

Education-to-Workforce Indicator Framework

Chapter IV. Evidence-based practices

Framework excerpt

This file contains Chapter IV of the Education-to-Workforce Indicator Framework. This chapter includes examples of practices shown to move the needle on key outcomes and education-to-workforce system conditions, along with guidance for decision makers on how to select the evidence-based practices most appropriate for their context. The full framework includes five chapters:

- I. Introduction and approach
- II. Indicators and metrics
- III. Disaggregates
- IV. Evidence-based practices
- V. Data equity principles



A. Overview

Education-to-workforce (E-W) decision makers must use data to drive action. In many cases, the data may point to a need to address inequitably distributed system conditions, such as increasing funding, hiring more advisors, or offering more early college classes in schools. However, these system conditions are not the only levers for change. Often a new practice, program, policy, product, or intervention may be needed.^{xxix} For example, students who have fallen behind may need individualized support, such as through an academic intervention, tutoring, or summer program. To help E-W decision makers determine which practices are most likely to be effective for implementation, the framework offers summary guidance on how to vet and select practices that meet evidence standards and are relevant to their contexts. This guidance is followed by examples of evidence-based practices that have been shown to move the needle for priority groups on key E-W outcomes and milestones, and related system conditions. The list is not comprehensive; however, it provides an illustrative sample of practices across the continuum of pre-K to workforce that are backed by evidence for decision makers to consider.

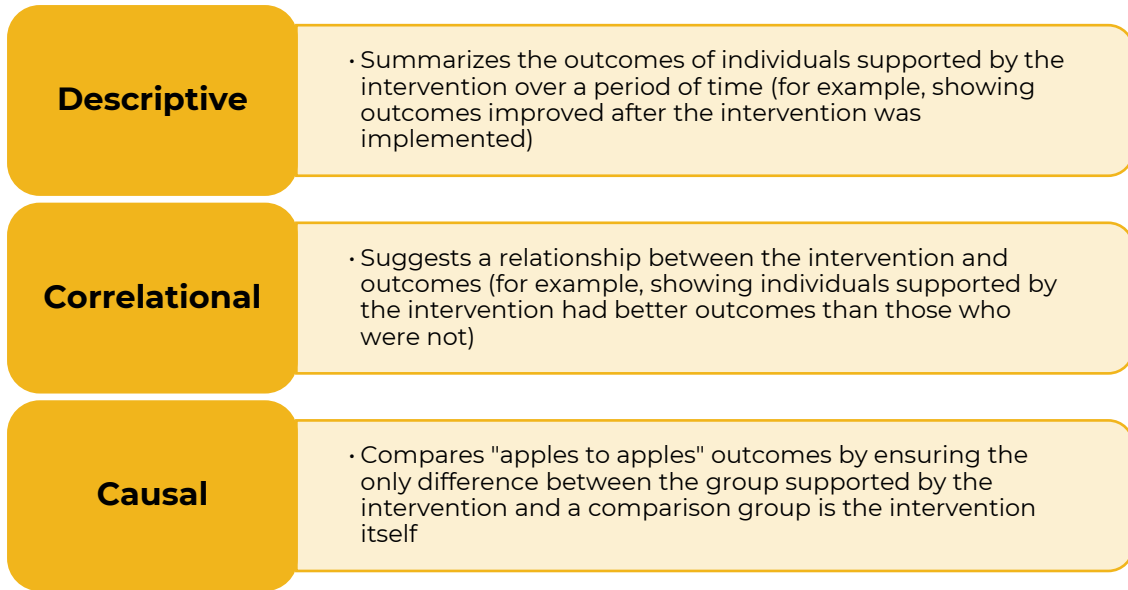
B. What is an evidence-based practice?

We define evidence-based practices as those informed and supported by rigorous evidence demonstrating consistent, positive impacts on individual outcomes. The level of evidence is an important factor to consider when selecting a practice for implementation, but not the only one. For instance, E-W decision makers should also consider factors such as the funding, staffing, training, and buy-in needed to ensure high-quality implementation in their local contexts, as we discuss later in our recommended guidance. However, a critical step is identifying potential practices that research has shown to be effective.

Different types of research may be available, ranging in their degree of rigor (Exhibit IV.1). Causal research that makes “apples to apples” comparisons between the outcomes of an intervention group and a similar comparison group ensures that the only likely difference between the two groups is the practice being tested. Thus, causal research is the most rigorous type of evidence available to gauge the effectiveness of a practice in the context studied. Causal research includes experimental studies (also known as randomized control trials, in which individuals are randomly assigned to the intervention or a control condition) and quasi-experimental studies, such as those identifying a matched comparison group similar to the intervention group based on available baseline data. Other types of research, such as descriptive or correlational studies, can point to promising practices and inform our understanding of a problem and potential solutions, but these studies do not conclusively show whether a practice was effective. Newer practices, programs, and interventions, or those more difficult to evaluate using experimental or quasi-experimental methods, may be promising but understudied. Therefore, the rigor of the available research is an important consideration, but not the only one, for assessing the evidence.

^{xxix} In this chapter, we use the terms “practice” and “intervention” interchangeably to refer broadly to programs, products, practices, policies, and other types of interventions aimed at improving outcomes.

Exhibit IV.1. Three types of research evidence, from weakest to strongest



Source: Adapted from Mathematica (2016).¹³⁹¹

In practice, there is no single approach to determine whether a study is sufficiently rigorous, although there have been efforts to standardize definitions. As just one example, the U.S. Department of Education’s What Works Clearinghouse (WWC) has developed standards for assessing whether a study provides causal evidence of effectiveness. (Refer to the WWC¹³⁹² for a description of how a study meets WWC standards.) In summary, studies must use experimental or quasi-experimental research designs to make valid comparisons between the outcomes of an intervention group and a similar comparison group. Only high-quality experimental studies can receive a rating of meeting WWC standards “without reservations.” However, it is worth noting that other evidence clearinghouses may apply similar but slightly different standards. For example, a study could receive a rating of “high causal evidence” by the U.S. Department of Labor’s Clearinghouse for Labor Evaluation and Research (CLEAR), but not be eligible to meet WWC standards “without reservations.” Although both clearinghouses review studies according to detailed, carefully vetted technical standards, there is a degree of subjectivity in determining whether a study provides sufficiently strong causal evidence.

