

STEAM implementation guidelines

STEAM education should not be seen as an end in itself or as a Holy Grail that will solve all educational problems inside your institution. Before implementing STEAM education in school it is important to identify main problems, that needs solving immediately and then decide, whether implementing STEAM education will help you solve that. For that purpose it may be useful to consider the following seven steps outlined by Stacey Childress and Geoff Marietta in their resource “A Problem-Solving Approach to Designing and Implementing a Strategy to Improve Performance” as you reflect upon improving the inquiry and problem-solving skills of your STEAM implementation team.

The problem-solving approach to designing and implementing a strategy includes these seven steps:

1. Identify and Analyze the Problem
2. Develop a Theory of Action
3. Design the Strategy
4. Plan for Implementation
5. Implement the Strategy
6. Assess Progress
7. Adapt and Modify for Continuous Improvement

Identify and analyze the problem

To identify problem it is important to answer these questions:

- What is the performance problem we are trying to solve? Describe it in simple terms with no jargon (no more than a sentence or two). Be sure that it is linked to activities and outcomes related to the instructional core (students, teachers, academic content).
- What concrete evidence do we have to back up the short description we developed? Will this evidence enable us to communicate the nature and importance of the problem to staff and stakeholders? How will we test our assumptions with them and learn from their feedback?
- What are three or four observable symptoms of the problem we identified? What are the root causes of each symptom? This question could be answered using different root cause analysis techniques, such as “5 Whys” or Fishbone (Ishikawa) Diagram.
- Is it possible to prioritize the root causes that emerge from our analysis? Often it is not possible to do everything at once, and your team should develop a common point of view about where to start. One way to force your team to prioritize is by asking, “If we only had time or money to tackle one or two root causes, which ones do we believe would have the most impact?”

- What are the consequences of not solving the problem? Be specific. How will a failure to act affect students over the long-term? How will it impact district-wide performance in the medium term?

Develop a theory of action

Questions that will help you to develop a theory of action:

- What specific actions do we think will reduce or eliminate the effects of one or more of the root causes we identified in the previous step? Answer this question for as many root causes as you can.
- Why do we think these actions will lead to the results we desire? In other words, what assumptions are we making about how kids learn? How adults learn? How our team operates? About our context or environment? About our students and their families? Another way to think about this step is, “What do we have to believe for our theory to have merit?”
- From the above analysis, construct a series of “if...then...” statements that communicate the theory of action (e.g. if we integrate different subjects not only our students will get a grasp of the difficult concepts easier, our staff members will also learn to collaborate better).

Design the strategy

Your strategy should include the target of the intervention (particular student groups, grade levels, content areas, or employee groups), the specific actions that will be taken, and the timetable for implementation and results. In addition to identifying the activities of your strategy in this step, you must diagnose the level of coherence in your organization with your new strategy.

Questions to develop your strategy:

- What set of actions will we take to put our theory of action into practice? How do the specific actions map back to the assumptions about cause and effect that underpin our theory of action?
- Who will be affected by our actions (students, stakeholders, employees)?
- What is a reasonable timeframe over which the actions have to be consistently implemented to achieve results? (Build this directly into your strategy statement.)
- What are the specific short, medium and long term targets we will hit if our strategy is successful?
- Are the relevant systems, structures, resources and culture of our organization likely to make it easier or harder to effectively implement the strategy? If they make it harder, what changes are needed in order to increase the likelihood that we can implement the strategy well?

