

Barriers for Principals and Teachers to Program Implementation in Milwaukee Public Schools (MPS)

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Abstract

The following report details the management and decision-making barriers that Milwaukee Public Schools (MPS) principals encounter when introducing and sustaining CS education within their buildings. This research aims to understand how principals optimize school structures, components, and leadership disposition when making curriculum and personal decisions. Interviews were conducted with middle school principal leaders, with one or more teachers trained in CS instruction in their schools. From the interviews, we found the principals liked the idea of computer science but showed limited knowledge of what CS education is and its differences from the larger concept of “technology literacy.” The research found the issues that hurt CS curriculum expansion are 1) funding issues, 2) classroom time, and 3) CS training. Despite these barriers, the potential of CS education to inspire and empower students is undeniable, urging us to overcome these challenges.

Acknowledgment

The author was supported in part by National Science Foundation grants CNS-1923581 and CNS-1923597. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of NSF.

Suggested citation

Banwo, B. O. (2024, August). *Barriers for Principals and Teachers to Program Implementation in Milwaukee Public Schools (MPS) [Report]*. Chicago, IL: The Learning Partnership.
<https://doi.org/10.51420/Report.2024.11>

Report Goals

The changing educational environment, the diverse needs of students, and the expectations of schools from the public and policymakers to prepare students as future citizens and workers demand a continual need for educational change not only at the system level but also at the building level. This research aims to explore the decision-making processes in curriculum implementation at the school level, a topic of significant importance in the field of education. For many policymakers, efforts to improve and introduce new curricula, techniques, and pedagogies have been a feature of the system level of educational management, usually following a traditional top-down formula of mandated policies and practices (Dufour, 2007; Green, 2022). Nevertheless, as attitudes and leadership practices shift from top-down approaches to more shared or collaborative philosophies, the question of “who decides” remains prominent and central to the decision-making and programmatic improvement processes of schooling.

School management and the question of who decides which and when new curricula and practices are introduced and adopted into a school building are at the heart of this research. Traditionally, as in the case of the Milwaukee Public Schools (MPS), the location of the study, these decisions are made at the executive level through district mandates, initiatives, and funding. Although the Preparing the Urban Milwaukee for Principles of Computer Science (PUMP-CS) Research Practice Partnership (RPP) is studying MPS’s creation of a computer science (CS) pathway without a traditional top-down mandate, the initiative does provide building leaders with training for their teachers, instructional supplies, and technical knowledge for adequately implementing the CS curriculum in their schools. This research aimed to answer four questions: 1) What is the process for deciding what middle school courses are offered and what curricula are used for each course? 2) What does the principal think of middle school computer science? Their opinion about it as an academic subject? 3) How familiar is the principal with MPS’s CSD curriculum offerings? 4) What is the principal’s opinion about the MPS CS initiative? What is needed to encourage more principals to implement CS curricula?

This research grows out of anecdotal conversations with teachers and curriculum trainers; we found teachers interested in being trained and, in some cases, implementing CS curricula for a short while. However, from earlier research and observations, we have yet to see long-lasting fidelity of CS implementation, which refers to the sustained and consistent use of the CS curriculum. This earlier research has narrowed our focus to the building level of school management, particularly who and for what reasons school leaders introduce new curricula into their schools.

Principal Leaders: School Management and Curriculum Implementation

Principals in MPS primarily serve as the instructional and operational leaders of district-run educational institutions. They are mainly tasked with leading their district efforts to achieve student goals and district initiatives (MPS, 2024). This includes managing what are essentially small companies, hiring and evaluating staff, and completing various administrative duties that focus on achieving the goals set forward by their governing body. Principals in MPS are expected to promote high-quality instructional practices, select and assign staff, support differentiated professional growth, and build the leadership capacity of staff and students. In essence, MPS building leaders wear many hats and have an enormous effect on the culture and climate of their school buildings. Indeed, looking at these school leaders from a management

perspective, we can regard effective principalship as seeking to optimize the utilization of all school components as a tool to fulfill its role as a preparation for future societal members (Kompri, 2017). Considering schools and their role as formal organizations of our society, educational institutions and their leadership are tasked with producing graduates with academic abilities, valuable skills, attitudes, and mentalities that serve to better society.

