



Teaching *for*
TRANSFORMATION

Optimizing Middle School Lockers 6th Grade Math

Michael Bolland
Hope Academy





Deep Hope:

Since our Creator is wise & His design is admirable, our Math class will become a community of creative strategists who generate loving solutions to the daunting problems we & our neighbors face.



Essential Learning Targets:

- I will write a thoughtful proposal to optimize middle school locker space that considers current and future needs of students & the school.
- I will measure the middle school locker space by calculating areas.
- I will do field research to observe order worth admiration & disorder that needs reorientation.
- I will use ratios & division to propose improvements on how to best use locker space available to the middle school.



Teaching *for*
TRANSFORMATION

Transferrable Concept

Out of love, space can be optimized to better meet human needs when we use wisdom





Curricular Outcomes:

6.G.A.1

Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

6.RP.A.3

Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

6.NS.A.1

Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

6.NS.B.2

Fluently divide multi-digit numbers using the standard algorithm.

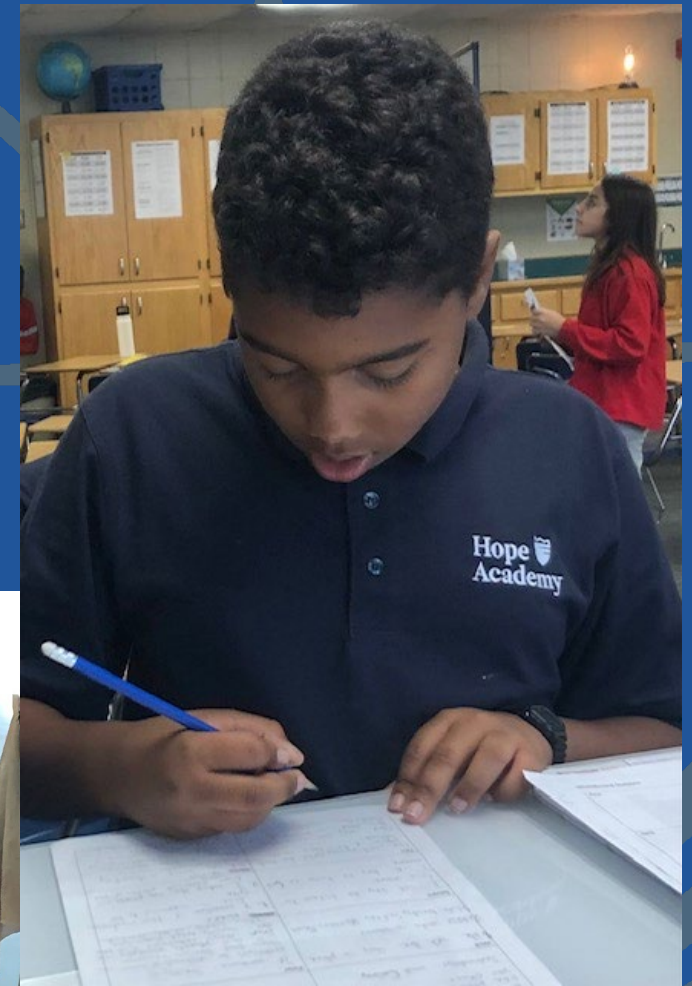
6.NS.B.3

Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.



Teaching *for*
TRANSFORMATION

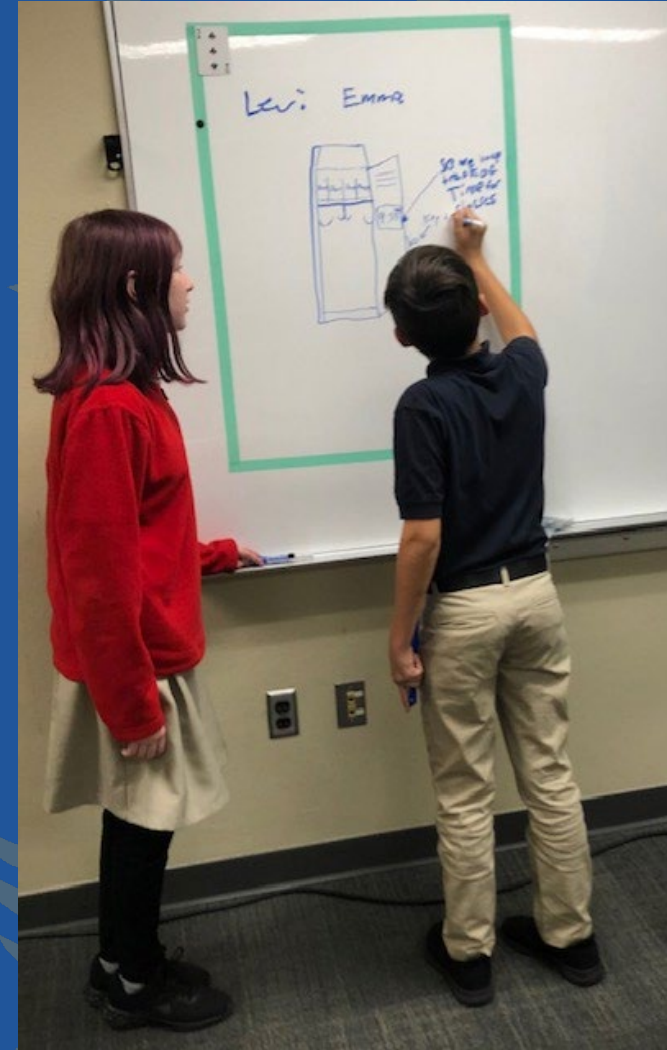
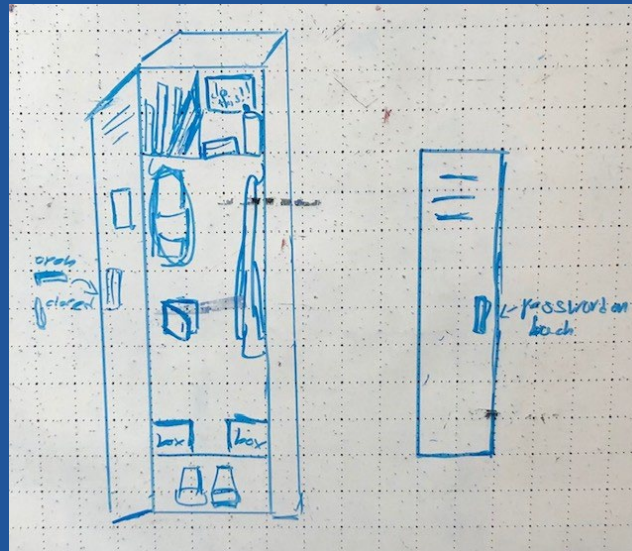
Curious Thinking





