

STEM Integration Through Project-Based Learning (PBL)

A Workbook for Instructional
Partners

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A Workbook for Instructional Partners

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OVERVIEW

How to Use This Workbook?

Follow the workbook in order, or use the following graphic to decide where to begin, based on your schools' needs.



DEFINITIONS

Tool #1: Building Shared Foundations

A challenge in implementing project-based learning (PBLs) in STEM contexts is conflicting definitions. After reading the resource, discuss the following terms with your colleagues and consider what each term means within your content area. **Based on your reading and discussion, develop and record a set of shared definitions for your educational setting.**

STEM Integration as a way to implement PBL:

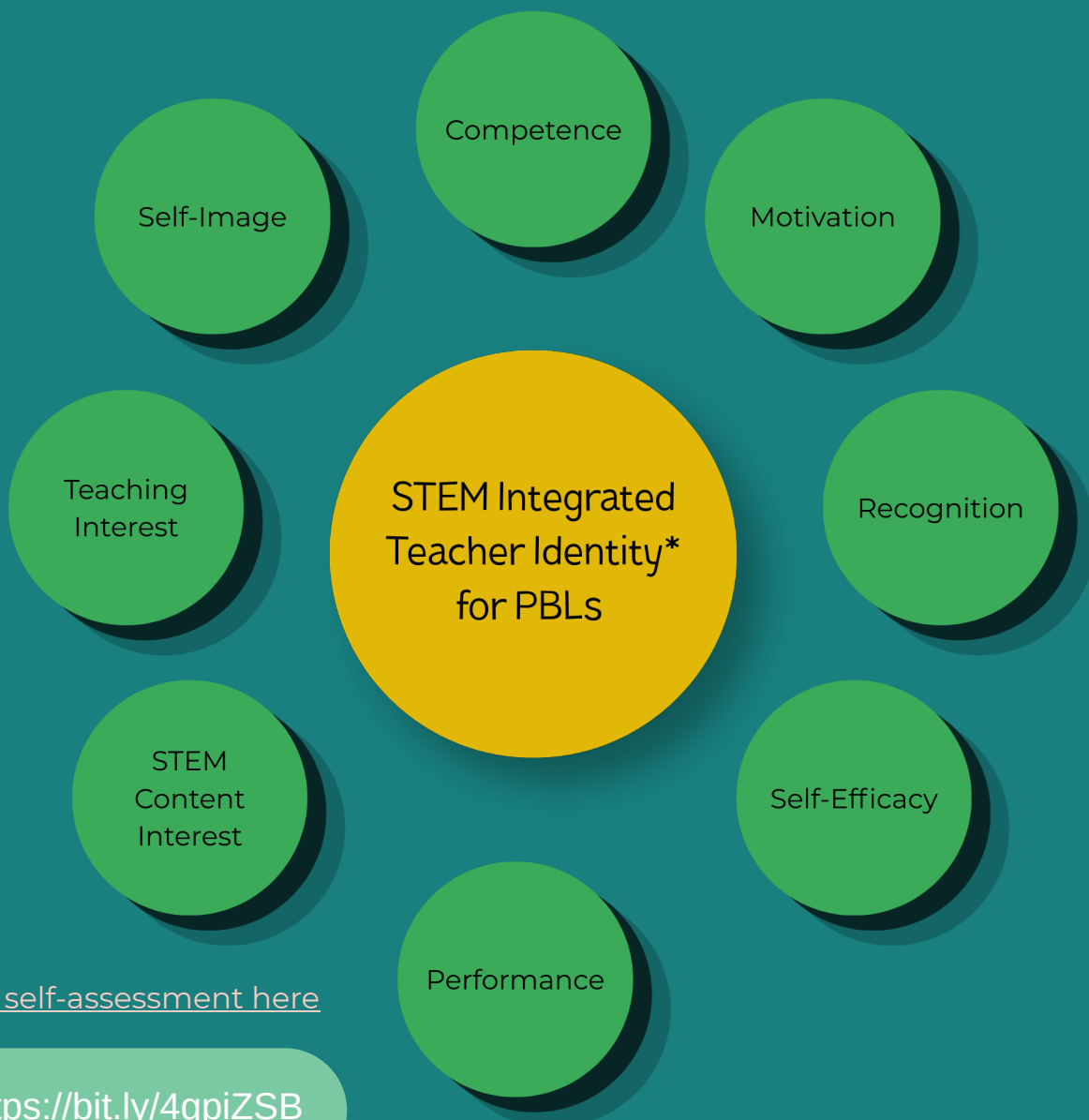
STEM Identity:

Collaborative Ecosystem:

SELF-ASSESSMENT

Tool #2: Building capacity

While PBL offers a meaningful way to integrate STEM across content areas in STEM-focused schools, effective implementation depends on instructional partners feeling confident and prepared to contribute, collaborate, and support students in engaging with authentic STEM learning experiences. **This self-assessment tool can help you reflect on how you identify as a STEM integrator.**



[Access the self-assessment here](https://bit.ly/4gpiZSB)



<https://bit.ly/4gpiZSB>

*Adapted from Holincheck & Galanti (2023)

ACCOUNTABILITY

Tool #3: Building a Collaborative Ecosystem

This tool is a matrix designed to support the implementation of STEM-integrated PBL in your educational setting.

In STEM-focused schools, PBL provides a meaningful opportunity to integrate STEM across all areas of instruction and school life, but **oftentimes, it is unclear who is accountable for what.** Accountability, in this context, involves both holding one another responsible and taking personal responsibility for enacting and supporting the various components of STEM-integrated PBL.

