Introducing Project Based Inquiry to New Students

Resources

Workshop
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Community School for Social Justice
CONTENTS

INTRODUCING PROJECT BASED INQUIRY TO NEW STUDENTS..................................................................................................3

COMMUNITY BUILDING ACTIVITIES .............................................4

STUDY SKILLS AND TEACHER DIRECTION ..........................5

   Guided Notes: Percent Change.................................................6

GROUP WORK AND COOPERATIVE LEARNING ..................7

CHALLENGES..................................................................................8

TOOLS FOR FACILITATING CHALLENGES............................9

   Class Challenge: Who are we?...............................................112

   The Metro Card Challenge......................................................17

APPENDIX A..................................................................................22
Introducing Project Based Inquiry to New Students: A model for enacting curriculum in a Math A Classroom

Community Building

“Traditional Pedagogies”

Group Work & Cooperative Learning

Class Projects/Challenges
Community Building Activities

**Pieces of the Puzzle**

Activity: In this activity, students receive a “piece of a puzzle.” I make them by cutting a large piece of poster board into puzzle pieces. Each person receives their own puzzle piece to decorate with their name and what strengths they bring to working in the class. At the end of the session, students face the challenge to complete the puzzle as a class.

Debrief: Reflective writing works well on this, possible prompts might be: *Why do you think we did this activity? What was challenging about putting the puzzle together? What did you learn about yourself and the class from doing this activity?*

**Stand-up line up**

Activity: Have students stand up and line up silently in order of their birthdays. Sometimes we do it with talking at first and then move to not talking. I repeat this activity often the first week using things like first name, number of siblings, number of pets, etc.

Debrief: A brief whip. *Using one word, describe how you felt while doing this activity.*

**Partner Interviews**

Activity: Each student should interview their partner (I generally do this having one person talk for a set amount of time, say 1 minute, and then the other person talks). After a set amount of time, one partner introduces the second partner.

Debrief: Generally happens while students are introducing their partner. *Was there anything that surprised you...either that you shared, or that you heard?*

**Human Knot**

Activity: The class stands in a circle, shoulder to shoulder. Each student raises their right hand and grabs the right hand of a person who is not next to them. Then students raise their left hand a grab the left hand of someone not standing next to them. A knot is formed. The challenge is to unravel the knot. This can be a very frustrating task depending on the students, I generally do this after I have been working with a group for a little while, or if I know they have done activities like this in the past.

Debrief: *Who did what?* (See Appendix A)
Study Skills and Teacher Direction

At the beginning of the year, there seemed to be a lot of resistance to doing group work. Many of my students seemed to struggle with organization and abstract reasoning. In light of conversations with students, I chose to use the following tools to help structure the class. For them, the highly structured class seemed to feel safer, though we might call it more traditional; it helped these students be successful in a time of transition into high school.

1. **Using a notebook:** At the beginning of the semester, students receive explicit instructions on how to keep a notebook. They are given dividers to make sections and together we put together their three ring binders on the first day of class. Throughout the year (though more so in the beginning) I tell them which section each piece of work we do should go in.

2. **Structures for class time:** On most days, we follow a highly structured format for class time:
   a. Do Now (5-10min)
   b. Guided Notes (20min)
   c. Practice, Practice, Practice (20min) - this may include some sort of activity.
   d. Sharing (10min)

3. **Guided Notes:** As the year progresses, I talk less and less about note taking. At the beginning of the year, notes are highly structured. However, by the end of the year, we might be able to emphasize note taking from multiple sources. See an example of guided notes.

4. **Spiraling:** Student visit and revisit concepts in more complexity as the year goes on.
Guided Notes: Percent Change       Date: ______________

What is percent change?
____________________________________________________________________

Percent increase: ________________________________________________________

Percent decrease: ________________________________________________________

Calculating percent change:

\[
\text{percent of change} = \frac{\text{Amount of Change}}{\text{Original Amount}} \times 100
\]

Remember:

Example:

From 1987 to 1993, the number of days of unhealthy air quality in Atlanta dropped from 15 to 4. Find the percent decrease in the number of days of unhealthy air.