Teaching *for*
TRANSFORMATION

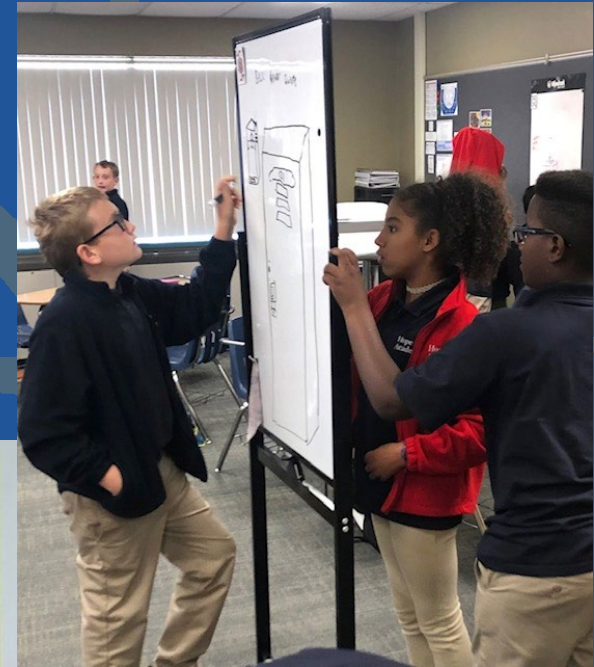
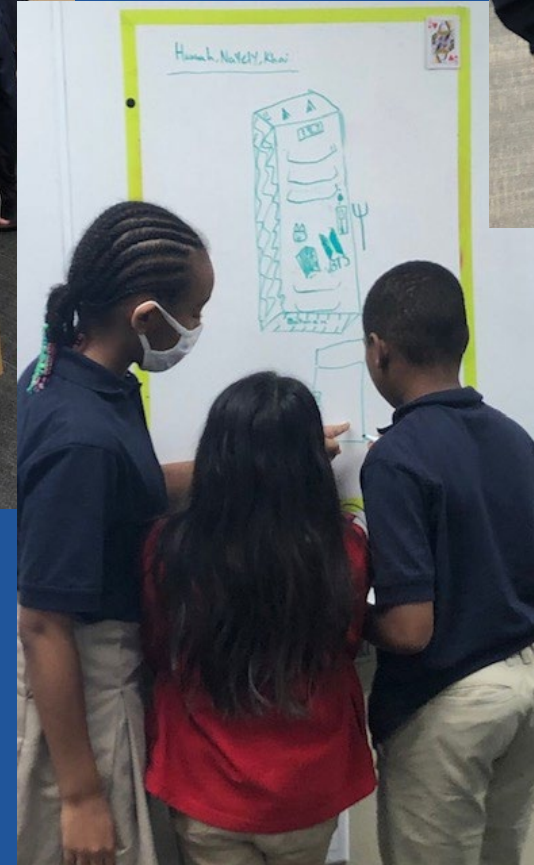
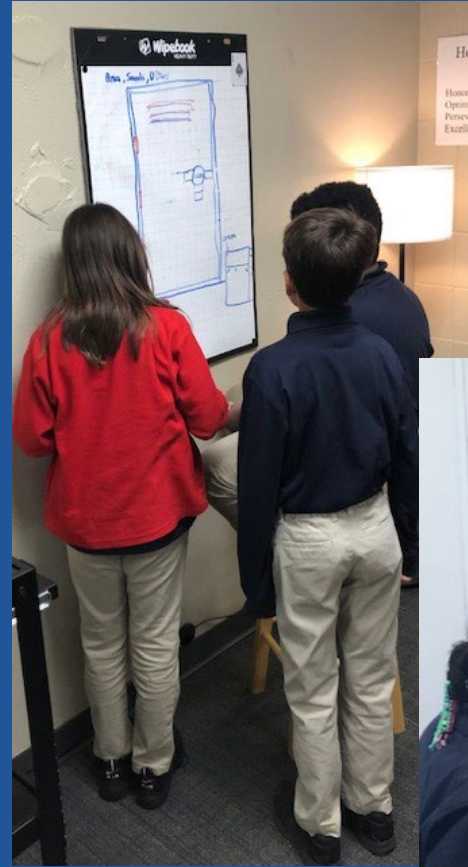
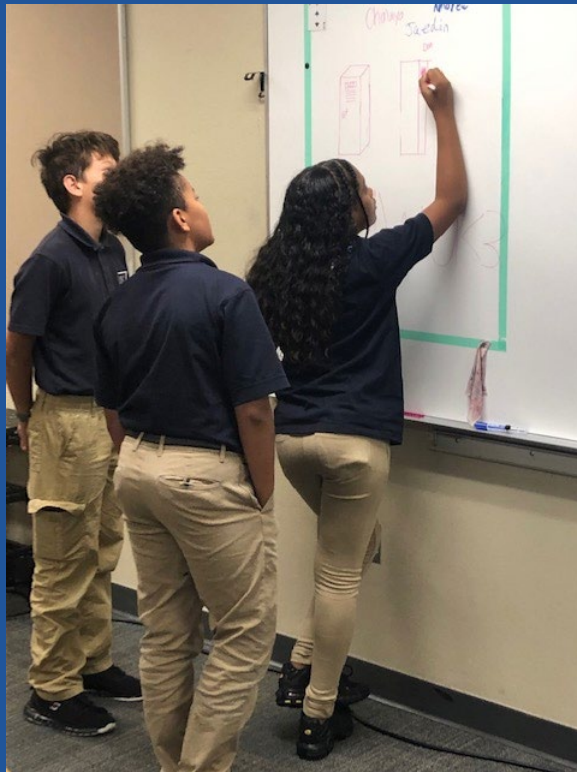
Courageous Designing