In addition to considering the rigor of a given study, it is critical to synthesize the available evidence based on additional considerations, such as the number of studies conducted; whether they demonstrate consistent, positive findings; and whether they were conducted in multiple, diverse settings. A single causal study can point to whether a practice worked in a particular context, but not necessarily whether it is likely to be successful in other settings. As noted above, there is no one approach for determining the overall level of evidence behind a practice, though the WWC again serves as an example of a standard approach. In addition to reviewing individual studies, the WWC periodically assesses and synthesizes the overall evidence base on a topic area to develop “practice guides” that summarize recommended practices backed by minimal, moderate, or strong levels of evidence (Exhibit IV.2). For example, one recent practice guide the WWC published summarized evidence-based practices for “effective advising for postsecondary students.”¹³⁹³ The WWC determines the overall level of evidence for a practice based on the following:

- The number of studies evaluating the practice that meet WWC standards of rigor for causal research
- Whether the practice was tested directly or in combination with other practices
- Whether the practice consistently led to improved outcomes, both within and across studies
- Whether the studies captured a diverse range of students and contexts

Each recommended practice also is assessed by a panel of nationally recognized researchers and practitioners before it is assigned a level of evidence, highlighting the value of consensus expert opinion in determining whether something can be considered “evidence based.”

Exhibit IV.2. The WWC’s levels of evidence for practice guides

| Minimal evidence | Moderate evidence | Strong evidence |
|---|--|---|
| <ul style="list-style-type: none">• Evidence may not meet WWC standards or may exhibit weak or conflicting evidence of effectiveness• Based on expert opinion of researchers and practitioners, the practice is necessary to complement other evidence-based practices | <ul style="list-style-type: none">• Some evidence that meets WWC standards and indicates the practice improves student outcomes• Unclear whether that improvement is the direct result of the practice• Unclear whether findings can be replicated with a diverse population of students | <ul style="list-style-type: none">• Consistent evidence that meets WWC standards without reservations and indicates the practice improves student outcomes• Evidence based on a diverse population of students |

Source: Adapted from [WWC](#) (2017a).¹³⁹⁴

Other levels or tiers of evidence are also used in practice. Since passage of the Every Student Succeeds Act (ESSA) in 2015, education agencies have been formally encouraged to select evidence-based interventions shown to improve student outcomes. There are four tiers of evidence under ESSA (Exhibit IV.3), which are based on the following:

- Whether there is at least one study evaluating the intervention that meets WWC standards of rigor, and whether the study meets standards with or without reservations
- Whether the intervention led to improved outcomes in that study, and there were no strong negative findings in any other studies conducted
- The size of the study sample, and whether it is based on more than one school or district
- Whether the study population or setting are relevant to the policymaker’s local setting

Exhibit IV.3. The ESSA tiers of evidence

| TIER 4: Demonstrates a rationale | TIER 3: Promising evidence | TIER 2: Moderate evidence | TIER 1: Strong evidence |
|---|--|--|--|
| <ul style="list-style-type: none"> Well-defined logic model based on rigorous research Effort to study the effects of the intervention is planned or underway | <ul style="list-style-type: none"> At least one well-designed and implemented correlational study, or a study that meets WWC standards but is based on fewer than 350 participants or just one district or school Statistically significant positive effect on a relevant outcome, and no strong negative findings from other experimental or quasi-experimental studies | <ul style="list-style-type: none"> At least one study that meets WWC standards with reservations Statistically significant positive effect on a relevant outcome, and no strong negative findings from other experimental or quasi-experimental studies Study sample includes at least 350 participants in more than one district or school Either the study population or setting are relevant to the local context | <ul style="list-style-type: none"> At least one study that meets WWC standards without reservations (must be a randomized control trial) Statistically significant positive effect on a relevant outcome, and no strong negative findings from other experimental or quasi-experimental studies Study sample includes at least 350 participants in more than one district or school Either the study population or setting are relevant to the local context |

Source: Adapted from Regional Educational Laboratory Midwest (n.d.).¹³⁹⁵

The WWC can be used to identify interventions that meet ESSA evidence tiers, although the levels of evidence currently used in WWC practice guides differ somewhat from ESSA’s tiers of evidence. For example, whereas the WWC practice guides consider the *number* of studies that meet WWC standards of rigor to determine whether there is a strong level of evidence, it is possible for an intervention to meet the highest tier of evidence under ESSA with just one study that meets its standards. This example highlights that there is no single definition of what constitutes “strong” evidence. (Refer to WWC¹³⁹⁶ for more information.)

Other efforts to develop research quality standards are underway, including the Institute of Education Sciences’ (IES) Standards for Excellence in Education Research (SEER), which builds on and complements the WWC’s focus on causal rigor to identify “additional factors that can make research transformational.”¹³⁹⁷ SEER has developed a number of recommendations to improve the overall quality and usefulness of research. Recommendations to researchers include pre-registering studies (that is, documenting their confirmatory research questions and planned analyses ahead of time to limit the risk of cherry-picking findings); making data openly available to allow other researchers to replicate findings; describing the components of an intervention and how they are hypothesized to affect outcomes; describing the implementation context, including the comparison condition and fidelity of the intervention’s implementation; measuring the cost of the intervention relative to the comparison condition; examining both immediate and more distal outcomes, and the potential that initial impacts may fade over time; and being attentive to whether the findings can be generalized to other contexts and the intervention can be scaled. IES continues to refine these recommendations, with the ultimate goal of developing concrete standards that can be used to assign quality ratings to studies: certified, silver, gold, or platinum.

Rather than endorse a single definition of what constitutes “strong” evidence, we recommend E-W decision makers consider several factors in assessing the level of evidence available, including the following:

- The number and quality of causal studies that have been conducted
- Whether the practice consistently led to improved outcomes both within and across studies, and the magnitude of those improvements
- Whether the practice was tested directly or in combination with others
- The number of individuals included in the studies
- Whether the studies were implemented in multiple sites
- Whether the studies include diverse populations or populations relevant to the local context
- Whether the studies include diverse settings or settings relevant to the local context
- Whether there is consensus among experts (including researchers and practitioners) about the effectiveness of the practice

Together, these considerations inform the likelihood that a given practice may be effective if replicated in other contexts, assuming it is implemented well. E-W decision makers should consult evidence clearinghouses, such as the WWC and CLEAR, as well as meta-analyses, because they systematically review and synthesize the extent and quality of available studies. It is the responsibility of researchers, not policymakers, to review and synthesize the research field, which is vast and continuously evolving. However, being aware of and considering the above factors can help E-W decision makers become better consumers of research. In addition, the process for assessing evidence and ultimately selecting a practice to implement should be a collaborative, multistep process. As a starting point, below we provide an overview of guidance for selecting an evidence-based practice.