Original amount: _________

New amount: ______

Amount of Change: ___________________________________________

\[
\text{percent of change} = \frac{\text{Amount of Change}}{\text{Original Amount}} \times 100
\]  

You Try!

Physical therapists measure strength on a dynamometer, which uses unit called foot-pounds. Suppose you increase the strength in your elbow from 90 foot-pounds to 125 foot-pounds. Find the percent of increase.

Original amount: _________

New amount: ______

Amount of Change: ___________________________________________

\[
\text{percent of change} = \frac{\text{Amount of Change}}{\text{Original Amount}} \times 100
\]
**Group Work and Cooperative Learning**

There are generally two ways I think about grouping students. First, is in terms of activities, how many students are required to work together to make the activity successful? And how well do they work together as a group? The second way I think of group work is in terms of methods of grouping. I generally start by choosing the groups, then move to random grouping. This seems to help begin conversations about how to work together in groups and what challenges group work presents. Below is a chart summarizing those strategies.

### Activities

<table>
<thead>
<tr>
<th>Pairs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Daily class work</td>
</tr>
<tr>
<td>• Poster making</td>
</tr>
<tr>
<td>• Writing your own problem</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Groups of 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Word problem challenges</td>
</tr>
<tr>
<td>• Review posters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Groups of 4:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Class challenges</td>
</tr>
<tr>
<td>• Complex tasks</td>
</tr>
<tr>
<td>• For students with experience working in groups.</td>
</tr>
</tbody>
</table>

### Methods of Grouping

1. **Teacher**
   - a. Learning Styles (heterogeneous based on students strengths)
   - b. Personalities (heterogeneous based on how students interact with their peers)

2. **Random**
   - a. Count off
   - b. Handing out cards
   - c. Find someone wearing the same/different…

3. **Choice**
   - a. I generally do not allow students to choose their own groups unless it is during a student facilitated challenge. Only after an initial conversation with students about how do decide on groupings.
Challenges: A model for project based learning
Tools for Facilitating Challenges
(See Appendix A for reproducibles)

1. Defining the Problem
   a. See attached tool.

2. Negotiating Standards
   a. Students brainstorm and decide on four traits with corresponding attributes that would make a quality product and process.

3. Having a Focus
   a. Having a focus helps students define the standards of quality. I usually use cooperation as an overarching focus for first year students.

4. Listening/hearing all voices
   a. Whip - one word response to a question (everyone gets a chance to speak)
   b. Sweep - extended response to a question (everyone gets a chance to speak)
   c. IP3 - a way for students to begin brainstorming what they can do individually to ensure everyone is heard.

5. Consensus building
   a. Thumb tool - when a decision needs to be made, student put thumbs up for agree, thumbs side ways for I need more information, but I could be convinced to go along with the group, or down if they completely oppose the idea and could not be convinced otherwise. The facilitator then asks to hear from all people with thumbs sideways. If a thumb is down, we look for other proposals.

6. Debriefing/Reflecting
   a. Ok→Next time - At the end of a challenge, students debrief both the process and the product. What went well? What would they do differently next time?

Reference:
*Education by Design: Tools for the EBD classroom (1999), Critical skills Program – Antioch New England Graduate School*

Rebecca Tatistcheff
Teacher Facilitation:
- The teacher models the process of facilitation for/with students
- The teacher gives out standards/rubric, etc.

Student Facilitation:
- Students decide on a class facilitator/recorder/time keeper.
- Teacher as observer and coach
- Students negotiate the standards and rubric on both the process and the product.

A continuum of facilitation

Student Design:
- Students define a problem from their experiences and design a challenge to address that problem.
Example 1: Who are we?
Class Challenge: Who are we?

As a class, you are going to write a survey to gather information about your fellow students. You will then give that survey to your family group in order to collect information about who you are as a freshman class. After compiling the data, your group will explore different representations of the data and create a bulletin board display of your findings.

Day 1:
_____ Identify topics that will help you learn who your classmates are.

