

A SKILLS AND CONCEPTS
FOCUS ALONE IS INSUFFICIENT
FOR RETAINING STUDENTS
IN CALCULUS PATHWAYS

HOW CAN WE
SUPPORT ALL
STUDENTS TO
EXPERIENCE MATH
AS MEANINGFUL?

STEM ~~PIPELINE~~ PIPELINE

MATH IS MEANINGFUL
WHEN IT IS
EXPERIENTIALLY REAL

(FREUDENTHAL 1983;
MOSES & COBB, 2001)

RIGHT, SO WE AIM
TO EXPOSE STUDENTS TO
MATH LEARNING EXPERIENCES
THAT RELATE TO THEIR LIVES

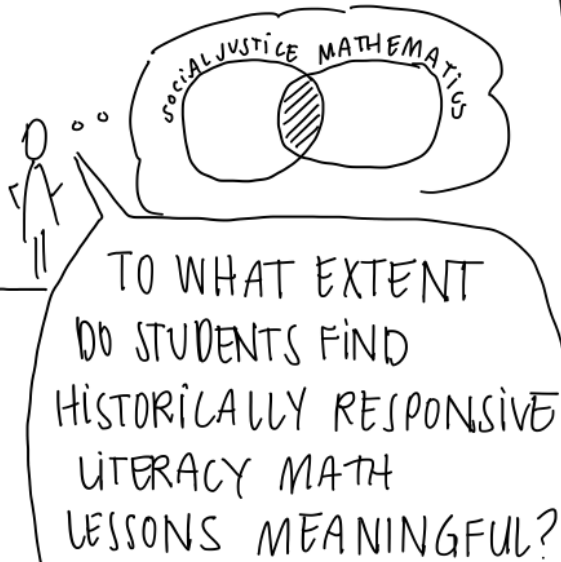
COMMUNITY-ENGAGED RESEARCH & TEACHING

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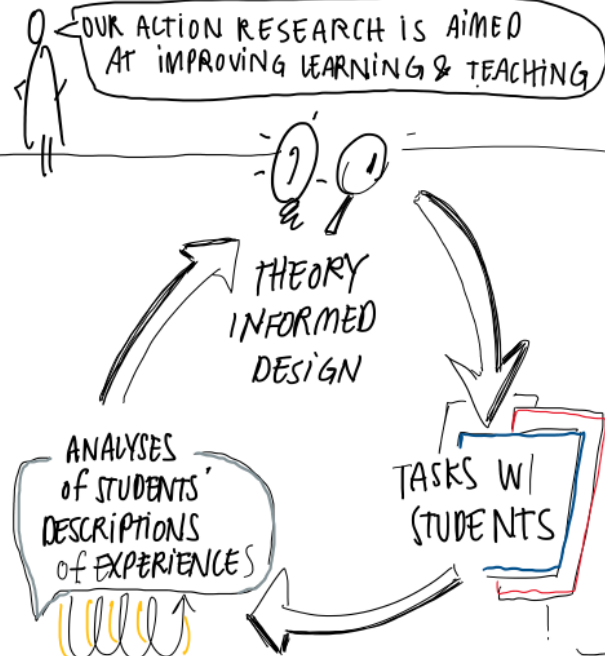
THIS MEANS
CENTERING LOCAL
SOCIAL JUSTICE ISSUES

