

**LMCMS Redesign
2023-24**



LAWRENCE

Public Schools

TEACHING AND LEARNING

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Executive Summary

At its March 27, 2023 meeting, the following motion was approved by the Board of Education:

I move the Board of Education direct the superintendent to create a Middle School Redesign committee comprised of Grade 6-8 educators and administrators, who will return to the board by December 2023 with redesign implementation recommendations for the academic year 2024-25 to include:

- 1) repurposing LMCMS with a special curricular focus,
- 2) boundary shifts aiming for a more equitable distribution of socio-economic status within the student body,
- 3) contingencies for the possible elimination of the middle school second plan time, and
- 4) other related curriculum adjustments.

The committee shall demonstrate that it consulted with community members, students, content experts, district bargaining units, and other stakeholders as needed; and that equity, inclusion, and belonging is embedded in all recommendations to the board.

The committee was convened in April 2023 and met eleven times prior to an update to the Board of Education in late September. At that meeting, the committee shared the collected feedback from students, families, and educators. The committee also recommended a STEAM curricular focus for Liberty Memorial Central Middle School. Since the September update, the committee divided into working groups and has toured schools, attended STEAM professional development activities, and worked with potential partners. This report will provide an overview of the curriculum adjustments and examples of partnerships that would support those adjustments, possible schedule changes to support student learning, and next steps.

District administration, in collaboration with the Middle School Redesign Committee, recommends that Liberty Memorial Middle School begin the 2024-25 school year with a curricular focus on Science, Technology, Engineering, Arts, and Mathematics (STEAM), that is available to all students who reside within the Liberty Memorial Central Middle School boundaries and students in grades 6-8 both within district and outside of district boundaries who determine that the curriculum and instruction at LMCMS would best meet their learning needs.

Design Principles

Part of the work in reviewing a redesign for a Science, Technology, Engineering, Arts, and Math (STEAM) centered school was to examine the teaching process and educational theories that can guide a STEAM teaching approach. The working groups used “An Educator’s Guide to STEAM” by Quigley and Herro to understand more how we might adapt curriculum and instruction to increase student learning and engagement. Here is one section that helped inform the working group:

STEAM teaching uses a variety of strategies and there are several interrelated strategies to STEAM teaching. These approaches make up the STEAM conceptual model and are helpful for guiding teachers as they integrate STEAM into the classroom. In this model, we focus on the learning context, or the context the teachers create to facilitate STEAM learning. This includes how the teachers structure their classroom for STEAM and the ways they can integrate the disciplines based on this environment. It’s critical to rethink the learning context so the school starts to move the ways people solve problems in the real world, which fosters students; problem-solving skills.

Part of this restructuring of the teaching process is to look at educational theories that can guide STEAM. One such theory is called connected learning. Connected learning looks to uncover and build collective capacity, identities, and opportunities. It acknowledges the variety of pathways that students bring to a learning experience and suggests that these pathways are often connected. Presently, much of the focus on connected learning has been on informal learning programs and online communities. In our work we have found that connected learning aligns with STEAM education in two primary ways: 1) as a means to draw the student's interest and help teachers choose authentic real-world problems to solve when designing STEAM problem-solving scenarios (for example, local issues students have interest in), and 2) tapping into the ways students learn outside of school such as video production, digital drawing/sketching, and visual collaboration tools when developing and sharing creative solutions to problems.

Educational researchers and schools are particularly interested in connected learning for its potential to motivate learners and offer deep learning as children pursue personal interests with the support of peers and adults who recognize their skills and accomplishments (e.g., youth create personal blogs detailing their everyday experience and neighborhoods, losing green space and play space due to urban sprawl, or videos created and shared via social media revealing the aftermath of a hurricane and asking for donations for family members or the local community). While connected learning is not common in formal schooling a small but growing number of innovative teachers are invested in the approach believing that students learn best when they are allowed to creatively solve problems they care about.

Teachers reviewed this research and two critical principles:

- *Learning Principles* (peer-supported, interest-powered, and academically oriented) make up the context for learning and can extend learning across home, community, and school settings.
- *Design Principles* (production-centered, shared purpose, openly networked) inform the intentional connections between active learning and how people participate

For ease of communication, the redesign team identified the following design and learning principles that will guide the work of LMCMS STEAM:

Problem-Based - Teachers create scenarios that change learning from the content to solving the problem.