Teaching *for*
TRANSFORMATION

Joy-Filled Collaborating





Teaching *for*
TRANSFORMATION

See God's Story

The story of space & human need

Story of Space & Human Need

<p>Creation</p> <p><i>"God blessed them and said to them, "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish in the sea and the birds in the sky and over every living creature that moves on the ground." (Gen 1:28)</i></p>	<p>Redemption</p> <p><i>"Do not let your hearts be troubled. You believe in God; believe also in me. My Father's house has many rooms; if that were not so, would I have told you that I am going there to prepare a place for you? And if I go and prepare a place for you, I will come back and take you to be with me that you also may be where I am. You know the way to the place where I am going." (John 14:1-4)</i></p>
<p>Fall</p> <p><i>"So the Lord God banished him from the Garden of Eden to work the ground from which he had been taken." (Gen 3:23)</i></p> <p><i>"As people moved eastward, they found a plain in Shinar and settled there... Then they said, 'Come, let us build ourselves a city, with a tower that reaches to the heavens, so that we may make a name for ourselves; otherwise we will be scattered over the face of the whole earth.'" (Gen 11:2,4)</i></p>	<p>Restoration</p> <p><i>"See, I will create new heavens and a new earth... They will build houses and dwell in them; they will plant vineyards and eat their fruit. They will not labor in vain, nor will they bear children doomed to misfortune; for they will be a people blessed by the Lord, they and their descendants with them. Before they call I will answer; while they are still speaking I will hear. The wolf and the lamb will feed together, and the lion will eat straw like the ox, and dust will be the serpent's food. They will neither harm nor destroy on all my holy mountain," says the Lord." (Isa 65:17-25)</i></p>



Teaching *for*
TRANSFORMATION

See God's Story

- God has provided our school with amazing space for our mission of a remarkable education
- Our number of students has increased, and we need God's wisdom to meet their needs.
- Because God blessed us & we believe in His name...
 - We know we need his wisdom & love to meet student & school needs.
 - We believe the space God has provided can be cultivated to glorify his Name
- We trust that God will redeem all spaces & human needs when Christ anoints the new heavens & new earth.



Teaching *for*
TRANSFORMATION

See God's Story

Competing Stories

- "What we have is not going to work for me. Therefore, I will grumble."
- "God's provision isn't enough."
- "Things will always be this way, so I will just put up with it I guess."

