assessment literate allows these teams to first administer assessments that are reliable and valid, and ensures the student performance data they view as they engage in sensemaking accurately depicts what their students know and can do so they can make instructional decisions accordingly.

PLC Team Composition

While certain nuances such as agendas, norms, and meeting times are similar for both teams, there are apparent differences that affect how each team approaches the student performance data and engages in the sensemaking process. Sensemaking in the context of this study refers to how the members of each PLC describe the student performance data they are viewing. This approach is driven

by social factors in the group and norms: spoken and unspoken. The English 1 team is entering their second year together, a characteristic uncommon for most teams at the school. This familiarity with one another is evident in how the team interacts. In a study of the conversational moves and routines within two PLC groups, Horn and Little (2012) use the term normalizing to describe interactions in one group of their study. Normalizing is defined as "moves that defined a problem as normal, an expected part of classroom work and teacher experience" (Little & Horn, 2007, p. 192). In teams that engage in normalizing experiences with one another often, teachers feel a sense of reassurance that their viewpoints and opinions are acceptable, thus strengthening the bond of the PLC (Horn & Little, 2012). The English 1 PLC engages in normalizing their experiences often, which allows them to be vulnerable and trust one another. Their team has a strong sense of collegiality, which is evident in their exchanges with one another. When engaging in sensemaking or formation of attributions, it is apparent each member feels their description and explanation of the student performance data will be met with a sense of acceptance which encourages them to share their experiences more often.

The dynamic of the Algebra 1 PLC team differs in that the lead, Ms. Dawn, plays a more active role in facilitating the team's meetings. As an experienced leader in her fourth year at the school, she is familiar with her role of taking charge and guiding her team as she has done with her teams in the past. She crafts meeting agendas, develops pacing calendars, and helps to clarify learning expectations of each standard that is taught. Additionally, she provides testing questions for each standard, which helps her team understand the standards more in-depth, as her teammates are new to her team. As a result, her speaking contributions are greater than other members. Unlike the English 1 team, there are not many opportunities to engage in normalizing experiences amongst team members due to the nature of the meetings and the desire to stick promptly to an agenda. When conversational moves allow teachers to

engage in normalizing their experiences, they can build their sense of belonging to the team and affiliation with one another (Horn & Little, 2012). Because these opportunities for normalizing do not occur often in the Algebra 1 PLC, their team does not appear to be as harmonious as the English 1 team.

PLC Collaborative Routines

The Algebra 1 team's approach to the student performance data is thorough and standards-driven. Beginning with a clear expectation of the standard and learning objectives, the team examines assessment data by standard. The team utilizes an assessment platform that allows them to gauge how their students are performing with respect to each standard. The platform generates reports that allow the team to access the percentage of students who scored correctly on each standard. Whenever the student performance data indicates poor performance in a particular standard, the team revisits the curriculum guide to identify what parts of the standard might need remediation. In their study of misconceptions about data-based decision-making in education, Mandinach and Schildkamp (2020) discuss the misconceptions educators hold about data-based decision-making and offer recommendations based on their review of the literature. One of their recommendations for teachers when participating in data-based decision-making is "do not start with the data, but clear and measurable goals" (Mandinach & Schildkamp, 2020). The Algebra 1 team's analytical approach allows them to navigate the new standards carefully while engaging in sensemaking. This allows them to form attributions and draw conclusions about what the students can do and make instructional adjustments accordingly.

The English 1 team engages with the student performance data in a similar way but with a different focus. While they, too, utilize the curriculum guide to determine the learning objectives of the standard, they do not refer back to the curriculum guide as often, as this team is more familiar with their standards. The team uses a different testing platform than the Algebra 1 team uses that generates item

analysis reports for each of their assessments. The team examines the item analysis, reviewing the number of students who select each answer choice on the assessment. From there, they carefully evaluate each test question and work through each answer choice, aiming to identify the root cause of any misunderstandings the students may have about the standard. This process is repeated for any test questions that indicate a common misunderstanding amongst students. As the team views these reports and engages in sensemaking collectively, they often reference what instruction has taken place and how they interact with the students leading up to the assessment to aid in their formation of attributions. In the discussion of the misconceptions of data-based decision-making in education, another recommendation the authors make based on their review of the literature is to "connect professional judgment and data to increase the quality of decision making" (Mandinach & Schildkamp, 2020). This triangulation of data sources in student performance data and classroom experiences allows the team to form instructional plans to address misconceptions.

Implications for Teachers

The implications of this study have significant relevance for educators, particularly in the context of their PLC. The findings suggest that the way teachers engage in PLCs has a direct impact on the decisions they make for their classrooms. Specifically, the level of engagement, the normalization of situations in their practice, and their response to student performance data all influence the decisions made by teachers. Therefore, educators need to be aware of the preconceptions that may impact their sensemaking and attribution processes. By doing so, they can make more informed decisions and improve student outcomes.

These implications also suggest that team leads play a critical role in the sensemaking process during PLC meetings. By setting the agenda and determining the amount of time dedicated to data

analysis for certain standards, team leads can either facilitate or hinder the process of sensemaking and attributions formed. The emphasis placed on certain aspects of data can influence the conclusions drawn by teachers. Therefore, team leads should carefully consider the agenda they create for PLC meetings and ensure there is enough time dedicated to thorough data analysis and that all aspects of the data are given equal attention. By doing so, they can ensure effective and efficient PLC meetings to inform their instructional decision-making.

Implications for School Leaders

The implications of this study suggest that principals or school leaders should consider how they construct teacher teams. Factors such as years of experience, collegiality, professionalism, and personality type should all be taken into account when selecting teachers to work together. For teams in which years of experience are limited, support should be provided. This study highlights the importance of creating well-rounded teacher teams that can work together effectively to respond to student performance data and support student success. The findings of this study can help schools consider how they construct teaching teams to create a more collaborative and productive teaching environment.

Implications for Research

This study intentionally drew upon and built on the work of Bertrand and Marsh (2015). Both studies intended to explore teachers' sensemaking of data and discovered the attributions formed through this process. This study found similar results as it pertains to the attributions formed by teachers while engaging in sensemaking such as the instruction that occurred before the test, student understanding, and nature of the test. The findings of this study differed in that one attribution that emerged from the research is the notion that the achievement level of the class justified the student performance data. Another finding that emerged from the research is how the PLC team composition

can influence how teachers engage in the sensemaking process. Future research should consider examining how teachers respond to student performance data concerning the achievement levels of their classes as well as the dynamics of the PLC in which they are involved and how these dynamics influence their instructional decision-making.

Conclusion

The findings of this study provide insight into the factors that influence how teachers engage in sensemaking and form attributions within the context of the PLC as well as how these processes influence instructional decision-making. The research indicates that the role of the lead of the PLC, the dynamics of the team, preconceptions teachers hold, and the overall achievement level of students could be factors that influence how teachers engage in sensemaking in response to student performance data. Ultimately, this research highlights the importance of considering multiple factors when determining which aspects impact the instructional decision-making processes of educators.

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