STEM teaching tools

Plan-Do-Study-Act Work Template

Use this template to reflect on your own teaching, in conjunction with STEM Teaching Tool #75.

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PROJECT TITLE:

START DATE:

PROJECT GOAL:	
PLAN	
Describe the Plan for Improvement (responding to a problem or opportunity of practice)	
What do you plan to change to cause an improvement? Be specific (Who, What, Where, When…).	
Make a Prediction	
What do you think will happen as a result of the change you make? Why? Leading predictions: What will happen in the short term to let you know your change is working?	

Lagging predictions: What will happen in the long term (e.g., by the end of the semester or year) to let you know your change is working on that timescale?

Plan How you Will Collect Data

What data will be collected to show if there is an improvement? Consider both qualitative and quantitative data. Consider student data from moments of learning and from assessments.

When will you collect the data? (Note: Look for short data collection cycles of less than one semester so that you know if the change is having an impact as soon as possible.)

Who will collect the data?

DO

Record Classroom Activities and Your Observations and Interpretations

STUDY

Analyze What Happened

Look at the data you collected—and notice important qualities or patterns. What does it tell you? Are you having the impact you predicted? If so, why? If not, why not? You can study both *integrity* (did we do what we said we would do) and *impact* (is what we are doing making any desired change).

Note: We suggest that you use the Crosscutting Concept prompts at the end of this document to analyze your data. Rotate across concepts or choose one that relates to your analysis.

ACT

Do Something Based on What You Figured Out

What tweaks, adjustments, or transformations will you make because of what you figured out? Intentionally focus on educational equity as you envision these changes.

What will you keep doing because it's working?

What new questions or issues occur to you that warrant further study?

Using the Crosscutting Concepts as Classroom Lenses for Problem Solving and Improvement

Questions to Ask

Use the following questions to reflect on your own teaching. This is meant to be used in conjunction with this STEM Teaching Tool.

Patterns: Actively Interpret the Data & Reflect on Your Operating Assumptions

- Is there a pattern to the behaviors I'm observing? How could understanding the pattern allow me to prevent or encourage this behavior? How does it relate to understanding culture, learning, and identity?

- Is there a pattern in the assessment data (formative or summative) that can help me understand the effects of my instruction?

- What does the pattern in this data allow me to conclude about the effectiveness of the strategy I implemented?

- Reflect on your assumptions and whether you are reinforcing or disrupting the status quo.

- What type of mathematical analysis or data representation will best help me understand the data I collected?

- What do I predict will happen next time in the classroom, and why?

- Are there similarities and differences between (the situations, the behaviors, the outcomes, etc.) that could help me explain what is happening?

Cause and Effect: Specify and Shift What You Take to Be Influences on Learning

- How do you know that _____ (cause) _____ influenced what was observed? Could there be another reason (or multiple reasons) this is happening?

- Can you test whether _____ (cause) _____ is an ongoing influence of what was observed?

- How does _____ affect _____?

- How could a change in _____ affect _____?

- Is there any cognitive, cultural, or institutional reason you can think that can explain what is causing this particular behavior, situation, or outcome? How could you explore those influences further?

- Is what I am observing correlational or causal? Do I have enough evidence to know, and if not, how could I gather that evidence?

- Once you know a specific causal influence, what else is it connected to in the context, culture, or system? How is it rooted into educational practices? Based on that, how might you change it, if desired?

Scale, Proportion, and Quantity: Dimensionalize Your Analysis

- What is my ratio of _____ to _____ (e.g., providing individual feedback vs. group feedback)?

- What is the proportion of students who are _____?

- Why did this strategy work at one scale but not at another (individual student, groups, whole class; early but not late in the unit; with one class but not all)? What is different across those scales?

- If the pace of the classroom was slowed down or sped up, how would that affect the desired outcome?

Systems and System Models: Broaden Your Frame on the Patterns You See

- What are the components of this classroom learning system? What are the inputs and outputs of work and learning? From a critical stance, what histories and power relations are present?

- How do parts of the classroom system (for example students, teacher, furniture, technology, etc.) interact? How are things interconnected? How should they be?

- What would happen if the students worked together vs. working alone?

- What would happen if a part of the classroom system was changed (added, increased, decreased, removed)? Can a part of the system be brought into coordination with another (e.g., can norms for disciplinary behavior be aligned with belonging and rightful presence)?

- What outside factors at play here given that my classroom is a subsystem of a whole school (e.g., what expectations do student bring into my class)? How can I leverage this knowledge?

- What systems could I create (or refine) in my classroom to solve, avoid, or dampen problems—or to help me plan more effectively with limited time and resources?

Structure and Function: Attend to Designed Things That Influence Learning

- What physical structures are in my classroom, and how do they affect teaching and learning? How can I shift them to improve learning processes and a sense of belonging (e.g., arranging talk circles)?

- What procedures are in place for _____, and what purpose do they serve? Are they fulfilling their purpose? Which of them need to change?

- How will I structure this activity to best support student learning and interaction?

- What parts of the neighborhood structure outside of the classroom could I make intentional use of (e.g., by directly accessing place-based phenomena or community expertise)?

Stability and Change: Refine the Dynamics of the Learning Context

- What is changing in the (classroom, student, group, etc.) to cause a particular outcome to occur?

- Is there a pattern to a change that is occurring in my classroom?

- How does the shifting dynamic of classroom life inform me about how we are doing when it comes to being an equitable learning community? How do we learn to recognize social injuries and rebuild community afterwards?

- What can I think of that might disrupt my classroom or student learning? Can this be prevented?

(Please note that the Energy and Matter: Flows, Cycles, and Conservation crosscuting concept is not addressed in this approach since it does not easily relate.)

Equity Considerations:

- Carefully consider accurate root causes and effects. For example, achievement gaps between high and low income students are really opportunity gaps, because higher income students often have more opportunities to engage in science learning.

- When considering your classroom structures and systems, use culturally responsive teaching methods to reach all students. Think of ways to amplify the voices of all students.