Instructional Partner	Support Responsibilities	Accountability Structures
School-level administration	• Establish school-wide PBL goals and provide intentional, consistent support to all staff in implementing PBL. • Share responsibility and take ownership of PBL processes. • Monitor PBL processes through observations, meetings/check-ins with instructional support and teachers.	• School-level administration can implement a rewards system to encourage PBL engagement.

Instructional partner	Support responsibilities	Accountability structures
Instructional support staff (e.g., instructional coaches)	• Share resources and support teachers to enact PBL. • Actively and consistently participate in the planning process. • Emphasize the importance of STEM integration through PBL. • Check lesson plans for required PBL components. • Observe implementation of PBL for content area. • Provide teachers with feedback.	• Feedback for STEM observational tool • Calendar • PBL as a meeting agenda line item • Documented PBL lesson plan feedback
Teachers	• Plan STEM-integrated PBL instruction. • Lead the development of the bulletin board. • Facilitate instruction and learning experiences. • Support and encourage student inquiry throughout the PBL process. • Engage in self-reflection.	• PBL bulletin board, display rubric, and calendar • Self-reflection tool • PBL planning template document
Para-professionals	• Intentionally look for connections they can make throughout the learning process. • Support the teacher and students during PBL instructional time.	• Self-reflection tool • Contributions to PBL planning template document
District-level administrators (e.g., STEM coordinator, content specialists)	• Create infrastructures to support it (e.g., evaluation criteria). • Observe and provide feedback. • Support planning meeting with coaches and teachers. • Facilitate meetings and check-ins with administration and coaches throughout the school year. • Provide resources and/or training to support PBL and content.	• Shared vision statement for pursuing interdisciplinary • PBL implementation for STEM district schools • Quarterly feedback and observations

Instructional Partner	Support Responsibilities	Accountability Structures
Students	• Engage with PBL STEM integration, contributing to the learning environment • Name the current PBL • Make connections to PBL outside of direct instructional time • Take ownership of their learning and use their interests and learning styles to show content mastery • Maintain STEM/PBL journal	• Student STEM/PBL journal to document process and growth • Performance-based task and rubric • Self-reflection
Non-instructional (e.g., custodial, cafeteria, front office)	• Support students maintaining STEM/PBL journal • Celebrate and reinforce PBL when they see examples reflected in their roles • Promote STEM/PBL through language and interactions with students and staff • Understand the school's STEM initiatives • Acknowledge exemplary students	• Share examples of exemplary student engagement in PBL with instructional staff
Community partners (e.g., parents, external partners)	• Encourage PBL (e.g., showing examples in the public library) • Support PBLs through volunteering or sharing their skillset as it relates to PBLs • Help fund PBL activities • Support students' inquiry around PBL and STEM outside the classroom	• Share information with instructional staff (e.g., through a newsletter) about exemplary PBL engagement with learners
Student Support Staff (e.g., parent liaison, social workers, guidance counselors)	• Share what is happening in the school context that might relate to PBL • Frame interactions as relevant to current PBL • Use STEM language when engaging with students	• PBL line items in meetings: Discuss and document how current SEL, attendance, and behaviors intersect with current PBL

PLANNING

Tool #4: Building an integrated plan



This activity is designed to help you identify where you are now and where you want to go next. This process doesn't happen all at once— **it's much like learning to ride a bike!**

STEP 1



EVALUATION

Identify data of which students need support.

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Identify how it connects to kids' interests, community resources, and school-level resources.

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

STEP 2

GOAL SETTING



Brainstorm PBL lesson topics relevant to your content area.

- ☐ _____
- ☐ _____
- ☐ _____

Talk to one to two other teachers to revise or add ideas to your list (e.g., first grade and fourth grade both have light and sound as a topic).

STEP 3

COLLABORATIVE REVISION



Review relevant teacher agency materials (e.g., State Department of Education) teacher notes for their content.

☐ _____
☐ _____
☐ _____

Identify how it connects to kids' interests, community resources, and school-level resources.

☐ _____
☐ _____
☐ _____

STEP 4

TEACHER IMPLEMENTATION WITH COACH



- Identify and converse with another teacher in a vertical alignment chart for feedback to identify synergies and conflicts with vertical alignment.
- Identify a teacher in another discipline to add interdisciplinary strategies to your preparation work.

STEP 5

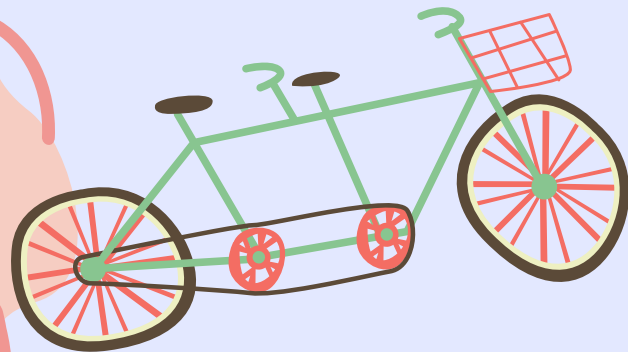
INCREASE OWNERSHIP



- Exchange “know and shows” with the above identified teacher.
- Ask questions to the teacher and/or coach during practice-teaching experiences.

STEP 6

**Your confidence
in STEM
integrated PBLs
can now
support yourself
and others!**



REFERENCES

Holincheck, N. M., & Galanti, T. M. (2023). Applying a model of integrated STEM teacher identity to understand change in elementary teachers' STEM self-efficacy and career awareness. *School Science and Mathematics*, 123(6), 234–248.



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