Study Findings

This report focuses on interviews with nine MPS principals about their management and decision-making opinions when determining when and where an initiative or curriculum will enter their building and seeks to answer the following four research questions;

1. What is the process for deciding what middle school courses are offered and what curricula are used for each course?
2. What does the principal think of middle school computer science? What is their opinion about it as an academic subject: (1) a *core subject important to students' futures*, 2) a *stand-alone subject that's nice for students*, 3) a *special or elective course*)?
3. How familiar is the principal with MPS's CSD curriculum offerings?
4. What is the principal's opinion about the MPS CS initiative? What is needed to encourage more principals to implement CS curricula?

This research is a continuation of earlier research that sought to understand teachers' perceptions of barriers to program implementation. This continuation of earlier research now turns its focus to school leaders intending to study their opinions of curriculum implementation to understand better when and why school leaders decide to implement new educational programs. Therefore, the following research will explore principals' opinions and curriculum implementation in two parts. The first section, Principal Decision-making, will examine the principals' management styles and leadership opinions on introducing new subjects and pedagogical practices in their buildings—particularly those focused on implementing and managing new curricula and initiatives entering their buildings. The second part, entitled “Opinions of Computer Science,” attempts to connect principals' supervision and management to their opinions and ideas of computer science.

Section 1: Principal Decision-making

Over the last ten years, the PUMP-CS RPP has been at the forefront of research studies to understand the adoption of computer science curricula in schools. Our focus initially led us to teachers and students and their unique implementation struggles. However, this research project explored the role of leaders and how their management disposition and district responsibilities affect teachers' ability to implement new curricula. Our study found that despite most building leaders' tight control over their building's culture and management, they were remarkably open and eager for new programming to enter their buildings. All principals expressed openness to district and community partnerships, teacher-led programming, and collaborative and shared leadership with building staff that fosters a sense of inclusion and teamwork. We found no evidence that principals' responsibility or accountability to district and state educational metrics affects their willingness to introduce a new academic curriculum. Most only required that if a new curriculum is being considered, it **1) benefits the students, 2) is funded, and 3) is connected to their state and district standards.**

Management and Shared Leadership

Throughout the interviews, we found principals interested in expanding CS education in their buildings; however, we found that leaders without CS activities in their buildings mainly highlighted funding issues, classroom time, and an opportunity and time for trained staff to share information with other building staff, as the most significant reasons for not implementing. Nevertheless, our participants were highly collaborative in their staff supervision and organizational management. Each principal described themselves in terms such as “*shared leadership style*,” “*Shared decision-making*,” and as a “*choir leader*” whom “*see what needs to be done, find ways to work with the staff, and whoever needs to do anything and get it done*” (Principal Interviews, April 2024)."

Management and Program Implementation

One initial rationale for this research was to assess the principals' management style and its connection to their willingness to implement new curriculums. We found from the interviews that all leaders expressed a desire to implement new academic programs and initiatives. They were not bound by whether these initiatives aligned with state educational standards and district requirements. The principals' primary consideration was the needs of their students, whether the school had time in the academic master schedule or their community's desire for a particular skill. In fact, it doesn't appear that a teacher's inexperience with a specific subject area (such as computer science) or even a teacher struggling with implementation will deter the leaders' willingness to implement a new academic initiative. The leaders' focus on student needs was evident, as they were very collaborative and willing to give teachers the time and space to grow. Our concerns about principals' nervousness or unwillingness to allow the implementation of unknown or new curriculums does not appear to be valid.

Lead Learner Model and Leader Opinions

Another aspect of principal leadership the RPP was interested in exploring was principal supervision and CODE.org's Lead Learner collaborative model (a model that shifts the instructor's position from what some consider the traditional role of “content expert” and primary source of knowledge for students to that of a collaborative source of discovery). Similar to the earlier section, across all interviews, leaders expressed positive feelings toward the idea of

student/teacher collaborative learning. For example, one leader stated, *“They don’t lecture through the whole time... introduce the lesson and then, they have the kids work in group, small groups...”* This leader described how his school uses a collaborative model for Math and English subjects. He felt his students would like the Lead Learner model, emphasizing the comfort students experience with this approach. However similar to early RPP studies, principals do not know CODE.org’s terminology of lead learner and are unaware that CODE.org is asking instructors to partner with students collaboratively. I don’t think this is a significant issue with building leaders, but it is crucial to inform leaders of the preferred pedagogical model CS curriculums are using. Also, this engagement should include ways in which principals can supervise CS teachers.