Authentic Tasks - Problems are designed around something that could be or is done in the real world. This helps to provide an academically oriented space by creating opportunities for students to see the connection to civic engagement and careers.

Multiple Solutions - If the problem is indeed a real-world situation, there will be multiple ways to solve it. When students are allowed to pursue different ways to solve a problem, this ensures that multiple abilities are necessary to solve the problem, which increases who participates and ways to demonstrate they are “smart”.

Student Choice - When creating a context for learning, student choice can focus on different ways of expression by creating interest-powered environments where learners can contribute expertise, ideas, and questions related to something that is personally satisfying to them.

Teacher Facilitation - Strategies that encourage more student-directed education create an environment where peers work together, shifting the learning to ways that are less teacher-directed. Teachers might be asking questions about the ways students are thinking and only offering expertise as needed.

Discipline Integration - Discipline integration is the way in which teachers connect multiple disciplines or content areas through a problem-based unit. In classrooms with high levels of discipline integration, students are often able to use multiple skills in solving a problem and transfer knowledge to new contexts.

Project Lead The Way & STEAM Challenges

Career Awareness Starting in Middle School

Through explorations of coding and robotics, flight and space, human body systems, and more, the Project Lead The Way (PLTW) Gateway fuels students' passion for discovery. As they engage in hands-on, collaborative problem solving focused on real-world challenges, students use and stretch their imaginations in brand-new ways and connect their learning to life. All the while, students step into roles spanning the career landscape – a crucial experience during this transitional time in their lives.

To ensure that more middle school students have equal access and opportunities to engage and be empowered through the PLTW experience, all PLTW Gateway units and teacher resources are available in both English and Spanish.

Each PLTW Gateway unit engages students in middle school STEM curriculum that not only builds knowledge and skills in areas including computer science, engineering, and biomedical science, but also empowers students to develop essential skills such as problem solving, critical and creative thinking, communication, collaboration, and perseverance.

PLTW Gateways:

PLTW Gateway (grades 6-8) opens paths that create meaningful futures. It connects students to careers in areas they can, and can't imagine. Below are 10 different curriculum options that PLTW currently offers.

Design and Modeling - Students discover the design process and develop an understanding of the influence of creativity and innovation in their lives.

Automation and Robotics - Students are given the opportunity to combine mechanisms with input and output devices to automate the mechanisms. Construction and programming skills are layered, and projects and the problem provide students the opportunity to connect their learning throughout the lessons in the unit. Students take on the role of interns, and work in teams to identify design requirements and create prototypes to meet the needs of clients. They also explore different aspects of automation and robotics, and experience how solving real-life problems involves the teamwork of mechanical engineers, software developers, and electrical engineers.

App Creators - This unit will expose students to computer science by computationally analyzing and developing solutions to authentic problems through mobile app development, and will convey the positive impact of the application of computer science to other disciplines and to society. Students will customize their experience by choosing a problem that interests them from the areas of health, environment, emergency preparedness, education, community service, and school culture. Because problems in the real world involve more than one discipline, the unit will introduce students to biomedical science concepts as they work on solutions for the specific problems they choose to tackle.

Computer Science for Innovators and Makers - This unit will allow students to discover computer science concepts and skills by creating personally relevant, tangible, and shareable projects. Throughout the unit, students will learn about programming for the physical world by blending hardware design and software development. They will design and develop a physical computing device, interactive art installation, or wearable, and plan and develop code for microcontrollers that bring their physical designs to life. Physical computing projects will promote student awareness of interactive systems, including Internet of Things (IoT) devices, and broaden their understanding of abstract computer science concepts through meaningful and authentic applications.

Energy and the Environment - Students are challenged to think big and toward the future as they explore sustainable solutions to our energy needs and investigate the impact of energy on our lives and the world. They design and model alternative energy sources and evaluate options for reducing energy consumption.

Flight and Space - The exciting world of aerospace comes alive through the Flight and Space (FS) unit. Students become engineers as they design, prototype, and test models to learn about the science of flight and what it takes to travel and live in space. They solve real-world aviation and space challenges and plan a mission to Mars.