C. How to select an evidence-based practice?

We recommend following a four-step process before deciding to adopt a particular practice:

- 1. Diagnose the need to be addressed by conducting a root cause analysis.** Before assessing possible practices and their evidence base, decision makers should have a clear understanding of the need they are trying to address (for example, reducing disparities in early college coursework and credit completion). The E-W Framework's synthesis of data equity principles offers guidance and links to resources on how to disaggregate data to analyze disparities and guide action, and how to examine social and historical contexts to identify root causes and develop data-driven solutions. Existing tools, such as the Resource Equity Guidebooks published by the Alliance for Resource Equity,¹³⁹⁸ can guide users through the process of unpacking data to identify underlying causes for observed disparities and develop an action plan. The data equity principles also discuss best practices and resources for engaging community members because it is important for community members to take part meaningfully in the decision-making process. Before moving on to the next step, there should be consensus among key decision makers on the problem of practice to prioritize and the hypothesized root causes behind it.
- 1. Identify potential evidence-based practices for consideration.** Once a clear problem of practice has been identified, decision makers should consider whether the root cause analysis suggests that disparities can be addressed by taking action around one or more of the system indicators in the framework (for example, improving course placement policies to ensure they are equitable, increasing the number of Advanced Placement [AP] courses offered across subjects, and subsidizing AP exam fees). Alternatively, addressing disparities might require implementing a new practice (such as after-school tutoring to help students prepare for AP exams).

If a new practice is needed, decision makers should examine the quality, quantity, and relevance of studies that make up the evidence base. (Refer to resources such as National Center for Education Evaluation and Regional Assistance [NCEEERA]¹³⁹⁹ and Planning Realistic Implementation and Maintenance by Educators [PRIME]¹⁴⁰⁰ for additional guidance on how to assess the evidence base and implementation factors to select an intervention.) A good starting point is to consult relevant evidence clearinghouses or meta-analyses that review and synthesize high-quality, rigorous studies (including, but not limited to, those cited in the E-W Framework). Decision makers should be careful not to simply pick out individual studies of which they are aware or might come across. Evidence clearinghouses and meta-analyses provide a fuller picture of the available causal evidence. For example, WWC practice guides synthesize the available evidence on a topic, drawing on studies it has reviewed and vetted.

Evidence syntheses also consider the quantity and relevance of evidence that meets standards for quality and rigor. Having multiple high-quality studies with consistent positive findings makes it more likely that an intervention will work in different contexts. Findings based on larger sample sizes and multiple sites also increase the likelihood they can be successfully replicated. Decision makers should also consider the relevance of the studies to their particular context, including whether the intervention has been tested with diverse populations of students in diverse settings or with populations and settings that resemble the local community. Another consideration is whether the intervention has been compared to “business-as-usual” alternatives relevant to the local policy context. For example, curricula typically are compared to other curricula to gauge their effectiveness, so knowing what the comparison curriculum was and whether it generally resembles what is being implemented locally is important for interpreting the available evidence. Finally, it can be helpful to consult with experts, including researchers and practitioners, to gauge the likelihood that an intervention backed by evidence will be effective.

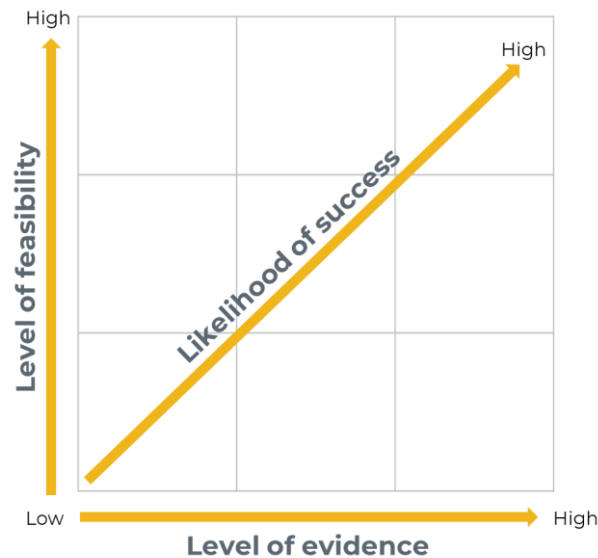
Relying on evidence to identify potential practices should not stifle innovation or assume a one-size-fits-all approach. It is important to start by reviewing the evidence, rather than preselecting a practice and looking for evidence to justify it. However, if there is limited causal evidence on effective interventions to address a particular problem of practice, decision makers should consider promising interventions with weaker evidence bases. Lack of causal evidence is not the same as having evidence of an intervention’s lack of effectiveness. Newer practices or practices not readily evaluated using causal research methods may be understudied but still hold promise. It is for this reason the ESSA tiers of evidence include a fourth tier for interventions that demonstrate a rationale. We recommend developing a logic model for how the potential intervention is expected to improve outcomes, drawing on research to outline hypothesized chains of cause and effect. (A logic model is a visual representation of the hypothesized chains of cause and effect that will lead to the intended outcomes. See Kekahio et al. for additional guidance on developing logic models for education interventions.¹⁴⁰¹ Creating a logic model also is a useful and recommended exercise for selected interventions regardless of the strength of the available evidence, as this process helps decision makers identify the necessary inputs and outputs that make an intervention “work.”)

- 2. Select a practice, weighing the evidence base against the feasibility of implementation.** After identifying a candidate list of practices that meet the identified needs of the problem of practice and root cause analysis, decision makers should weigh the evidence base against the feasibility of implementing the practices successfully in their contexts. Community members and practitioners should be a part of this process, as they may have the best understanding of how the candidate practices will play out in practice. Key implementation factors to consider include whether funding

is available to enact and sustain the practice; whether there are qualified staff to implement it as designed (including leadership to oversee and facilitate implementation and resources); what additional training or support staff may need to build their capacity; and whether there is buy-in from key community members, such as teachers, students, and families. It is also important to consider whether any adaptations to the intervention will be needed, given the particular implementation context, and how they might affect the intervention’s effectiveness.