Additionally, although the principals have a favorable view of collaborative teaching, they did not provide evidence that they understand it. The principals only describe that they liked the idea of students and teachers working together but struggled to identify a pedagogical plan or strategy for what that would look like in practice. The clarification of the concept of collaborative learning presents a clear opportunity for growth and improvement through future training initiatives.

Teacher, Principal, and Lead Leader

One key finding from the implementation study (Banwo et al., 2024) was the discomfort teachers felt when students were aware of their lack of knowledge in a particular subject. Overcoming this discomfort required significant trust and vulnerability from both students and teachers.

Additionally, the RPP speculated that principal supervision could influence teachers’ feelings. However, it’s important to note that no evidence was found to suggest that principals’ beliefs about student-teacher collaboration impacted their ability to work with students. In fact, across all interviews, building leaders believe student-teacher collaborative pedagogies were positive and felt that it was the preferred method of instruction they look to observe when entering classrooms.

Takeaways: School Management and CS implementation

Overall, the management of practices and ideas of the building leaders interviewed was that of shared leadership. They preferred to share power and management responsibilities. Each principal discussed having a strong team focusing on one or two elements while running the school. In schools with functioning CS programming, the principal highlighted there was a champion in the building, pushing CS forward. For example, one principal described his CS champion as, *“You got to have a lot of different pieces and they all got to fit. You got to have an administrator who believes in it. You got to have then a teacher lead who can -- and you got to give time for teachers to plan too.”* Although this quote is from a school with an advanced computer science program, the attitude expressed about allowing CS teachers to lead indicates how the building leaders approach management and the implementation of CS. Management, supervision, and oversight methods and techniques are not barriers to expanding CS in MPS schools. According to our participants, the barriers appear to be: 1. Funding (money), 2. Expertise/ curriculum standard alignment, and 3. Staffing and Space in Academic Calendar.

Section 2: Opinions of Computer Science

The earlier section focused on building leaders' management practices and organizational leadership. This section will connect their supervision and management to their opinion and ideas of computer science. Tucker et. al (2003) define computer science education as “the study of computers and algorithmic processes, including their principles, their hardware and software designs, their [implementation], and their impact on society (p. 6).”

Across focus groups, the leaders have a favorable opinion of CS overall. The language used when describing their opinion or how CS fits into their school ranges from teacher implementation performance to how CS skills are a part of “everything we do,” stating;

“we’re really lucky that we -- you know; I believe in it. We have teachers that believe in it,”

“the world of computer ... tie in to science and how it ties into everything that we do.”

However, there is an evident lack of understanding among the district school leaders of CS curriculum and programming. Across interviews, the participants knew of the district's desire to increase CS activities and education through a district-wide initiative. Indeed, all leaders could recognize Antonio Rodriguez's role as a STEM Curriculum Specialist and knew what his office did through Karen Greene and Renee Scianni's work. However, there is a strong need for engagement with the principals, particularly the leaders with limited CS activities and programming in their building. For example, this principal from a school without a stand-alone CS course or after-school club states,

Banwo: Okay, we are going to offer a computer course for the school...what would you want?

Leader: I think it is more than just resources. I think it has to do with staff. Luckily, the staff that I have are, they are great. They always want to try new things. And if it's something that's going to benefit the students, they do it. (Principal Interview, 5/14/2024)”

The above quote is a representation of how leaders spoke about CS. They clearly understood the importance of CS, but they could not express a cogent description of 1) CS education and 2) what it looks like in their building. Even with principals who had active CS activities in their building, CS education was seen as a form of technical skill preparation or as an extracurricular course. This confusion leads us to speculate that there is some confusion between **Computer/Technology literacy** (refers to the general use of computers and programs (K–12 Computer Science Framework, 2016, p. 13) and **CS education** (the study of computers and algorithmic processes, including their principles, their hardware and software designs, their [implementation], and their impact on society (Tucker, 2003, p. 6). For example, across interviews, the leaders were asked what CS looks like in their buildings. The leaders mainly described how CS connected to student engagement and the use of Chromebooks, stating,

Banwo: “how do you see the possibilities of computer science education fit into your school?”