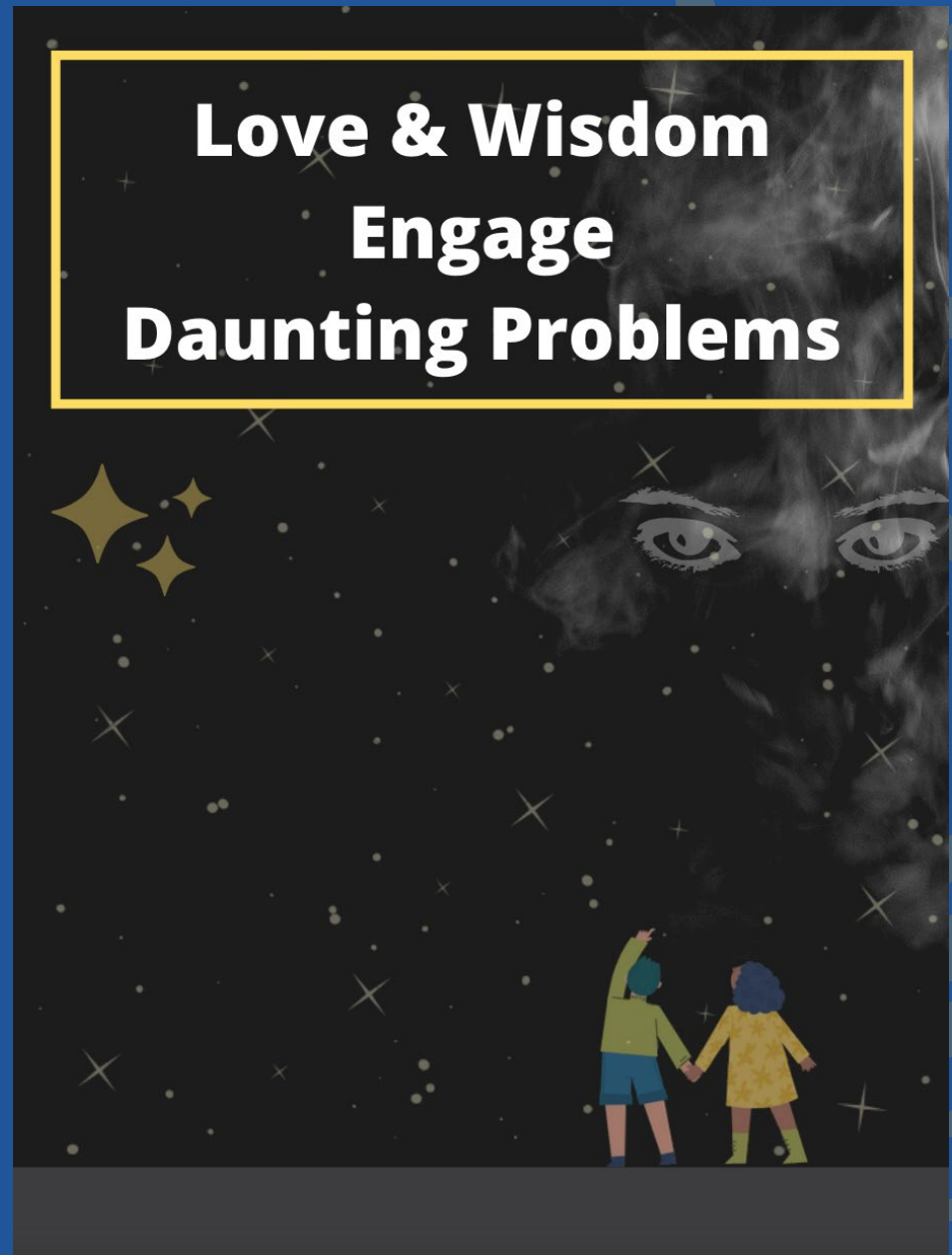


Teaching *for*
TRANSFORMATION

Storyline:

Out of love for our school and future students, we aimed to engage spatial issues with our middle school lockers to better meet the needs of future students.

**Love & Wisdom
Engage
Daunting Problems**





Throughline #1: Order-Discovering

Students sought to embody the creative traits of God in their designs of lockers that purposefully solved specific problems they identified.

Learners seek and find God's fingerprints in the intricate, purposeful design of what he has created.





Teaching *for*
TRANSFORMATION

Throughline #2: Beauty Creating

Students sought to go beyond basic designs of lockers that met our deep human needs for creativity, beauty, and variety.



Learners engage in beautiful work that enriches the world and reflects God's heart for diversity, complexity, and creativity.



Teaching *for*
TRANSFORMATION

Formational Learning Experience

Real need: specific problems connected to Hope Academy lockers
(size, crowding security, safety, appearance, function, disorder, organization)

Real people: Hope Academy Community

(students & staff – past, present, & future + families second-hand needs)

Real work: articulating & researching how the problems with lockers can be solved with creative strategies & mathematical knowledge (areas/ratios)



INVITE

- Opening Circle Protocol

"What is a time you made a mistake you did not want to go back & change?"

Written on post-it notes, teacher shared first, then with neighbors

To bring vulnerability & safety to the classroom as we entered into curious thinking

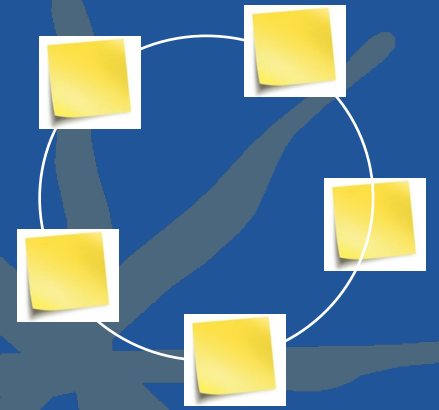
- Curious Thinking

Problems that involve the misuse of or lack of space & human needs

In the world --> In our city --> At Our School

Thinking/Writing Time --> Walk Around the Room & Share --> Full class sharing

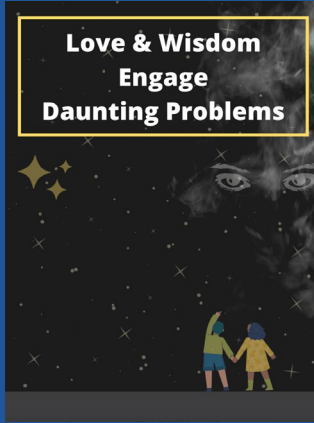
Naturally led us to the problem of locker space while also generalizing the idea





Teaching for TRANSFORMATION

Students were invited to practice characteristics of the kingdom which were intentionally framed as part of becoming a "community of creative strategists" who engage daunting problems with wisdom & love. They had ongoing and summative reflections on these traits they selected to practice.