An evidence-based practice decision-making matrix (Exhibit IV.4) can be a useful tool for mapping candidate practices along a continuum of low, medium, and high evidence versus low, medium, and high feasibility. Identifying where each potential practice falls within this matrix can facilitate the selection of an intervention most likely to be successful. In making the ultimate selection, decision makers should collaborate with the practitioners who will be responsible for its implementation, as well as with students and families who will be impacted.

Exhibit IV.4. Evidence-based practice decision-making matrix



Source: Adapted from Andrews and Buettner.¹⁴⁰²

- 3. Plan and monitor the implementation and outcomes of the practice.** Once a practice has been identified, decision makers will need to plan for its implementation. It can be helpful to conduct an assessment to gauge whether key drivers of successful implementation are in place for the practice, and to guide action steps. Existing resources, such as the Drivers Best Practices Assessment (DBPA) developed by the National Implementation Research Network, can assist organizations in assessing their readiness for quality implementation of a selected practice and planning next steps to ensure implementation can be executed successfully. For example, the DBPA helps organizations identify strengths and opportunities for improving their current supports and resources; select implementation best practices to strengthen staff competency and organizational practices; and provide an implementation team with a structured process to develop an action plan and data to monitor progress.¹⁴⁰³

In addition to planning for resources, staffing, professional development, communication, and other facets of execution, it is important to develop a plan for monitoring the degree to which the practice is being implemented as designed and outcomes are improving as intended. Decision

makers should track progress on the key indicator(s) they used to identify the problem of practice, as well as the leading outcome or related system indicators also expected to improve if the practice is being implemented effectively.

Decision makers need to assess implementation and outcomes continually in this step until the practice is consistently being implemented well and there is progress on key indicator(s). A rigorous evaluation may be appropriate at this point, particularly if the intervention does not already have a strong evidence base supporting it, it has been adapted, or outcomes are not trending in the right direction. Continued monitoring of implementation and outcome data can also help decision makers determine whether a new cycle of inquiry is needed to further diagnose and address the problem of practice.

D. Examples of E-W evidence-based practices

The evidence-based practices in the E-W Framework are examples drawn from leading syntheses of E-W research, supplemented by evidence reviews the Bill & Melinda Gates Foundation has conducted to guide the foundation's investment areas, as well as recommendations from the External Advisory Board. Identifying a complete set of practices across the pre-K-to-workforce continuum that meet accepted evidence standards would be a large, complex task beyond the scope of this framework; our intent is instead to highlight examples of evidence-based interventions as a starting place for E-W decision makers. Because we drew from different sources, there is no single standard of evidence that applies equally to all of the examples listed. However, we sought to identify practices informed and supported by rigorous evidence demonstrating consistent, positive impacts on individual outcomes.

We began by reviewing the following three syntheses of E-W research:

- 1. What Works in Early Childhood Education Programs?** This meta-analysis of preschool enhancement programs by Sun Joo et al.¹⁴⁰⁴ is based on a comprehensive database of early childhood research developed by the National Forum on Early Childhood Policy and Programs. The database includes 277 studies on early childhood education (ECE) programs for children up to five years of age that met review criteria from more than 10,000 reports considered for inclusion.
- 2. WWC.** This evidence clearinghouse, developed by the U.S. Department of Education, has reviewed nearly 10,000 studies spanning pre-K through postsecondary education. We focused on practices^{xxx} with moderate or strong evidence appearing in its Practice Guides, which summarize effective practices based on studies that met review criteria, the experiences of practitioners, and the expert opinions of recognized experts.
- 3. CLEAR.** This evidence clearinghouse, developed by the U.S. Department of Labor, has reviewed more than 1,000 studies of labor programs and policies. We focused on practices with moderate or high causal evidence appearing in its Synthesis Reports, which summarize the research across studies in a topic area.

These sources are only three out of a number that have systematically reviewed and synthesized studies on the effectiveness of E-W practices, and it is important to remember that no single source provides a comprehensive list of promising practices. To curate the list of practices appearing in the framework, we also drew on recommendations from the Bill & Melinda Gates Foundation and External Advisory Board, and reviewed the underlying research base—for example, by consulting WWC

^{xxx} We excluded specific instructional practices (such as reading comprehension strategies or approaches to teaching fractions) from the review.

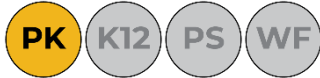
Intervention Reports and published literature reviews. From this collaborative process, we identified examples of 26 evidence-based practices (Exhibit IV.5). Below we provide summaries of these practices by sector, which we have mapped to associated indicators that appear in the E-W Framework in Appendix E. Framework users may wish to consult the sources cited in the framework, as well as other evidence clearinghouses and meta-analyses, to learn more about the evidence base behind specific practices.

Exhibit IV.5. Select evidence-based practices

| | Pre-K | K-12 | Postsecondary | Workforce |
|---------------------------------|---|--|--|---|
| Evidence-based practices | Teacher coaching and professional development | Response to Intervention | Co-requisite support | Employer partnerships with CTE programs |
| | Skill-based curricula | High-impact tutoring | Comprehensive, integrated advising | Youth workforce development programs |
| | Social skills training | Out-of-school programs | Mentoring and coaching | Sector-oriented job training programs |
| | Parent programs | Evidence-based curricula | Financial incentives for students | |
| | | SEL curricula and programs | Digital learning | |
| | | Intensive, individualized support for students off track on early warning indicators | SEL curricula and programs | |
| | | Small, personalized learning communities | Contextualized or integrated basic skills instruction in occupational training | |
| | | Accelerated postsecondary pathways | Intentionally designed career pathway programs | |
| | | Career pathway programs | | |
| | | Financial aid advising and hands-on assistance | | |
| | Enhanced college advising | | | |

Note: CTE = career and technical education; SEL = social-emotional learning.