_____ Write one survey question per pair that will help you to gather information about your topic.

Day 2:
_____ Compile the survey questions to create the final survey.

_____ Discuss how you will find out information from the people in your family group.

_____ Brainstorm different ways of displaying data

Homework: Interpreting data from a graph.

Day 3:
_____ Compile the data from your family groups

_____ Divide up the questions to make displays

Homework: Making a graph from a data set

Day 4:
_____ Choose the best way to display your data

_____ Create a poster that will display your survey question and the data graphically.

Day 5:
_____ Create a bulletin board to display your findings.

Day 6:
_____ Debrief the process and the product
Project Requirements: Who are we?  
Math A

Tuesday:

_____ Complete a poster with your partner.
_____ Define the product standards as a class.

Wednesday:

PUT UP THE BULLETIN BOARD!

Who is doing what?
Jobs:

We need people to take charge of certain areas that will not be included on your posters:

- Title for the Bulletin Board ____________________________

Miscellaneous information:

- Who did the project? ____________________
- What was the sample size? ________________
- What problems did we encounter along the way? ______________________________

Definitions:

- Frequency: ____________________
- Histogram: ____________________
- Sample Size: ____________________

Bulletin Board Design

- Background Paper: ________________________________
- Arrangement: ________________________________

Your group is responsible for making sure that their extra task is completed on or by Wednesday.
Names: ___________________________
____________________________

Project Standards

Poster Standards:

Decide who in your pair will be responsible for each poster component. To receive credit for your poster all of the following things must be included:

☐ Title ____________________________
☐ Histogram (do not forget to include a column for the number of students who did not answer correctly) ____________________________
☐ Labels ____________________________
☐ Frequency ____________________________
☐ Percents (do not forget to include the percent of students who did not answer correctly) ____________________________
☐ Possible answers and the question ____________________________
☐ Conclusion ____________________________

Bulletin Board Standards:

As a class your bulletin board must satisfy the following criteria (as negotiated by your class):

1. ____________________________ ☐
2. ____________________________ ☐
3. ____________________________ ☐
4. ____________________________ ☐
5. ____________________________ ☐
Ninth Grade Survey
By Cohort 9.4

Please fill out the following survey to help our math class compile data about our class.

1. What are your hobbies?
   
   a. music  
   b. computers  
   c. sports  
   d. other ________________

2. What is your favorite fast food?
   
   a. McDonald’s  
   b. Burger King  
   c. KFC  
   d. None of the above

3. Who is your favorite singer?
   
   a. Beyonce  
   b. Alicia Keys  
   c. Usher  
   d. Ashanti  
   e. Mary J. Blige

4. What is your favorite name brand?
   
   a. Pepe Jeans  
   b. Diesel  
   c. Nike  
   d. Puma  
   e. RW  
   f. AX

5. What is your favorite type of music?
   
   a. Rap  
   b. Country  
   c. Rock  
   d. Pop  
   e. Other ____________________

6. How is your neighborhood?
   
   a. good  
   b. Bad – Gangsta  
   c. Soft  
   d. Grimy
7. What’s your favorite food?
   a. Chicken
   b. Ground beef
   c. Vegetables
   d. Fruits
   e. Pork
   f. Steak
   g. Rice and Beans
   h. Others _______________________

8. What type of sneakers do you like?
   a. Payless
   b. Nike
   c. Jordans
   d. Spalding

9. What is your favorite sport?
   a. basketball
   b. football
   c. baseball
   d. soccer
Example 2: The Metro Card Challenge
The Metro Card Challenge

After reading the news story from the Daily News, it is your job, as a class to create a display that educates your peers, teachers, and school community about the MTA fare increases.

Your display must include the following information:

1. What is the percent change for monthly passes?
2. How many rides per day (at $2 per ride) would you have to take to make the new monthly fare worthwhile? (Write an equation!)
3. What is the percent change for weekly passes?
4. How many rides per day would you have to take to make the new weekly fare worthwhile? (Write and equation!)
5. What is the percent increase in the express bus?
6. What is the percent increase on major bridge crossings? Give an example (remember you will need to know the original fare in order to complete this problem).
7. What is the percent increase on minor bridge crossings? Give an example (remember you will need to know the original fare in order to complete this problem).
8. Calculate how much it will cost for someone to take the Metro North to New Rock City to go ice skating after the fare increases take place.