Storyline:

Your turn
(These will be posted next to your whiteboards)

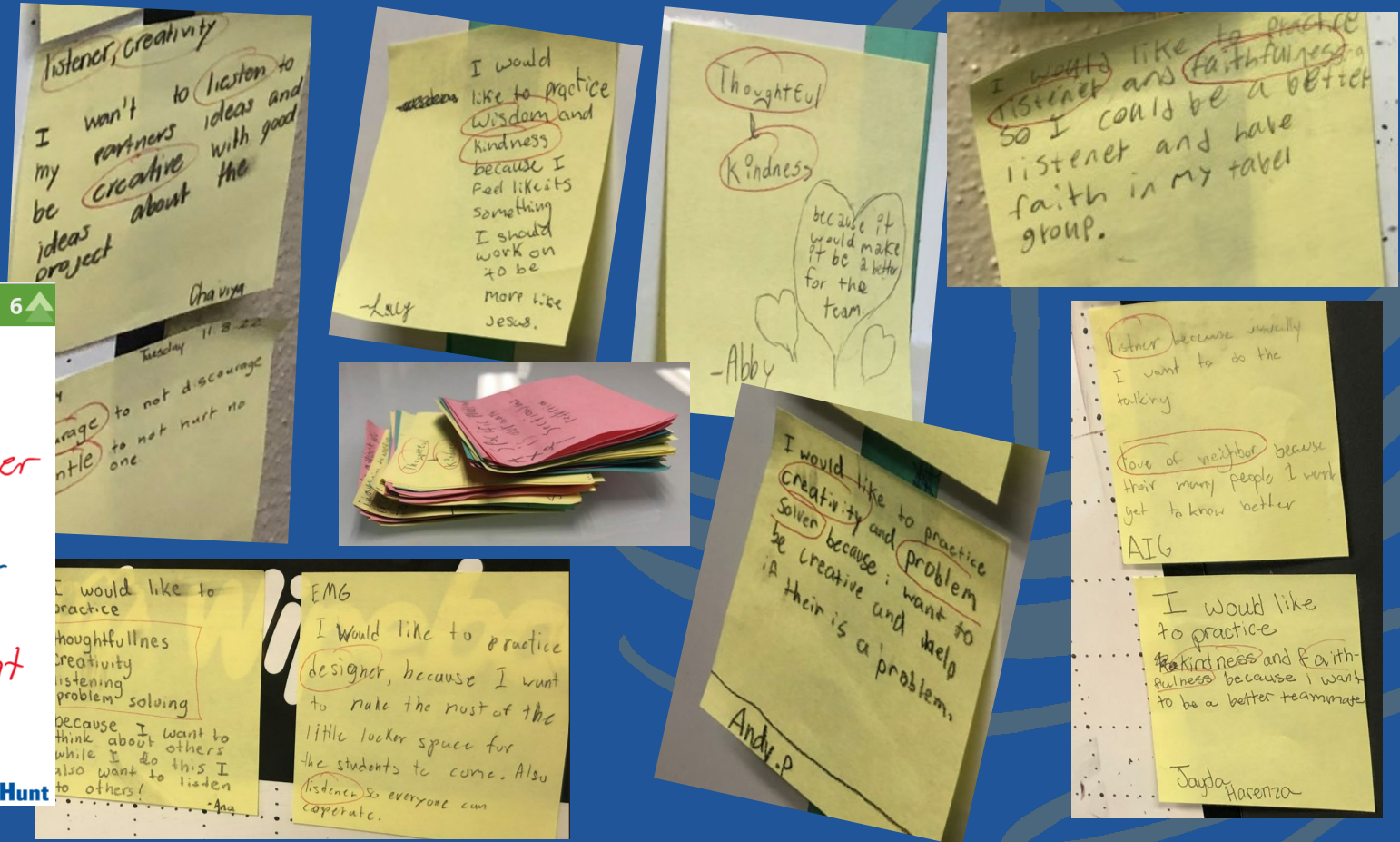
6

On your post-it...
Which 2 of the following characteristics would you like to try practicing during the locker project? Why?



- Kindness
- Courage
- Faithful
- Listener
- Love of neighbor
- Gentle
- Resilience
- Encourager
- Thoughtful
- Servant
- Problem solver
- Creativity
- Wisdom
- Strategizer
- Designer
- Planner

Kendall Hunt





NURTURE

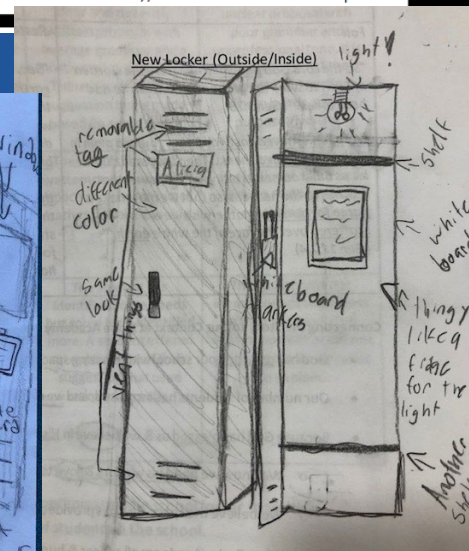
- Students were challenged to problem-solve for the BEST solutions to meet the needs of the school.
- Students were told to get creative with features that would enhance our community & help students better enjoy their learning environment.