Pre-K education



Teacher coaching and professional development

Professional development and coaching interventions generally focus on improving teacher-child interactions and instruction. A review of multiple studies suggests that these programs—which take many forms, but typically offer individualized coaching or mentoring from a more experienced individual—can improve the quality of pre-K instruction, as well as children’s learning and development outcomes.¹⁴⁰⁵ Early research suggests that technology and assessment data may play a role in effective teacher coaching and professional development. For example, MyTeachingPartner, a web-mediated feedback and consultation program that uses data from the Classroom Assessment Scoring System, was associated with improvements in the quality of instructional support for pre-K students. (However, no studies of MyTeachingPartner have met WWC standards.)^{1406, 1407} The National Institute for Early Education Research (NIEER) benchmarks for high-quality pre-K recommend that both lead and assistant teachers receive at least 15 hours of approved professional learning activities per year, and that all lead teachers receive coaching.¹⁴⁰⁸ Further research is needed to understand the types of professional development and coaching that are most effective, as the overall effectiveness of ECE professional development programs is mixed.¹⁴⁰⁹

Skill-based curricula

Using skill-based curricula in ECE programs is tied to large improvements in children’s cognitive abilities, pre-academic skills, and overall outcomes—especially for literacy or language-specific curricula.¹⁴¹⁰ Although most ECE programs use some form of a curriculum to promote children’s early learning, not every program uses evidence-based curricula that provide explicit academic instruction and focus a portion of the day on developing specific skills. The language-specific curricula reviewed by Sun Joo et al.¹⁴¹¹ provided teachers with structured guidelines to promote literacy/language skills in classroom activities (for example, role play, reading books, and so on) and instructional materials. For example, the Literacy Express curriculum, which includes teaching materials, suggested activities, recommendations for room arrangement, daily schedules, and classroom management, as well as professional development opportunities for teachers, had positive impacts on English learner pre-K students’ language and literacy skills.¹⁴¹² As another example, Doors to Discovery, a literacy curriculum that provides teachers with resource kits organized into eight thematic units, had positive impacts on children’s oral language and print knowledge.¹⁴¹³ The NIEER benchmarks for high-quality pre-K recommend states offer guidance on criteria for selecting evidence-based curricula or require adoption of specific curricula by all programs and sites.¹⁴¹⁴ Additional research is needed to identify effective pre-K curricula and the characteristics that make them effective, particularly for Black or Latino children, emerging multilingual children, and those experiencing poverty.

Social skills training

Social skills training refers to a series of practices that apply a behavioral approach to teaching children age-appropriate social skills and competencies, including communication, problem solving, decision making, self-management, and peer relations. The WWC found that social skills training had positive effects on social-emotional development and behavior for children with disabilities in early education settings, but no discernible effects on children's cognition.¹⁴¹⁵ Existing studies tend to be small, and additional research is needed to identify effective programs, as there are a variety of social skills training approaches and curricula that can be used in different settings. As one example, the Taking Part curriculum¹⁴¹⁶ was effective in improving the social-emotional development of children with developmental delays among a sample of 38 children.¹⁴¹⁷ However, all social skills programs are intended to promote positive interactions among children and between children and their teachers, through modeling, role-playing, specific instruction, and classroom reinforcement of social skills.

Parent programs

ECE programs designed to teach parents how to better support their children's early learning by providing stimulating interactions during daily routines and playtime at home are related to large improvements in children's behavioral, health, and some dimensions of socio-emotional outcomes, as well as modest improvements in their cognitive abilities and overall outcomes in general.¹⁴¹⁸ The ECE parent programs reviewed by Sun Joo et al.¹⁴¹⁹ were delivered in a variety of formats, including parent training, group meetings, family classes, and home visits, or parents were provided with at-home instructional materials to facilitate children's early learning processes. However, each of them was a fully developed, curriculum-based program, and generally they had a specific target of intervention (such as children's cognitive development or phonemic awareness). For example, the Research-based Developmentally Informed Parent (REDI-P) program provided additional home visits to parents of children in Head Start to help them use learning activities and games at home to enhance their children's readiness for school. It led to significant improvements in language and literacy skills, and social-emotional development.¹⁴²⁰

K-12 education



Response to Intervention

Response to Intervention (RTI) is an early detection and prevention strategy that combines universal screening for all students with instructional interventions targeted to students who need additional support. Universal screening is a critical first step in identifying students at risk of falling behind. The WWC^{1421, 1422, 1423} recommends screening all students at the beginning of each school year and again in the middle of the year. The WWC recommends that once students have been identified for support, schools should select an intervention that provides an explicit instructional focus to meet each student's identified learning needs. The greater the instructional need, the more intensive the intervention should be in the size of instructional groups and amount of instructional time. Students who score below benchmark should receive intensive instruction in small homogenous groups ranging from three to four students, using curricula that address foundational skills, and should meet

approximately three to five times per week for 20 to 40 minutes. The WWC is a good source for examples of specific instructional intervention programs that have proven effective for particular subjects, grades, and student needs (for example, Leveled Literacy Intervention¹⁴²⁴ for struggling readers in K–2 or Read180¹⁴²⁵ for struggling readers in grades 4–10). Intensive instructional support may need to be provided by trained specialists.

High-impact tutoring

The National Student Support Accelerator (NSSA) recognizes high-impact tutoring programs as those that have either directly demonstrated significant gains in student learning through research studies or have characteristics proven to accelerate student learning.¹⁴²⁶ These characteristics include substantial time each week spent on required tutoring, sustained and strong relationships between students and their tutors, close monitoring of student knowledge and skills, alignment with school curricula, and oversight of tutors to ensure quality interactions. Tutoring has an extensive evidence base, with a recent meta-analysis of 96 randomized evaluations of one-on-one and small-group tutoring finding consistent and substantial positive impacts on learning outcomes.¹⁴²⁷ This meta-analysis also found that tutoring delivered by teachers and paraprofessionals was generally more effective than tutoring delivered by nonprofessional staff or parents. Also, programs held during school tended to have larger impacts than those conducted after school. Other research suggests that high dosage has larger effects on student achievement.¹⁴²⁸

Out-of-school programs (such as summer programs)

Academically focused after-school, weekend, and summer programs (also known as out-of-school programs) can promote student achievement. The WWC recommends the following key features for effective out-of-school programs: the program should be aligned academically with the school curriculum, maximize student participation attendance, adapt instruction to individual and small-group needs, and provide engaging learning experiences for students.¹⁴²⁹ One example of an effective out-of-school program is the Elevate [Math] Summer Program¹⁴³⁰ for middle school students struggling with math, which improved students' algebra readiness scores.¹⁴³¹ Students participate in Elevate [Math] over a four-week period, receiving four hours of blended learning instruction a day focused on math content aligned with Common Core State Standards, and taught by trained, certified teachers.