AND TEACHING
STUDENTS TO BE
SMARTER ABOUT
RACIAL (IN)JUSTICE
ISSUES WITH MATH

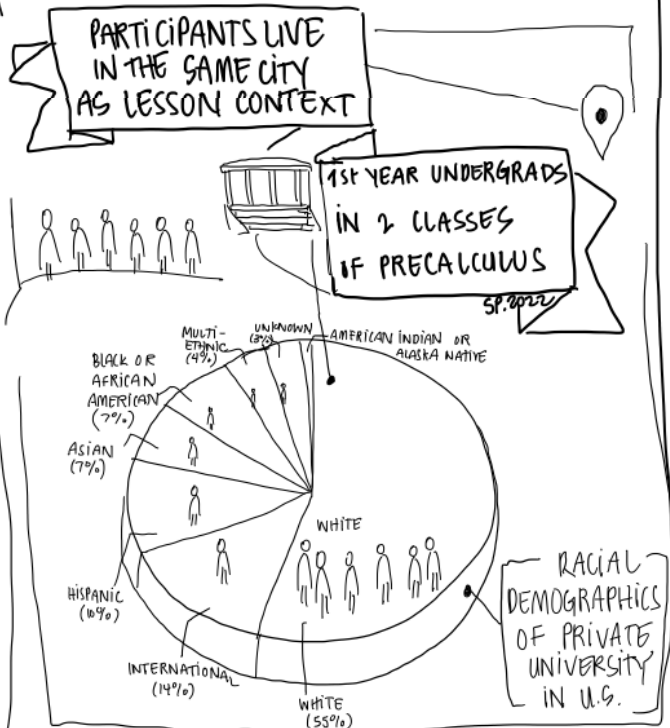
GUIDING QUESTION



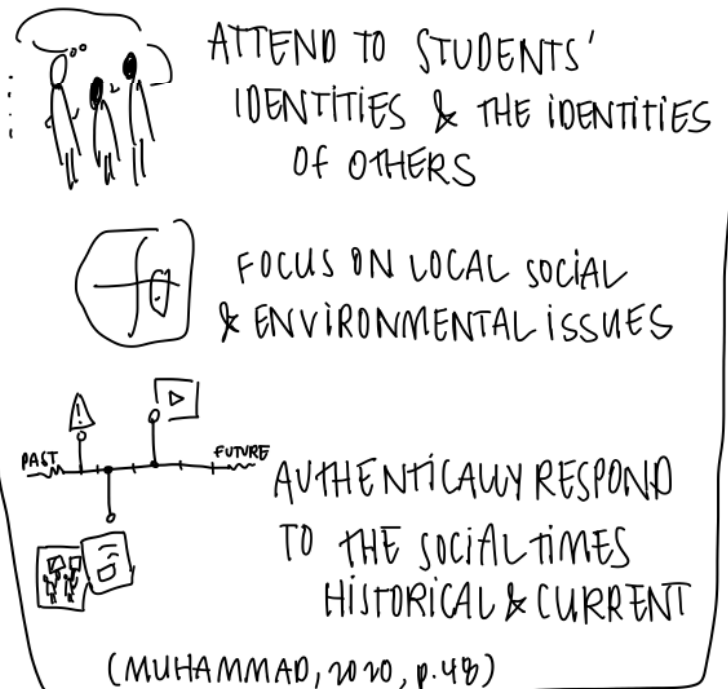
METHODOLOGY



RESEARCH CONTEXT



DESIGN FRAMEWORK: HISTORICALLY RESPONSIVE LITERACY



MATH TASK CONTEXT

ART BY NICOLE FONGER
SEP 2013

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STUDENTS LIVE IN AN URBAN CITY DIVIDED BY A HIGHWAY



HWY TO MOSTLY WHITE SUBURBS

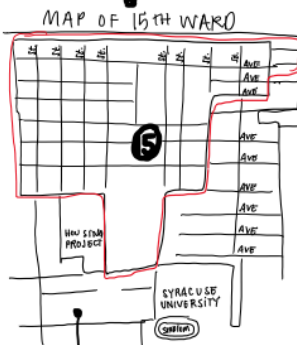
PREDOMINANTLY, BLACK RESIDENTS EXPERIENCE NOISE AND AIR POLLUTION NEXT TO THE HWY.



OUR TASKS COME ALIVE IN HOW WE ...



CONNECT WITH STUDENTS' IDENTITY VIA MAPPING



WHERE HAVE YOU BEEN?

HOW MIGHT IT HAVE FELT TO LIVE IN A PROSPERING BLACK COMMUNITY AT THE TIME?

LAYER STORY, IMAGE, VIDEO OF PEOPLE & POLICY...



POPULATION

THE HIGHWAY REVITALIZATION ACT OF 1956 FUNDED HWY 81

1956 1960

TIME

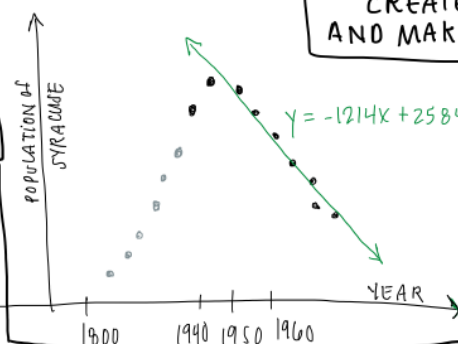
HOW DID LEADERS PREDICT THE HIGHWAY WOULD IMPACT THE POPULATION?

STUDENTS USE MATH TO MAKE SENSE OF & MODEL LOCAL DATA

YEAR	POPULATION
1950	220,583
1960	216,038

+10 YEARS
-4,545 PEOPLE

REASON ABOUT CHANGE IN TWO QUANTITIES



CREATE TABLES, GRAPHS, SYMBOLS AND MAKE CONNECTIONS ACROSS FORMS

WHAT DOES HWY 81 HAVE TO DO W/ THE POPULATION OF THE CITY OVER TIME?





WHAT WE
AIMED TO CULTIVATE
IN STUDENTS



WHAT
STUDENTS
SAID ...



STUDENTS'
VOICES

DEVELOP IDENTITY



↓ INVITE STUDENTS TO
CONNECT THEIR PERSONAL
HISTORIES, PLACES THEY
KNOW, & CULTURAL
PRACTICES TO MATH.