Trouble Shooting

- What is the issue we are running into with fitting lockers into sections?
- How could we better understand the issue?
- How could we fix or solve the problem?

	Section Length (in)	13	13.25	13.5	13.75	14	14.25	14.5	14.75	15
A	333.6	25.66	25.18	24.71	24.26	23.83	23.41	23.01	22.62	22.24
B	384	29.54	28.98	28.44	27.93	27.43	26.95	26.48	26.03	25.60
C	156	12.00	11.77	11.56	11.35	11.14	10.95	10.76	10.58	10.40
D	132	10.15	9.96	9.78	9.60	9.43	9.26	9.10	8.95	8.80
E	474	36.46	35.77	35.11	34.47	33.86	33.26	32.69	32.14	31.60
F	225.6	17.35	17.03	16.71	16.41	16.11	15.83	15.56	15.29	15.04
G	462	35.54	34.87	34.22	33.60	33.00	32.42	31.86	31.32	30.8
H	93	7.15	7.02	6.89	6.76	6.64	6.53	6.41	6.31	6.20

Key - 14.89 -> 14 = # of usable lockers // 0.89 = Amount of unused space

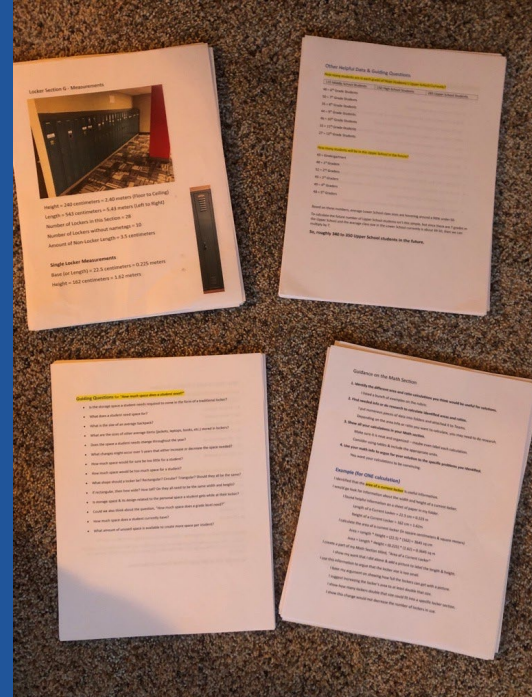
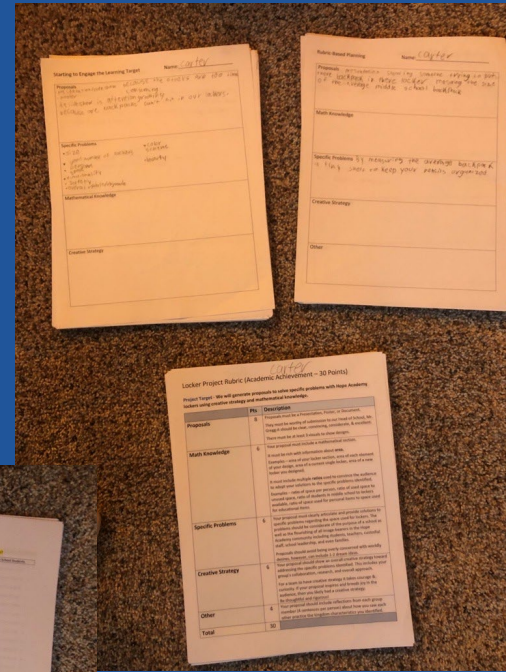




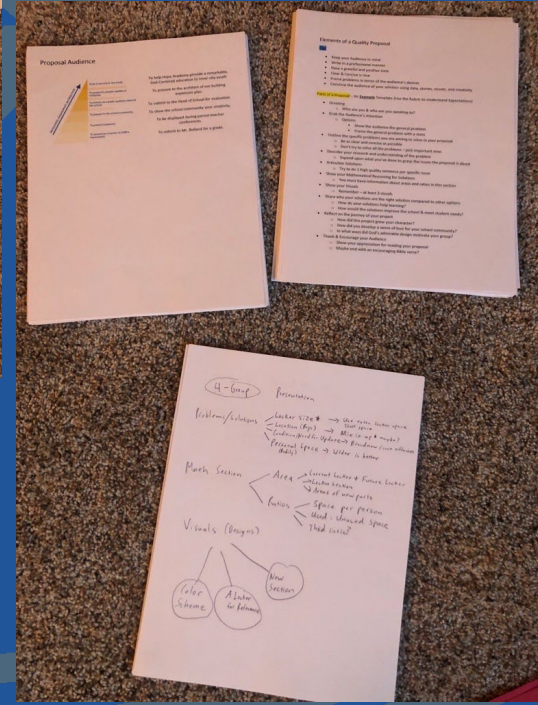
Teaching for
TRANSFORMATION

NURTURE

**Planning
Docs**



**Math & Data
Resources**



**Quality Control Tips
& Coaching Notes**

I used a folder system to give and store important resources for students



Teaching *for*
TRANSFORMATION

EMPOWER

Students worked either independently or in pairs to write proposals to Upper School leadership about how to improve our middle school lockers.

Elements of a Good Proposal

Dear Upper School Leadership...