Evidence-based curricula

A growing body of experimental research shows that particular subject-specific curricula can lead to different academic achievement outcomes for students.¹⁴³² The WWC can be used to identify particular curricula that have proven effective in different grades and subjects. To illustrate just one example, the Great Explorations in Math and Science (GEMS) Space Science Sequence, which uses models, hands-on investigations, peer-to-peer discussions, reflection, and informational student readings, has been shown to improve science achievement for students in grades 4–5.¹⁴³³ As another example, the University of Chicago School Mathematics Project (UCSMP) core math curriculum, which emphasizes problem solving, real-world applications, and the use of technology “based on a student-centered approach with a focus on active learning,” has been shown to improve math achievement for students in grades 7–10.¹⁴³⁴ There is limited evidence about the features of curricula that make them effective, although research summarized by Education First¹⁴³⁵ suggests that content richness and standards

alignment are common qualities of effective curricula. Also, curricula that prioritize student engagement through additional instructional materials or culturally relevant content may have positive effects on student achievement. Curricula that engage and support teachers effectively may increase the frequency and fidelity of implementation, which are likely to shape the effectiveness of those curricula in improving student achievement. We recommend decision makers consult the WWC, as well as resources such as EdReports, which rates curricula according to their coherence, standards alignment, and usability, to inform the selection of evidence-based curricula.

SEL curricula and programs (such as growth mindset interventions)

Students with stronger social and emotional skills tend to have better academic outcomes. To promote student engagement and prevent school dropout, the WWC¹⁴³⁶ recommends offering explicit social and emotional instruction through classroom curricula or separate programs offered outside of the classroom for off-track students. At the middle and high school levels, skills taught might include how to make better decisions in high-stakes situations, strategies for stress and anger management, and setting and tracking progress toward goals. There is also growing evidence on teaching growth mindsets, as this concept relates specifically to students' math identity and achievement. Students who are more confident about their abilities in math and science are more likely to choose elective math and science courses in high school and select math and science-related college majors and careers. A recent national experiment showed that an online growth mindset intervention teaching students that intellectual abilities can be developed led to improved self-determination and higher grades among lower-achieving students, although the impact on grades was small (on average, the intervention raised the math grade point average (GPA) of lower-achieving students from a 1.91 to a 1.99).¹⁴³⁷ As a strategy for encouraging girls in math and science, the WWC¹⁴³⁸ recommends that, to enhance students' beliefs about their abilities, teachers explicitly instruct students that academic abilities are expandable and can improve.

Intensive, individualized support for students off track on early warning indicators

Using data on on-track or early warning indicators (such as those recommended by the E-W Framework), schools can identify students who are off track for high school graduation or college readiness, and can intervene. The WWC¹⁴³⁹ recommends assigning these students a trained adult advocate who provides individualized support to meet their academic, social, and emotional needs. This individual can identify students' unmet needs and either directly provide support or coordinate additional support. An advocate is a student's "go-to person" for the resources and support needed to graduate or be ready for college. Advocates typically provide these supports for the entire time a student is enrolled in the school or, at a minimum, a full school year. They can be school staff or employed by outside organizations. Although the research reviewed is focused on dropout prevention in middle and high schools, intensive, individualized support that considers both academic and nonacademic needs may also be a promising intervention for students off track in elementary school or for college.

Small, personalized learning communities

In schools with many students who are off track to graduate, the WWC¹⁴⁴⁰ recommends creating small, personalized learning communities. By grouping students into small communities of no more than a

few hundred students, teachers and other school staff can be better equipped to implement other interventions, including providing students who are off track with intensive, individualized support. The WWC notes that in small, personalized communities, staff can check in with students more frequently, pay closer attention to their needs, and form stronger and more meaningful relationships with them. As the relationships between students, teachers, and other school staff grow, students may develop a greater sense of belonging in the school community, thus helping them stay engaged in school.

Accelerated postsecondary pathways

The WWC¹⁴⁴¹ recommends that high schools offer courses of study that allow students to earn college credits, with an explicit goal of having a certain number of transferable credits upon high school graduation. Growing research, including studies that meet WWC standards, demonstrates that participation in accelerated postsecondary pathways (such as early college high schools and dual enrollment) have positive effects on high school graduation and postsecondary enrollment and completion.^{1442, 1443, 1444, 1445} However, the evidence is not consistent for all types of accelerated coursework. In particular, there is mixed evidence on whether taking AP classes alone improves outcomes.^{1446, 1447} Passing an AP exam (earning college credit), however, has positive impacts on college admissions scores and on-time postsecondary degree completion.^{1448, 1449}

Career pathway programs

Offering curricula and programs clearly connected to a career pathway improves high school graduation rates.¹⁴⁵⁰ Career pathway programs have three main features: (1) they are organized as small learning communities, or schools within schools; (2) their curriculum centers on one career, occupation, or industry and combines academic and technical aspects relevant to that career; and (3) they provide work-based learning experiences, often through partnerships with local employers to offer students exposure to jobs in demand. These experiences can include summer employment, internships, and mentoring. Career pathway programs in high school produce strong and sustained increases in students' post-high school earnings, especially for young men.^{1451, 1452}

Financial aid advising and hands-on assistance

High schools can ensure that students take the necessary steps to obtain financial aid by educating students and their parents about college affordability and the availability of financial aid—for example, through workshops offered at the start of students' senior year. Students also benefit from one-on-one hands-on assistance in meeting financial aid deadlines and completing application forms. Programs that inform students about financial aid opportunities and provide help in completing financial aid applications have had positive impacts on financial aid applications and college enrollment.¹⁴⁵³

Enhanced college advising

Advising that engages students in the college application and enrollment process, providing hands-on assistance through each step, has had a positive impact on college enrollment. Advising providers may include traditional counselors; they may also include educators, school-based administrators, school staff (such as paraprofessionals), and third-party providers (such as nonprofit program staff or

AmeriCorps volunteers).¹⁴⁵⁴ There are somewhat varying models for advising programs with proven impacts, but the WWC¹⁴⁵⁵ recommends that students who want to attend a two- or four-year institution receive guidance in preparing for and taking college admissions tests; searching for a college that matches their qualifications, interests, and goals; and completing college applications. Students should receive one-on-one assistance with college applications (and financial aid applications, as noted above) to ensure they submit quality applications that are complete and on time. To expose students to the college environment and help them select a college, advising programs should coordinate college visits. Some programs also assist students in the transition to college. For example, OneGoal works with students for three years, including one year after high school graduation.¹⁴⁵⁶ Bottom Line, which has been proven effective in improving both college enrollment and degree completion, provides advising support for up to six years after high school.^{1457, 1458}