Leader: “I see it increasing -- fitting in number one, to **increase engagement**. Anytime you use computers in related to technology, the kids become more engaged, they become more interested, you know, their interest level shoots up anytime the teacher says “**Take your Chromebooks out**” or “Take your computers out,” they just become interested, because that is what -- that’s there now. (Principal Interview, 5/13/2024)”

The desire to increase student engagement is admirable and even a critical role educational leaders need to identify when implementing initiatives for students and their learning; however, this does not fit Tucker et al. (2003)’s definition of CS education. It is highly recommended that leaders be more engaged in the MPS CS initiative beyond just asking for permission to begin programming.

Section 3: Conclusion Related to Principals’ Opinions about Effective Leadership on Programming

This research sought to answer four questions that focused on the effect building leadership has on CS curriculum adoption and implementation. From the principals interviewed, we found they liked the idea of computer science, even with their limited knowledge of CS education, and wanted more options within their building. According to the leaders, the issues that hurt program expansion are 1) funding issues, 2) classroom time, and 3) expanding CS technical knowledge expansion to non-trained teachers. Table 1 below shows takeaways from the study, which were reported through research questions.

Table 1: Research Question

What is the process for deciding what middle school courses are offered and what curricula are used for each course?	When considering the addition of a new subject or area into the school’s curriculum, the principal’s discretion plays a significant role. Most principals, particularly those without a stand-alone CS course, cited a lack of staff, skills, or funding as the main obstacles. Interestingly, these same factors were also the driving force behind schools with CS programming. They either had the necessary funding, time in the school academic schedule, or a skilled champion in the building. Principals play a key role in the curriculum selection process, often deferring the decision to their assistant principals and department heads or entrusting it to a school ad-hoc committee. They also rely on the central office’s curricula. When considering new academic needs or subject areas, a teacher or a community member often brings this need or want to the principal’s attention. The principal then assesses if the subject is a good fit. Importantly, the principals appear to have broad discretion when implementing new subjects/ educational topics and demonstrate a strong willingness to add new subjects, topics, and curriculums when the community expresses interest.
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What does the principal think of middle school computer science? What is their opinion about it as an academic subject: (1) a core subject important to students' futures, 2) a stand-alone subject that's nice for students, 3) a special or elective course)?	For the most part, the principals have a very positive view of CS as an academic resource. Each principal believes CS education is occurring in their school, even when no official program occurred. While we didn't directly inquire about the status of CS as a core subject, it's evident that most view it as a valuable addition, not a necessity. They see it as a beneficial resource, not a mandatory one, similar to Math and English. Most regard CS as a special or something that will be useful for students but not necessarily critical. The principals' view of CS as a special directly relates to the lack of understanding and conversation about CS education.
How familiar is the principal with MPS's CSD curriculum offerings?	Throughout the interviews, we found principals interested in expanding CS education in their buildings; however, leaders without CS activities mainly highlighted funding issues, classroom time, and training as the most significant reasons for not implementing. However, a couple of principals described not knowing or being fully up to date on the MPS CS offering; one principal described this as "the initiative isn't packaged well," in other words, they felt the MPS suite of curriculum was not being fully explained and presented to the principals. This lack of awareness appears to be across interviews and could serve as an area of improvement.
What is the principal opinion about the MPS CS initiative? What is needed to encourage more principals to implement CS curriculums?	Across interviews, the participants were aware of the district's ambition to increase CS activities and education through a district-wide initiative. They could all acknowledge Antonio's role and were familiar with his office's work through Karen and Renee. However, there is a significant need for engagement with the principals, especially those with limited CS activities and programming in their building.