-----> Indent each Paragraph (Press Tab Once)

- Start with an Introduction
 - Grab the attention of the audience
 - Share why you are writing to them
- Identify Needs of MS Students & School connected to Locker Space**
- Make your Suggestions**
 - Aim for between 3-5 clear suggestions of how to optimize lockers to meet needs
 - No more than 7 suggestions
- Provide Mathematical Reasoning**
 - Use geometric data (length, height, area, etc.)
 - Use a ratio
 - Use any other relevant in the "Data Summary"
- Answer Key Questions
 - How will my suggestions help students?
 - How will my suggestions help the school?
 - From a biblical lens, why does your suggestion matter in the long-run?
- Brief Description of Research Process we did as a Class
 - How did we investigate a solution to our daunting problem?
- Share Additional Creative Ideas about Design
 - This section should not dominate your proposal
 - Keep it to 1 or 2 ideas you'd like most
- Conclusions
 - End on a note of gratitude and hope for the future
 - Thank your audience for considering what you've written

Sincerely,

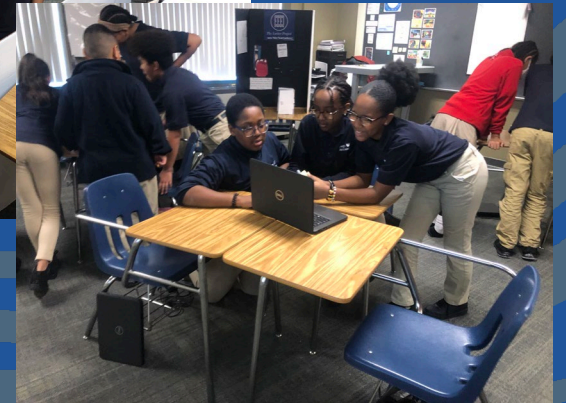
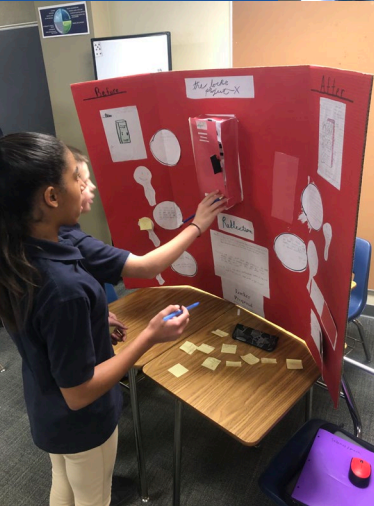
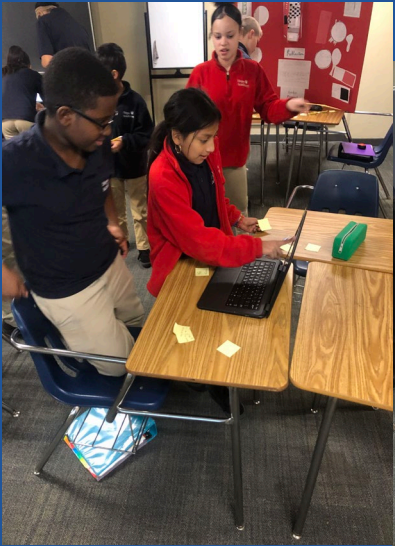
Student Name(s)



Teaching *for*
TRANSFORMATION

EMPOWER

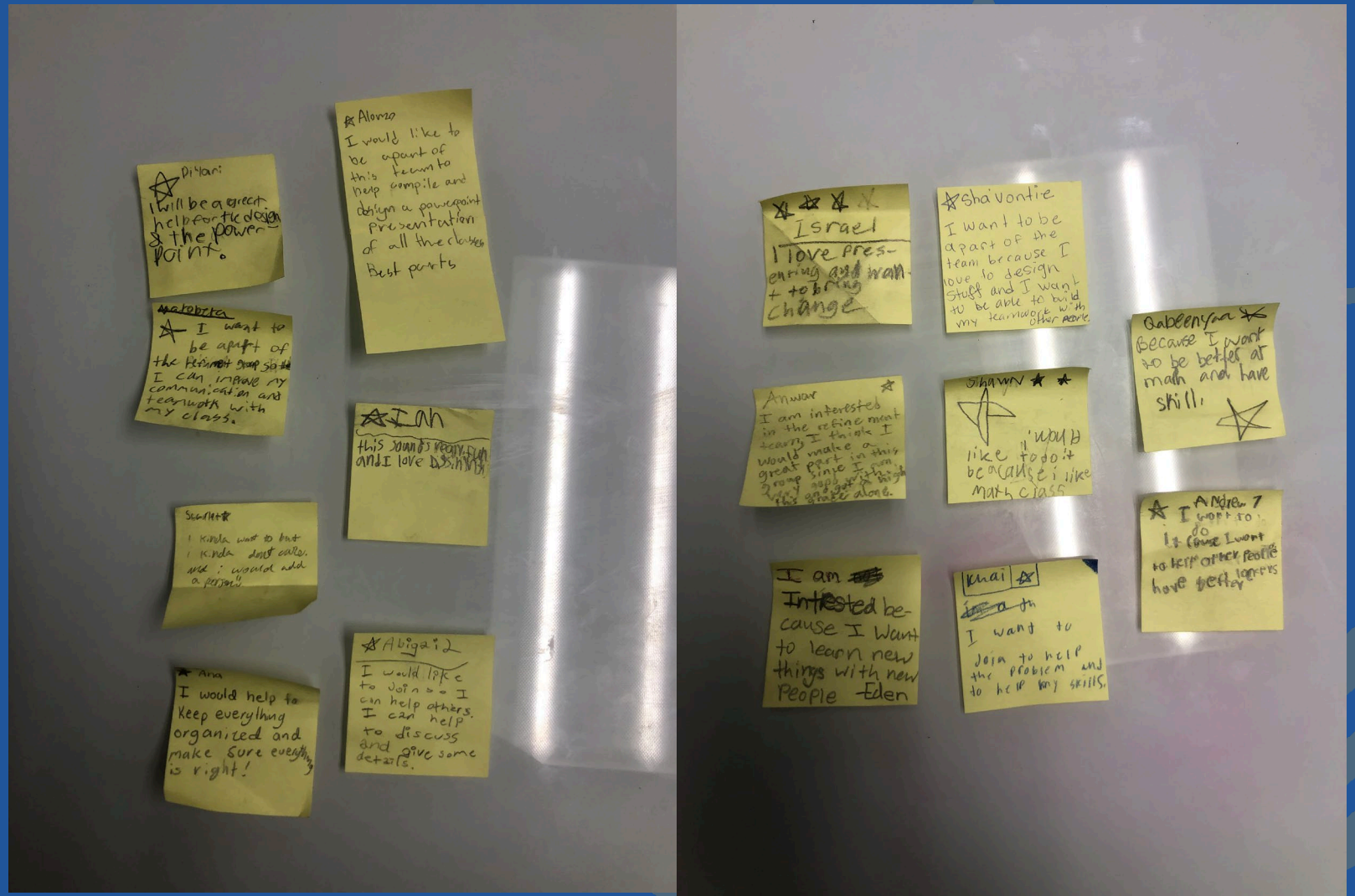
In process of identifying what we would like to submit to Mr. Gregg & the "experts" (architects)