Postsecondary education



Co-requisite support

Co-requisite approaches, in which students with developmental education needs receive support at the same time they take credit-bearing gateway courses (concurrent support), have had positive impacts on students passing gateway courses and progressing through college.^{1459, 1460, 1461, 1462, 1463} These approaches stand in contrast to traditional developmental education, in which students must pass a developmental course before they can take a gateway course and then are placed directly into gateway courses without additional support. A multisite study of the Accelerated Learning Program (ALP)¹⁴⁶⁴—an English co-requisite model with extended instructional time and academic support services—found that it improved students’ likelihood of passing English Composition I in the first and second years, and increased the number of college-level credits they completed overall.¹⁴⁶⁵ In the ALP model, students receive support during classroom instruction. Courses include a mix of students with and without developmental needs, and class sizes are smaller to help instructors provide support. Another successful model is the Dana Center Mathematics Pathways (DCMP),¹⁴⁶⁶ which enrolls students directly into a gateway math course aligned to their program of study while offering enhanced supports (in some cases, including a co-requisite support course). This model, which has been implemented and studied in 27 community colleges in Texas, had positive impacts on students passing gateway math courses and earning college credits.¹⁴⁶⁷ Co-requisite approaches also include paired-course models (in which students enroll in a gateway and developmental course at the same time); extended instructional time models; required academic support models (which may include technology-mediated support); or some combination of the above.

Comprehensive, integrated advising

Comprehensive, integrated advising that connects students with a broad range of individualized academic and nonacademic supports helps students successfully complete developmental course requirements, earn credits, complete a degree or industry-recognized credential, and transfer to a four-year institution.^{1468, 1469, 1470} This type of advising model stands in contrast with the light-touch, transactional structure of traditional college advising, encouraging advisors to engage with students through deeper, more frequent, and lasting interactions. By building and sustaining a relationship with

students, advisors can develop a better understanding of their holistic needs and help connect them to appropriate supports to meet their academic, financial, social, and emotional needs. An exemplar of this model is the Accelerated Study in Associate Programs (ASAP)¹⁴⁷¹ model implemented by the City University of New York to help students graduate in three years. The program offers a suite of supports, including comprehensive advising, tutoring, career assistance, early registration, and financial support. Another successful model is the Monitoring Advising Analytics to Promote Success (MAAPS)¹⁴⁷² project implemented at Georgia State University, in which an early warning data system with more than 800 alerts allows advisors to intervene quickly to help students get back on track. Key elements of effective advising models include access to data from progress monitoring or early warning systems (allowing advisors to proactively reach out to students); sustained relationships with the same advisor; frequent advisor-student interactions; social and emotional support in addition to academic support; and smaller caseloads to encourage advisors to spend more time with their assigned students.

Mentoring and coaching

Mentoring and coaching can enhance the role advisors play in helping students reach their educational and career goals.¹⁴⁷³ “Mentoring” refers to an informal, supportive learning relationship between a student and mentor (such as a faculty member, peer mentor, or professional with experience in the student’s field of interest), whereas “coaching” describes a more formal and structured relationship with a trained coach (such as a “student success coach”) built around specific goals. Both mentors and coaches can play an important role in motivating students and helping them set and achieve goals. Although the types of activities, frequency of meetings, and duration of the mentoring or coaching relationship varied across the studies reviewed, there were significant, positive impacts on students’ progression through college, academic achievement, and degree completion. For example, in a study of the InsideTrack¹⁴⁷⁴ coaching program implemented in eight colleges, students were paired for two semesters with a trained coach, who communicated with them via phone, email, text, or social media around identifying strategies to overcome barriers to success. The program improved persistence and degree completion.¹⁴⁷⁵

Financial incentives for students

Performance-based incentives are monetary awards disbursed to students based on meeting specific academic benchmarks, and are intended to supplement (not replace) students’ financial aid packages. By identifying and incentivizing short-term goals (such as maintaining a minimum level of enrollment, successfully completing coursework, or participating in advising programs), these initiatives support students’ progression through college.¹⁴⁷⁶ Incentive programs can vary in the amount of the incentive, the requirements for receiving it, and the number of semesters for which students are eligible for it. In the studies reviewed, incentive amounts ranged from about \$600 to \$1,500 per semester, and students typically were eligible for two or three semesters. For example, in the Louisiana Opening Doors program,¹⁴⁷⁷ students who were parents with low incomes received \$1,000 per semester for two semesters for maintaining at least half-time enrollment and a 2.0 GPA. The ASAP program¹⁴⁷⁸ offers financial assistance with textbooks, a tuition waiver that covers the difference between a student’s tuition and fees and the financial aid package, and a monthly transportation pass. To be eligible for these supports, students have to enroll in at least 12 credits per term; a 3.0 GPA or higher is required to be eligible for funds covering winter or summer coursework. Although performance-based awards may

reduce the amount of student loans or grants awarded in some instances, they usually result in a net financial gain for students.¹⁴⁷⁹

Digital learning

Technology can help foster productive and engaging course experiences for larger numbers of students and a more diverse student population. The WWC¹⁴⁸⁰ recommends that postsecondary institutions leverage technology to (1) vary, blend, or accelerate course formats; (2) package course content to minimize cost, maximize accessibility, and accommodate different learning preferences; and (3) generate and provide timely performance data to students and instructors. These practices have led to improved academic achievement, credit accumulation, and persistence. As one example, in 2014 the Bill & Melinda Gates Foundation launched the Next Generation Courseware Challenge (NGCC)¹⁴⁸¹ to develop and scale high-quality adaptive courseware in gateway courses with historically poor outcomes for students from low-income households and students of color. Evaluations of 28 courseware uses showed that implementing courseware in blended and fully online courses can improve student success in high failure-rate courses and save them money while potentially reducing instructional costs for the institution. The effects on students' course grades were positive overall, and greater for students of color. However, the results varied widely across contexts—for instance, courseware was more effective in four-year than two-year colleges, and in biology, psychology, and math courses than in courses in the humanities or social sciences.¹⁴⁸²

SEL curricula and programs (such as self-regulated learning)