Science and Technology - Science impacts the technology of yesterday, today, and the future. Students apply the concepts of physics, chemistry, and nanotechnology to STEM activities and projects, including making ice cream, cleaning up an oil spill, and discovering the properties of nano-materials.

Magic of Electrons - Through hands-on projects, students explore electricity, the behavior and parts of atoms, and sensing devices. They learn knowledge and skills in basic circuitry design, and examine the impact of electricity on the world around them.

Green Architecture - Today's students have grown up in an age of "green" choices. In this unit, students learn how to apply this concept to the fields of architecture and construction by exploring dimensioning, measuring, and architectural sustainability as they design affordable housing units using Autodesk's® 3D architectural design software.

Medical Detectives - Students play the role of real-life medical detectives as they collect and analyze medical data to diagnose disease. They solve medical mysteries through hands-on projects and labs, measure and interpret vital signs, examine nervous system structure and function, and investigate disease outbreaks.

Biomedical Science Pathway

6 - 8th Grade Units

CAREER EXPLORATION

**DESIGN AND MODELING***

-  Orthotist
-  Prosthetist
-  Data Scientist
-  Metrologist
-  Chemist
-  Engineer
-  Occupational Therapist
-  CAD Skills (Interior Design, Architecture, Manufacturing, Animation, Construction, Technical Illustration)

**MEDICAL DETECTIVES**

-  ER Doctor and Nurse
-  Microbiologist
-  Advanced-Practice Provider
-  Neurologist
-  Patient Educator
-  Epidemiologist
-  Radiologist & Radiologic Technologist

**APP CREATORS***

-  Tech Innovator
-  UI Design-Product/Web/UI Developer
-  Roboticist
-  App Developer & Beta Tester
-  Research Scientist
-  Citizen Scientist
-  Graphic Designer

**CAREER CONNECTIONS**

*Biomedical Science Pathway connections

CAREER EXPLORATION



CS FOR INNOVATORS AND MAKERS

- ✔ Computer Scientist
- ✔ Software Engineer
- ✔ Data Scientist
- ✔ Programming in Advertising
- ✔ Programming in Entertainment
- ✔ Sales Executive (for tech products)
- ✔ Cybersecurity (Security Architect, Security Engineer, Incident Manager, Information Security Specialist)



AUTOMATION AND ROBOTICS

- ✔ Agricultural Service Technician
- ✔ Wind Turbine Technician
- ✔ Mechanical Engineer
- ✔ NASA Engineer
- ✔ Process Control Systems Engineer
- ✔ Control Systems Engineer
- ✔ Careers with robots in food service
- ✔ Careers with drones (Creative Team, Operations Team, Pilots, Controllers)



APP CREATORS

- ✔ Tech Innovator
- ✔ UI Design-Product/Web/UI Developer
- ✔ Robotacist
- ✔ App Developer & Beta Tester
- ✔ Research Scientist
- ✔ Citizen Scientist
- ✔ Graphic Designer



CAREER CONNECTIONS

CAREER EXPLORATION



FLIGHT AND SPACE

- ✔ Mechanical/Aerospace Engineer
- ✔ Aircraft Pilot
- ✔ Engineer
- ✔ Aircraft Dispatcher
- ✔ Crew Scheduler
- ✔ Aircraft Maintenance Technician
- ✔ Astronaut
- ✔ Rocket Scientist
- ✔ Programmer
- ✔ Pilot
- ✔ Photographer



DESIGN AND MODELING

- ✔ Orthotist
- ✔ Prosthetist
- ✔ Data Scientist
- ✔ Metrologist
- ✔ Chemist
- ✔ Engineer
- ✔ Occupational Therapist
- ✔ CAD Skills (Interior Design, Architecture, Manufacturing, Animation, Construction, Technical Illustration)



AUTOMATION AND ROBOTICS

- ✔ Agricultural Service Technician
- ✔ Wind Turbine Technician
- ✔ Mechanical Engineer
- ✔ NASA Engineer
- ✔ Process Control Systems Engineer
- ✔ Control Systems Engineer
- ✔ Careers with robots in food service
- ✔ Careers with drones (creative team, operations team, pilots, controllers)

NSTA Conference

Three current LMCMS teachers, Josh Spradlin, Ana Marie Wilde, and Jackie Coty, attended the National Science Teachers Association Conference in Kansas City on October 26th, 27th, and 28th. We attended with the idea of what information we can gather and take away from established STEAM schools. We wanted to talk to the people that work at these schools and make contacts to continue to ask questions. We attended sessions with the idea of gathering information about the following:

- Staffing
- Curriculum
- Instructional Day
- Schedule
- Community Outreach
- Products
- Grants

Performing/Fine Arts Requirement

All students attending the STEAM Academy at LMCMS will be enrolled in a Fine Arts class. Sixth grade students will kick off the school year with an Introduction to Fine Arts. After the students complete a two-week exploration in each of the following: Band, Choir, Orchestra, Art, Theater, they will select a focus area for the remainder of the school year. Students will continue in this focus area during seventh and eighth grade. Because this is a STEAM Academy, not STEM, we want to make sure we are embedding Arts curriculum into every day of every single student. Each student will participate in a minimum of one Fine Arts class as an elective, to practice integrating Arts into other aspects of their learning and daily life. Skills learned through Fine Arts classes require the application of critical thinking, creativity, and collaborative learning, which tie directly to the Design Principles. These classes will include: art, band, choir, orchestra, and theatre. Students will be introduced to each content area in an exploratory wheel during the first quarter of their 6th grade year. After this time, students will choose an area to focus on for the remainder of their middle school career.

Integration of Core and Elective Courses

Core time - Based on what we found at other schools we investigated including a visit to the Wilkens STEAM Academy at Hillcrest in Belton Missouri, the committee is recommending a block of flexible core time. The core time will be comprised of a Humanities section that will integrate English Language Arts skills and standards with science and social studies standards and themes. Math requires specific scope and sequence and is recommended to remain explicitly taught during the core block.

Inquiry - The inquiry block is designed to allow for teacher facilitated, student driven learning. The intent is to provide students with authentic tasks to utilize problem based learning. The inquiry block will allow for discipline integration with electives such as Project Lead The Way, Electronic Media, and Communication Arts, among others, so students are not limited to a semester with a specific focus. This could look like: students design an application and create a sales pitch to get funding for their app; design, plant, maintain, and harvest in the school garden; write and perform a dramatic production.

Elective Opportunities will still be available for students. Again, all students will be expected to participate in a fine arts class. PE will continue to be offered to students.

Schedule Ideas

The committee is recommending that the STEAM Academy has flexibility within the school day to designate inquiry time to complete the PLTW Units and/or STEAM Challenges. Schedules will follow district negotiated items.

Comparison of Schedules:

Current Schedule	STEAM Schedule												
<table border="1" style="margin: auto;"> <tr><td style="text-align: center;">Math</td></tr> <tr><td style="text-align: center;">ELA</td></tr> <tr><td style="text-align: center;">Social Studies</td></tr> <tr><td style="text-align: center;">Student Success</td></tr> <tr><td style="text-align: center;">Science</td></tr> <tr><td style="text-align: center;">Elective/PE</td></tr> <tr><td style="text-align: center;">Elective</td></tr> </table>	Math	ELA	Social Studies	Student Success	Science	Elective/PE	Elective	<table border="1" style="margin: auto;"> <tr><td style="text-align: center;">Student Success</td></tr> <tr><td style="text-align: center;">Core</td></tr> <tr><td style="text-align: center;">Inquiry</td></tr> <tr><td style="text-align: center;">Fine Arts</td></tr> <tr><td style="text-align: center;">Elective/PE</td></tr> </table>	Student Success	Core	Inquiry	Fine Arts	Elective/PE
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Next Steps

- Community Engagement
- Community Partners
- Staffing & Enrollment
- Professional Learning
- Mapping out standards
- Branding

The items listed above are the next steps that will take place. They will not all be completed by the committee, but will be a focus throughout the second semester. One of the first things we feel needs to take place is the Branding/Naming of the new school. In order to advertise this new school, it will be imperative to have a name and a logo to be able to print and share. Another step that the committee would like to see happen soon is to schedule and plan community engagement evenings where families and community members can come to the building, hear information and possibly experience an inquiry-based process. We also need to plan professional learning opportunities for the staff working in this building. Staff members will also begin the process of mapping out standards and planning the cross-curricular teaching and inquiry projects. Lastly, we will need to address the other details listed above in order to make this school the STEAM Academy @ LMCMS a success.