"DID YOU FIND THE PROBLEM
SOLVING LAB MEANINGFUL
TO YOU?"

"IT WAS MEANINGFUL BECAUSE
[THE CITY] IS NOW MY HOME
AND I NEED TO BE INFORMED
ON WHAT GOES ON AROUND
ME."

#LOCALITY IDENTITY

CRITIQUE THE
STATUS QUO;



ENCOURAGE
CRITICALITY

CONNECT PRESENT
DAY INEQUITIES TO
HISTORICAL INJUSTICES.

I CAN NOW BE AN ACTIVE
MEMBER OF THE COMMUNITY
FOR THIS ISSUE AND TRY TO
ADDRESS THESE INJUSTICES THAT
HAVE OCCURED

#SOCIAL AGENCY

INSPIRE
INTELLECT



INSPIRE
LEARNERS TO
KNOW ABOUT THE
ISSUES IMPACTING
THEIR COMMUNITIES
& HOW MATH IS A
USEFUL TOOL.

HOW DID HWY 91 IMPACT
THE POPULATION?

[THE HWY] DIVIDED &
DECIMATED A GROWING CITY.
FROM THE TIME THE HWY
WAS CONSTRUCTED, THE
POPULATION BEGAN DECLINING
RAPIDLY



WHAT WE
AIMED TO CULTIVATE
IN STUDENTS

WHAT
STUDENTS
SAID ...

STUDENTS'
VOICES

EXPRESS
EMOTION

INVITE LEARNERS
TO EXPRESS &
EMPATHIZE
WITH OTHERS'
FEELING/EMOTION

WHAT MIGHT IT HAVE
FELT LIKE TO LIVE IN
THE 15th WARD FOR
AFRICAN AMERICANS

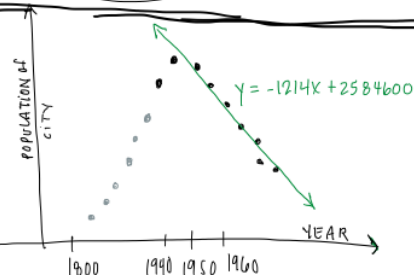
"IT COULD HAVE FELT
LIKE A SAFE HAVEN...
IT ALSO MOST LIKELY
FELT DISCRIMINATORY
B/C THE CITY WAS...
NOT ALLOWING THEM
TO LIVE ELSEWHERE"

BECOME SKILLFUL.



MATH SKILLS ARE
MEANINGFUL WHEN
USED TO UNDERSTAND
THE PLACES, PEOPLE,
& DESIGNS FOR OUR
FUTURES.

HOW IS THE
POPULATION
CHANGING?



ITS ALMOST
THE SAME CHANGE
EACH TIME

THE TREND IS
ALMOST LINEAR
-- SEE - ITS A
LINE

WHY?

IN 10 YEARS THE
POPULATION DECREASED
AND KEPT DECREASING

PLACE
MATTERS!



STUDENTS' STORIES
CONVEY PERSONAL,
MEANINGFUL CONNECTION
TO LOCAL SOCIAL JUSTICE
ISSUES THROUGH A MATH LENS

CONNECT!



NFONGER@SYR.EDU



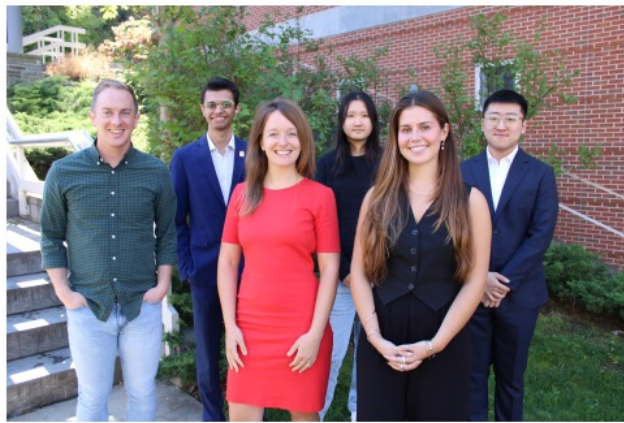
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ENHANCING STUDENTS' INCLUSION & BELONGING BY DEVELOPING MEANINGFUL MATHEMATICS LITERACY IN THE 'PLACE WE NOW CALL HOME'

(p.6)

EMANUEL . HANYI . QIONG(MARS) . NICOLE
BOUTROS XU WU FONGER

"THE D.E.I.A. SYMPOSIUM: GALVINIZE CHANGE"
2023 • SYRACUSE UNIVERSITY • SYRACUSE, NY



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BY DR. NICOLE FONGER
www.nicolefonger.com

MEANINGFUL MATH RESEARCH GROUP

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