They are writing post-it comments about the 2 most remarkable things in each proposal.



Teaching for TRANSFORMATION



There are 2 teams (one team from each class) working on a high-quality proposal to represent their whole class. These teams will prepare final proposals that will be shared with the Head of School for consideration in the new building project for middle/high school.



Teaching *for*
TRANSFORMATION

Student Reflections:

Reflection: One thing we reflected on was creativity. We did that by thinking how our lockers affect our community as of now and how it would affect our community if our design were the current lockers. Our team created a modified model of what the lockers should look like and how they look as of now



Student Reflections:

Ashirah's Reflection

I think that Najah practice Kingdom Characteristics because she was thoughtful when she designed the lockers on a paper. She also was a problem solver when she did the math.

NiDaria was creative when she drew the lockers, It helped us a lot with what we needed to be done. She was focused sometimes, and I could tell she wanted to get it done and wanted to get a good grade on it. Very good at the ratios and knew what to do.

NiDaria's REFELECTION

- I Think Najah was very helpful and very good at doing the math and taking time doing the proposal. Very nice while she was doing it. Didn't get distracted really.
- I think Ashriah did very good on this project and she was very focused and knew what to do and didn't get off task at all the whole time we were making the project. She was very focused on what she needed to do.



Student Reflections:

Yonathan did good with being kind and was a good helper. Yonathan took good photos, he was not yelling, he had courage, and he was being wise.
– Miles

Miles has been an amazing worker and he perseveres hard and just has so much kindness - Levi

Notes about each other!

Levi cooperate with all are ideas. he goes with flow. He persevere while he was sick. And ask what can I do to help.
- Yonathan



Student Reflections:

Ana

The math process was a little difficult, but it got easier as we were working as a team. Everyone helped do at least one thing and we all shared our ideas and voted to agree on the final thing. It was a very fun experience if I had to do it again I would. My team worked really hard on the designs and the drawing of the lockers but for a while, we might have forgotten the math side of things we were just having so much fun! Everyone worked well and played a part in the locker project. Everyone was included and we all did our parts.

Scarlet

I think Eunice showed creativity because she was very creative in her drawings, and she was kind by doing a lot of the writing and she helped keep me on track when distracted by all the stuff you can do on power point. Ana showed creativity by helping with the drawings and adding designs to the power point and she showed kindness by being kind to me and Eunice :)

Eunice

I kept my group on task and I showed listening when brainstorming ideas. I listened to all my groups ideas, even if it was a dancing pig. This project was for sure hard but me and my team worked through it together. I switched class periods almost as soon as we started the locker project, so it was kind of weird, but I have a good group and we worked well together. I feel me and my group grew in design because we all collaborated in different ways to make this presentation!



Teaching *for*
TRANSFORMATION

*How were Deep Hope and
long-term learning targets
realized through FLEx?*

Teacher Reflections:

I saw students genuinely work as a team to creatively solve problems regarding lockers. They pushed through when it was intimidating or confusing. They enjoyed this experience thoroughly and are walking away with a stronger sense of how important it is to approach solutions with a heart of practice and growing positive characteristics. They were resilient through sicknesses and not knowing what to do when their team didn't have chemistry. I personally enjoyed supporting them and equipping them. I improved a lot on a sense of "audience" for the project & we are currently in process of identifying what we would like to submit to Mr. Gregg & the "experts" (architects). There are two teams working on a final proposal to represent the whole class's work.



Teaching *for*
TRANSFORMATION