Learning Assessment for Project-Based Learning in STEM Education Training

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General Assessment Approach

For each objective in our PBL in STEM Education training program, we will use a combination of formative and summative assessments. These will include:

1. Peer and instructor evaluations
2. Rubric-based assessments of created materials
3. Microteaching observations
4. Post-training implementation reports
5. Digital artifact creation and sharing

Assessment Details by Objective

Goal 1: Develop middle school STEM teachers' proficiency in designing and implementing effective Project-Based Learning (PBL) experiences.

Objective 1.1: Redesign a traditional STEM lesson plan using PBL principles

Assessment Method: Peer review using a standardized rubric.

Rationale: Peer review encourages collaborative learning and provides multiple perspectives.

Validity: The rubric will be aligned with established PBL design principles.

Reliability: Reviewers will be trained on the rubric to ensure consistent evaluation.

Practicality: Can be conducted during the training session with minimal additional resources.

Alignment: Directly assesses the ability to apply PBL principles to lesson redesign.

Objective 1.2: Create a complete PBL unit plan

Assessment Method: Instructor evaluation using a comprehensive rubric.

Rationale: Allows for in-depth assessment of teachers' ability to plan a full PBL unit.

Validity: Rubric will be based on Buck Institute for Education's PBL standards.

Reliability: Instructor will be well-versed in PBL principles and follow the comprehensive rubric.

Practicality: Can be completed as a take-home assignment and evaluated post-training.

Alignment: Directly assesses the ability to create a comprehensive PBL unit.

Objective 1.3: Demonstrate effective facilitation techniques

Assessment Method: Peer and instructor feedback during microteaching session.

Rationale: Provides immediate feedback in a simulated teaching environment.

Validity: Feedback will be based on established effective PBL facilitation techniques.

Reliability: Use of a standardized observation form will ensure consistent evaluation.

Practicality: Can be conducted during the training with existing participants.

Alignment: Directly assesses the ability to facilitate PBL in a classroom setting.

Objective 1.4: Implement a PBL unit and report on outcomes

Assessment Method: Standardized feedback form completed post-implementation.

Rationale: Assesses real-world application and reflection on PBL implementation.

Validity: Feedback form will be designed to capture key aspects of PBL effectiveness.

Reliability: Standardized form ensures consistent data collection across participants.

Practicality: Can be completed by teachers in their own time after the training.

Alignment: Assesses the ability to implement PBL and reflect on its outcomes.

Goal 2: Enhance teachers' ability to integrate available technology resources into PBL activities to support student learning in STEM subjects.

Objective 2.1: Create a technology integration plan for a PBL unit

Assessment Method: Rubric-based evaluation of the integration plan

Rationale: Allows for detailed assessment of technology integration strategies.

Validity: Rubric will be aligned with best practices in educational technology integration.

Reliability: Use of a standardized rubric ensures consistent evaluation.

Practicality: Can be completed as part of the training and evaluated by instructors.

Alignment: Directly assesses the ability to plan for technology integration in PBL.

Objective 2.2: Select and justify digital tools for PBL activities

Assessment Method: Written justification evaluated against SAMR model criteria

Rationale: Encourages critical thinking about technology selection and its impact on learning.

Validity: Use of the established SAMR model ensures validity of technology integration assessment.

Reliability: Evaluation criteria will be standardized based on the SAMR model.

Practicality: Can be completed during the training with minimal additional resources.

Alignment: Assesses the ability to select appropriate technology tools for PBL.

Objective 2.3: Troubleshoot technical issues

Assessment Method: Instructor observation during hands-on workshop session

Rationale: Allows for real-time assessment of problem-solving skills in a practical context.

Validity: Issues presented will be based on common real-world scenarios in STEM classrooms.

Reliability: Standardized checklist for instructor observation ensures consistent evaluation.

Practicality: Can be integrated into the hands-on portion of the training.

Alignment: Directly assesses the ability to resolve technical issues in PBL implementation.

Objective 2.4: Create and share a digital artifact

Assessment Method: Peer feedback using a structured evaluation form.

Rationale: Encourages sharing of resources and peer learning.

Validity: Evaluation form will be based on principles of effective digital learning resources.

Reliability: Use of a standardized form ensures consistent evaluation across peers.

Practicality: Can be completed post-training and shared digitally.

Alignment: Assesses the ability to create digital resources that support PBL in STEM.

Objective 2.5: Develop a plan for ongoing professional learning

Assessment Method: Instructor review of professional learning plans

Rationale: Encourages long-term commitment to professional growth in PBL and technology integration.

Validity: Review criteria will be based on best practices in professional development planning.

Reliability: Use of a standardized review checklist ensures consistent evaluation.

Practicality: Can be completed as a final assignment and reviewed post-training.

Alignment: Assesses the ability to plan for ongoing professional development in PBL and technology integration.

Complete Learning Assessment for Objective 1.2

Objective 1.2: By the end of the training, participants will create a complete PBL unit plan for their STEM subject area that includes at least three of the seven essential project design elements, as defined by the Buck Institute for Education.

Assessment Tool: Comprehensive Rubric for PBL Unit Plan

Administration: Participants will submit their PBL unit plans electronically after the training. Two instructors will independently score each plan using the rubric. If scores differ by more than 3 points, a third instructor will review and a consensus will be reached.

Feedback: Participants will receive their scored rubric along with written feedback highlighting strengths and areas for improvement. Those scoring below 20 points will be offered additional support and resources for revision.