Teaching college students to be self-regulated learners means helping them focus on the parts of the learning process they can control. Self-regulating learning can be embedded in coursework by demonstrating to students how to approach a task, implement that approach, evaluate how well it worked, and decide what to do next. The WWC¹⁴⁸³ recommends using technology that models and promotes self-regulated learning strategies to promote postsecondary student learning—for instance, by prompting or supporting students to set goals, take effective notes, seek help, monitor their own progress, and plan and manage their time. Evidence reviewed by the WWC¹⁴⁸⁴ also suggests growth mindset interventions that encourage college students to view intelligence as a “malleable” characteristic that grows with effort and leads to higher academic achievement, although they had no discernable effects on measures of college progression. Social belonging interventions that aim to ease the burden of negative stereotypes underrepresented groups face had mixed effects on achievement and progression, and no discernable effects on degree completion.¹⁴⁸⁵

Contextualized or integrated basic skills instruction in occupational training

Contextualized or integrated basic skills instruction offers career and technical education (CTE) students the opportunity to develop the foundations in math, reading, and writing (“basic skills”) they need to be successful in occupational coursework and beyond. This type of instruction has had positive impacts on students' credit accumulation and completion of an industry-recognized credential.¹⁴⁸⁶ Students entering career pathways have diverse educational and employment backgrounds, and some may need support to build these foundations. “Contextualization” refers to instruction that explicitly links basic skills to concrete applications in an occupation of interest to the student. In integrated basic skills instruction, basic skills are taught at the same time as occupational content, often by a team of

instructors. For example, Washington State’s Integrated Basic Education and Skills Training (I-BEST) program,¹⁴⁸⁷ an effective model developed by the Washington State Board for Community and Technical Colleges, uses a team-teaching approach to provide job training and basic skills instruction in reading, math, or English as a second language in the same classes as part of a structured career pathway. Both instructional approaches can help close skill gaps and improve student motivation, allowing students to see how basic skills apply to job training and future employment.

Intentionally designed career pathway programs

The design and implementation of career pathways can vary widely, depending on the target industries and occupations. However, key design elements can make a career pathway more effective at helping students earn credits, complete an industry-recognized credential, and gain employment and higher earnings.¹⁴⁸⁸ Effective career pathways offer students a clear blueprint for educational and employment advancement that meets industry needs. This blueprint should include multiple “on and off ramps” that individuals with varying needs can access. For example, students who need basic skills training may start in a pre-pathway bridge program, whereas others may enter directly into a short-term or one- to two-year certificate program. Pathways should offer stackable credentials that build on each other and allow students to enter and exit the pathway at multiple points as they progress in their careers. For instance, a short-term certificate can lead to an entry-level skilled job and a longer-term certificate, which then can be followed by mid-level skilled employment or a two-year degree, and so on. An example of an effective pathway program is the Pima Community College Pathways to Healthcare Health Profession Opportunity Grant (HPOG) Program,¹⁴⁸⁹ which features placement assessments, contextualized basic skills and training, support services (including advising, financial assistance, and social supports), and employment connections to work-based learning opportunities.

Workforce



Employer partnerships with CTE programs

Employer partnerships with high schools and postsecondary institutions are a key component of effective career pathways, offering students in CTE both classroom and work-based experiences to develop the skills they need to be successful in the workplace.¹⁴⁹⁰ Career pathways that develop and sustain employer partnerships can improve the relevance and alignment of the curriculum to employer or industry needs; expand opportunities for students to engage meaningfully with employers through presentations, onsite visits, work-based learning opportunities, and career fairs; and increase the potential for job placement and advancement.

Youth workforce development programs

Workforce development programs for disconnected youth can have positive effects on their education, employment, and earnings outcomes, although the evidence is mixed on which types of programs are most effective.^{1491, 1492} Examples of effective programs include the National Guard Youth ChalleNge program, which offers a six-month residential program for youth who have dropped out of high school, followed by placement in employment, education, or the military and a year of structured mentoring.

Experimental research found that the program increased educational attainment, employment, and earnings three years after enrollment.¹⁴⁹³ Another example is Youth Corps, which offers youth a stipend along with educational supports, employment and training, and community service activities, and led to higher earnings (a more than \$1,200 per year increase) for youth 18 months after enrollment; however, it had no impacts on employment or education, and the program was not equally effective in all participating sites.^{1494, 1495} Internship programs for youth and young adults also have shown encouraging findings. A study of the Young Adult Internship Program (now known as Intern & Earn), which offers disconnected youth a 10- to 12-week paid internship, along with job readiness workshops and individualized supports, found that the program increased earnings for participants a year after completing their internship.¹⁴⁹⁶ YearUp—which offers six months of intensive training followed by paid six-month internships in the fields of information technology and financial operations to youth from low-income households—improved earnings measured three years after participation (though not after four years).^{1497, 1498} There are also examples of programs that have not yielded consistent benefits for participants; for example, evidence on summer job programs for youth is mixed.^{1499, 1500, 1501} The Workforce Innovation and Opportunity Act (WIOA) recommends that youth programs include multiple elements, including education and other supportive services, work experience, occupational skills training, mentoring, leadership development opportunities, and follow-up support.¹⁵⁰²

Sector-oriented job training programs

Sector-oriented training programs are designed to prepare workers for a particular industry or sector in demand by local employers. There are several examples of sector-oriented training programs that have proven effective in improving long-term employment, earnings, and educational attainment outcomes for participants.¹⁵⁰³ For example, the WorkAdvance model, which provides employee assessments, career readiness services, occupational skills training, and job development and placement services in different sectors, led to higher rates of credential attainment of 26 percentage points¹⁵⁰⁴ and increased earnings by an average of almost \$3,000 several years after participation in the program.¹⁵⁰⁵ As another example, the Wisconsin Regional Training Partnership's sectoral employment program, which provided training lasting two to eight weeks, along with case management and job placement assistance, increased earnings by more than \$6,000, on average, over two years after acceptance into the program.¹⁵⁰⁶ Common industries targeted by sector-oriented training programs include health care, information technology, manufacturing, and transportation.¹⁵⁰⁷ Research suggests that key aspects of effective sector-oriented job training programs are on-the-job training and technical instruction that lead to an industry-recognized credential in demand by local employers, job search assistance and placement supports, and post-employment job retention services.^{1508, 1509}

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