Research Takeaways

This work is a continuation of earlier research that sought to understand barriers to MPS CS curriculum implementation from the teachers' point of view. Our study found that despite most building leaders' tight control over their building's culture and management, they appear open and eager to see new programming enter their buildings. Our initiative feared that state and local testing standards might affect our participants' desire and willingness to introduce new programming, which I regard as unwarranted. Although testing has taken up much of the classroom educational time in the schools, our principals did not raise testing barriers to CS implementation. The principals continually raised funding, skill, and academic time as the most significant barriers to CS expansion. Table 2 shows three recommendations that we believe will benefit CS education, curriculum implementation, and leader engagement to increase CS educational offerings.

Table 1: Research Recommendation

Topics	Recommendation
Curriculum Decisions	• Principals are highly involved in the curriculum decisions in their building, which means we need to connect with them when thinking about program expansion. • Currently, principals do not have a clear idea of CS education. This understanding is crucial and needs to be engaged when interacting with principals in the future. The RPP must help principals understand that CS education goes beyond Chromebooks and Computer/Technology literacy.
Opinions of CS	• The RPP has willing partnerships in MPS schools. The building leaders have a very positive view of CS; many believe it's a critical subject their students need to learn (Frederking et al., 2023). The RPP could use this framing when selling the curriculum. • All principals expressed openness to district and community partnerships, teacher-led programming, and collaborative and shared leadership with building staff that fosters a sense of inclusion and teamwork. We found no evidence that principals' responsibility or accountability to district and state educational metrics affects their willingness to introduce a new academic curriculum. It is recommended that the RPP revisit program requirements and remind the leaders that participating in MPS's CS activities requires 1) benefits the students, 2) funding, and 3) connecting to their state and district standards.
Leader Engagement	• Leaders are aware of Antonio's role and were familiar with his office's work through Karen and Renee. However, there is a significant need for engagement with the principals, especially those with limited CS activities and programming in their building. The RPP aims to expand CS offerings, yet our leaders cannot describe what types of pedagogical goals and learning practices CS education entails. This lack of knowledge affects so many aspects of our desire to expand; for example, when the principals go into classrooms, they do not know what to look for, which might inform their willingness or need to introduce learning strategies like computational

	thinking. The RPP could help the principals by thinking deeply about how best to cue leaders in on CS education without overwhelming them. ● In addition, it is important to create a process to educate principals about computer science education. There was an evident lack of understanding of computer science education vs. technology literacy.
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Appendix 1: Methods, Research Questions and Context

The following research examines Computer Science Discoveries (CSD) non-implementing school principals and teachers, where at least one teacher has been trained but failed to start instruction. The study was conducted in Milwaukee Public Schools (MPS), which is in the midst of implementing a system-wide CS pathway¹ by connecting and aligning existing district initiatives and curriculums operating within their traditional K-12 educational model. This study is part of a more extensive research project that seeks to understand and document the growing pains of a K-12 CS pathway.

Principal Interviews

This research consisted of nine interviews with MPS principals and school leaders, focusing on gauging their opinions and views of their academic and leadership decision-making. This part of the research was intended to assess how principals decide what subjects are taught in their building (*does that decision occur on the local level? Or do they regard it as the purview of the district office?*). Additionally, we seek to clarify their staff member's CSD training participation and how the principal saw their staff member(s)' CSD participation and subsequent computer science knowledge and skills fitting into their school building culture, knowledge production, and course offering.

Part One: Research Questions

1. What is the process for making decisions about what middle school courses are offered and what curricula are used for each course? (Scheduling)
2. What does the principal think of middle school computer science? What is their opinion about it as an academic subject: (1) *core subject important to students' futures*, 2) *a stand-alone subject that's nice for students*, 3) *a special or elective course*?
 - a) Which structure for offering CS best fits within their school's middle school offerings?
3. How familiar is the principal with Code.org's CSD curriculum?
 - a) Does the principal know about CODE.Org Lead Learners Collaborative Instruction and learning model?
 - b) Does the principal know the educational background of the teachers who participated in CSD training to implement the curriculum?
 - c) Why did they allow a teacher to participate in CSD training? And why haven't they implemented CS in their building (*what are the barriers*)?
4. What is the principal's opinion about the MPS CS initiative? What is needed to encourage more principals to implement CS curriculums?

