

Tier 2: Using Moderate Evidence to Inform Educational Technology Use

Measuring Practice Impact to Guide School Implementation

Building evidence that meets Tier 2

The [Elementary and Secondary Education Act](#) of 1965 (ESEA) encourages state and local educational agencies to prioritize evidence-based interventions, strategies, and approaches. Under ESEA, there are four tiers of evidence: [\(1\) Strong Evidence](#), [\(2\) Moderate Evidence](#), [\(3\) Promising Evidence](#), and [\(4\) Demonstrating a Rationale](#). The Department has defined those terms for use in ESEA and other programs in its regulations (see [34 CFR 77.1](#)). At the *Moderate Evidence*² tier, education practices are supported by at least one well-designed **quasi-experimental, non-randomized**, study exploring the **causal relationship** between variables. In education, such a study would examine the effects of an educational intervention on student or teacher outcomes. To be considered well-designed, the study must meet the Institute of Education Sciences' **What Works Clearinghouse Evidence Standards With or Without Reservations**.

Tier 2 and educational technology use in schools

Information from Tier 4 and Tier 3 activities can be used to develop a Tier 2 study plan for using and evaluating educational technologies in schools. To build Tier 2 evidence, state and local education agencies may need to partner with internal and external education evaluation organizations to:

- ❖ collect data on participant outcomes related to educational technology use with an **intervention group** and **comparison group** at two points in time: before (**pre-test**) and after (**post-test**) the intervention
- ❖ compare outcomes between an intervention group and a comparison group, controlling for the pre-test, to determine if the educational technology intervention had a **statistically significant** effect
- ❖ alternatively, examine the effect of an intervention by comparing outcomes among participants who barely meet, or barely do not meet, cut-offs that determine eligibility to receive the intervention
- ❖ control for any potential **confounders** (e.g., age, gender, grade level) that may affect the relationship between the intervention and participant outcomes using [statistical methods](#) such as **regression analysis**



Key Evidence Terms

- **Quasi-experimental:** An approach for examining cause and effect between two or more variables that does not require subject randomization
- **Non-randomized:** Not randomly assigning participants to an intervention or control group
- **Causal relationship:** When one variable (i.e., an intervention) has a direct effect on another variable (i.e., an outcome)
- **What Works Clearinghouse:** U.S. Department of Education-funded repository of reviews of educational research
- **Intervention group:** Participants receiving an intervention (i.e., treatment group)
- **Comparison group:** Participants not receiving an intervention (i.e., non-treatment group)
- **Pre-test/Post-test:** A method for collecting data before and after an intervention is implemented to measure change
- **Statistically significant:** Statistical confidence that a given relationship or difference is not due to chance
- **Confounders:** Variables whose presence distorts the true effect of the intervention
- **Regression analysis:** A statistical method used to estimate the relationship between dependent and independent variables.

²For full definitions in the Education Department General Administrative Regulations of key terms, please visit <https://www.ecfr.gov/current/title-34/part-77>



Case Study: Putting Tier 2 into Action

A school district is interested in district-wide adoption of a new science app intervention showing promising evidence for increasing 3rd-6th graders' science identity development. The school district technology team previously collaborated with a local university to conduct a correlational study (see Tier 3). The results were used to secure an external research grant to conduct a larger scale quasi-experimental study exploring the causal relationship between intervention use and student science identity.

Your turn! What might be some reasons that a school or district would seek moderate evidence to identify an educational technology intervention?

With guidance from the local university's school research partnerships program, the school district technology team developed a quasi-experimental design to measure the relationship between the science app intervention and student science identity development. They chose a study design that allowed them to estimate the effect of the intervention on students' science identity development by comparing science identity between the two groups, controlling for levels of science identity prior to using the intervention and other potential confounds. The team chose this design because the intervention could not feasibly be randomized across classrooms – requiring adoption at the school level. Given this limitation, the team collaborated with the university to decide on the following study design:

Quasi-Experimental Study Plan for a Science App Intervention

Research Question: Does using the science app intervention have a positive effect on students' science identity development?

Intervention	Frequency	Outcome Measure	Participants	Data Analysis
Intervention use during home room classroom hours	3 times per week for 24 weeks for 60 minutes per week, per intervention classroom	Student Science Identity Survey (time 1 and time 2)	Grades 3-6 intervention sites: School A: 100 students, 4 classrooms School B: 100 students, 4 classrooms Control (non-treatment) sites: School C: 100 students, 4 classrooms School D: 100 students, 4 classrooms	Use regression analysis to control for potential confounders (e.g., student demographics, frequency of intervention use etc.)

The school district's plan included asking schools A and B (4 classrooms each, one per 3rd-6th grade level) in the school district to adopt the digital science intervention during home room class time 3 times per week for 24 weeks for 60 minutes per week. The school district technology team administered a high-quality outcome measure of students' science identity development before the intervention (pre-test) and after the intervention (post-test). The team used propensity score matching based on student pre-test scores and student demographics to establish [baseline equivalence](#) between the intervention group and a comparable comparison group of students in schools C and D of a neighboring school district to compare the change in student science identities associated with students' science app use.

Your turn! What are the pros and cons of a quasi-experimental research design? How might your school or district partner with research organizations to pursue a Tier 2 evidence strategy?

The digital science intervention had a significant, positive, effect on students' science identity, even after controlling for potential confounders – indicating moderate evidence for continued use of the digital science app. The school district voted to allocate the budget to adopt the digital science intervention across the district. The district also gave the technology team permission to partner with the university to submit a report describing the findings to the [Education Resources Information Center](#).