You have Monday through Thursday to complete this display. At the end of the day on Thursday, you must invite at least one teacher to view your display during workshop.

Monday:
_______ Read article
_______ Decide on groupings (I suggest that you have five groups…Four groups who solve the problems and one group doing the set up and design for your display)
_______ Decide what the display will be (you may want to use the bulletin board outside for your display)
_______ Divide up tasks within your group.

Tuesday:
_______ 5 minute check in at the beginning of class
_______ Solve each problem in your group
_______ Check the solutions with Becca

Tuesday (workshop)
Display group presents their ideas.
Decide what each group needs to do to complete their part of the display.
Invite two community members to the Thursday viewing

Wednesday:
Begin display drafts
put together a rough draft of the display
Begin the final draft of the display

Thursday:
Finish the display
Wrap-up
MTA board votes to increase fares
By SAM DOLNICK
ASSOCIATED PRESS WRITER
Thursday, December 16th, 2004

The board of the Metropolitan Transportation Authority voted Thursday to raise subway and bus fares, the second time in two years that prices for public transportation have been increased.

After 90 minutes of public comment, where an array of people spoke out against the increases, the board voted in favor of an increase that has 30-day unlimited-ride Metro Cards rising from $70 to $76, seven-day MetroCards going from $21 to $24, and express bus rides increasing from $4 to $5. The plan also calls for closing 164 station booths and cutting off-peak bus service. The $2 subway base fare remains the same.

Fares on the Long Island Rail Road and Metro-North will increase about 5 percent. Tolls on major bridge crossings and tunnels will increase 50 cents in each direction, and minor bridge tolls will increase 25 cents. The new fares are expected to go into effect in late February or early March.

"These increases are necessary to maintain service that everybody is accustomed to," MTA chairman Peter Kalikow said after the meeting. "It's not something we're happy about doing but it's something we need to do."

He said the increases were "minimal," only affecting the half of the ridership that uses unlimited-ride cards. Approximately seven million people use the city transit system every day.

The MTA has said the fare increase, the second in two years, is necessary to deal with upcoming budget shortfalls, including more than $1 billion for 2006. Kalikow has said the increases alone would not be enough to close the gap, and he has proposed raising $900 million in new annual tax revenue to pay for improvements to the transit system, the nation's largest.

The only votes against the increase came from the four board members recommended by Mayor Bloomberg. He has accused the MTA of inefficiency and wasteful spending. Gov. Pataki appoints the 17-member MTA board, upon the consent of the state Senate.

"The mayor believes that there's more to be done in the MTA," said Mark Page, one of Bloomberg's board recommendations. The MTA needs to "determine how it can do more with less."

State Comptroller Alan Hevesi said the MTA needed to create a long-term plan to deal with its budget crisis.

"Raising fares and cutting services is a one-year solution to the MTA's long-term budget problems," Hevesi said in a statement. "We will face this crisis year after year, unless the MTA develops a realistic long-term plan to balance its operating expenses, including contributions from everyone, not just commuters."

Advocates for riders are still upset over the fare increase last year, when the price of a subway ride went from $1.50 to $2.

The MTA came under harsh criticism from the public at the hearing.
Michael Harris, a 20-year-old from Brooklyn who uses a wheelchair, said closing token booths would make life more difficult for him and other disabled people.

"Token booths are lifelines for disabled riders and the proposal to close token booths will make the already daunting task of riding the subway even harder," he said.

After reading the story above please answer the following questions:

1. What is the old monthly fare?

2. What is the new monthly fare?

3. What is the old weekly fare?

4. What will be the new weekly fare?

5. How much did a minor bridge crossing increase?

6. How much did a major bridge crossing increase?

7. What is the percent increase for the Long Island Railroad?