Research Site

The study was conducted in Milwaukee, Wisconsin, in the mid-western region of the United States. Milwaukee Public Schools (MPS) is the largest school district in the state of Wisconsin. MPS serves a student population of 77,746, with 88% of that population being minoritized students.

¹ Educational Pathway, series of increasingly sophisticated and demanding educational challenges that support the development of academic and technical skills (Feinstein & Peck, 2008, p. 1).

Participants

The research consisted of nine principals in schools where at least one teacher has been trained to teach CSD but has failed to begin curriculum implementation.

Data Collection

The authors interviewed nine principals in person. The conversations were digitally audio-recorded and transcribed. The interviews lasted for an average of 40 minutes.

Data Analysis

The lead author analyzed interview data using deductive coding methods (Miles & Huberman, 1994; Saldana, 2009). We analyzed data that identified emerging patterns and themes.

+ operationalize key terms and phrases ahead of the leadership meeting so we have working definitions to discuss (e.g., fidelity, “better” implementation, novice, success, etc.)

Appendix 2: Interview Protocol

Interviewer:

Thank you so much for participating in this interview! This interview will take no more than one hour. I'm going to ask you questions related to computer science instruction. I want you to know that all your answers will be confidential, and what you share in this interview group will not be shared with persons outside the focus group and will not be attached to your name. If you don't want to answer a question, you don't have to. There are no right or wrong answers—I want to learn what you think. Does all of this make sense?

I'd like to tape record the interview so that I can remember what you say, if that's okay with all of you. Is that okay?

If after the interview is over, you want to withdraw from the project, I won't use your information. You won't get in trouble for withdrawing.

Do you have any questions?

Is it okay for us to start?

1. What is your opinion about computer science? Do you think it is important for students to learn about CS in MPS?
2. How do you see the possibility of computer science education fitting into your school?
3. What barriers do you have for incorporating CS into your school?
4. How do you decide which classes will be taught within your school?
 - Is it a collaboration between you and the district? Or is it your decision?
 - How do you consider students' and parents' wants in your decision-making concerning courses being taught in your school?
5. How would you describe your management style?
6. When you enter classrooms to assess a teacher's teaching, what do you look for?
 - Do you use a protocol for observations?
7. What if a teacher is teaching a new subject, like computer science, and is struggling, what would you do?
 - How long would you give them to become proficient in teaching the new curriculum?
8. How familiar are you with the CODE.org Lead Learner model? (If the person doesn't know, read the description example of the model)

CODE.ORG design their curriculum with the idea that the instructor will act as the lead learner. As the lead learner, the role of the teacher shifts from being the source of knowledge to being a leader in seeking knowledge. The lead learner's mantra is: "I may not know the answer, but I know that together we can figure it out." A very practical residue of this is that we never ask a teacher to lecture or offer the first explanation of a CS concept. We want the class activity to do the work of exposing the concept to students allowing the teacher to shape meaning from what they have experienced. We also expect teachers to act as the curator of materials. Our curricula include an abundance of materials and teaching strategies - too many to use at once - with the expectation that teachers have the professional expertise to determine how to best conduct an engaging and relevant class for their own students.

School Atmosphere

9. If a teacher wanted to teach a new subject, how would they do that in your building?
 - How would you like to receive that information?
10. Who is in charge of your different curriculums?
 - How are changes made?
 - How do you know that changes need to be made as a leader? (Feedback from teachers, test scores, student feedback, parents, district feedback)
11. How confident are you in modeling computational thinking?
 - How confident are you in modeling computer science?
12. What are academic coaches, AP coordinators, and curriculum success staff roles within your school?
13. What process do you undergo when changing and adding a subject or new curriculum?
 - Where do you look for information?
14. For example, if one of your teachers gets trained in a new skill, how would they share that information with the building?
 - How would you incorporate that skill?

Principal Identity

15. What type of leader would you consider yourself?

CS incorporation

16. Are you aware of MPS's push to add CS courses in schools?
 - What is your opinion of this initiative?

17. What would you change if you could change any rule, structure, or requirement to see more CS instruction and learning in your setting? Why?
18. As a leader in the district, how do you think this initiative is going?
19. What can the district do to help this initiative?