Plan for implementation

In this step, your team should identify the resources needed to successfully execute the strategy. These might include financial resources, people, and/or technology. Questions to ask during this step are:

- What steps will we take to implement our strategy? *Who* will do *what* by *when*?
- What material resources are required to implement the strategy? (curricular materials, technology, physical space, etc.)
- Is new training needed to ensure that the people asked to implement pieces of the strategy have the skills they need to do their best work?
- How much will the implementation cost? How will we pay for it? Will there be savings in other areas related to the new strategy?
- What are the implications for teachers, principals, and central office staff if nothing changes? This question helps uncover particular groups who might feel threatened by the changes you propose.
- How will we build support for the strategy, especially among stakeholder groups who think that they may lose out as a result of the change?
- What roadblocks (both internal and external) are we likely to encounter? What can we do to prevent or quickly address them? Who will be accountable for managing the response to roadblocks?
- Who – individual or group – will “own the implementation” – in other words, who will ensure that people and schools have what they need and are actually performing the work necessary for a successful implementation?
- What are some specific benchmarks we will measure throughout the process to assess whether or not the implementation is on track? What indicators will let us know if the strategy is as effective as we imagine it will be? What measures should we put in place to assess the validity of our theory of action and test the assumptions embedded in the theory?
- Are there systems in place to collect the data needed for the indicators developed above? If not how will we create them? Who will be responsible for analyzing the data that is gathered? Is there an existing team that is the logical group to make decisions based on the analysis? If not, should we create an ad hoc team for this purpose? Who should be part of this team?

Implement the strategy

During this step, roadblocks will surely arise, and the owner(s) of the implementation phase must address them immediately. Usually these barriers can be overcome, but occasionally a bump in the road is an opportunity to learn important information that will help improve the strategy.

Feedback loops that enable the organization to learn and continuously improve are critical to successful implementation over time. Guiding questions for the implementation step include:

- Do people understand how their day-to-day actions are related to the strategy? Is the strategy meaningful to them?
- Are we providing the supports people need to enable them to successfully perform the work required of them during the implementation phase?
- Are people actually implementing the strategy as it was designed? If not, why not? Are there consequences for failing to implement the strategy?
- What is the process for making sure that all participants provide regular feedback that will allow us to continuously improve performance by adapting the strategy as we learn?

Assess Progress

While implementation is underway, you should be collecting, analyzing, and making decisions based on data about three dimensions: 1) the progress of the implementation; 2) the effectiveness of the strategy; and 3) the validity of the theory of action. Below are suggested questions for each dimension:

Implementation

- Is the data we are gathering the best data for assessing our progress? Are we asking the relevant stakeholders to give us input about the implementation?
- Are we achieving all of the milestones we set during the implementation planning step? Are we on track in terms of timelines? Budget projections? Staff allocations?
- If we are missing milestones, why is that happening? Was the initial schedule unrealistically ambitious? Did we underestimate the time certain activities would take to accomplish? Did our forecasts fail to account for important factors? Have barriers come up that were unexpected? Should we adjust our expectations or accelerate our efforts in order to meet our original targets?
- Are individuals and/or teams engaging productively in the activities that the strategy requires? If not, why? Is it a problem of skill, which would call for us to provide more training and development? Or, is it a problem of will? Are some people opting out of the whole approach, believing that “this too shall pass”. If so, what steps will we take to help people change their behavior? If this is ineffective, what will we do?
- If our implementation seems on track but we are missing our targets, should we reexamine our strategy or our theory of action? Did we misdiagnose the root causes of the problem?

Strategy

- Assuming our implementation indicators are positive, do the interim performance results in the areas in which our strategy should have impact match the expectations we had during the design phase?
- If not, what can we learn from our feedback loops that might help us revise the strategy to make it more effective? Are there alternative activities that might be more powerful?

Theory of Action

- What do our interim results tell us about our predictions about cause and effect?
- Have we learned anything during implementation of our strategy that challenges any of the assumptions embedded in our theory? About our diagnosis of root causes?

Adapt and modify for continuous improvement

Throughout the implementation of the strategy, you might discover new problems or miss original targets. By adapting and modifying the implementation plan, the strategy and the theory of action as more information becomes available, leadership teams can accelerate their progress. Questions that can help in thinking about this ongoing step are:

- How should we respond to the information generated in the “assess” step?
- If we are making progress in solving the initial problem we identified, what adjustments do we need to make to our approach now that one or more of the root causes might be diminishing in importance?
- How can we create opportunities for the people involved in the work to celebrate progress while maintaining a sense of urgency about solving difficult performance problems over the long term?