

Developing a Core Components Nomenclature in Education: An Update on IES-funded work

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Supporting evidence building and use

A key IES function is to strengthen the national capacity to produce rigorous and relevant research and support the use of evidence to improve education practice. To that end, IES sponsors research and development activities in the education sciences.

In its work on *core components*, IES seeks to “get under the hood” of interventions to identify their active ingredients. This requires moving beyond whether *an intervention* works to thinking about *which interventions components* are associated with improving outcomes.

The necessary first step in identifying which intervention components are associated with efficacy is the development of a common language researchers and educators can use to describe education interventions.

This update describes IES-funded efforts to advance understanding of effective education practices through consistent reporting of intervention components.

Building a nomenclature of components

Purpose of identifying components

- Provide a framework to categorize and describe intervention components in various education topic areas
- Facilitate meta-analyses that examine which components are associated with impacts, yielding evidence-based “core” components
- Help educators make informed programmatic choices about what program components or strategies to implement

Work to date

- Investigated existing component frameworks in education
- Developed a tiered framework to use across education topic areas
- Created and piloted nomenclature of components in two topic areas, beginning reading and postsecondary developmental education, and a coding system for applying that nomenclature to interventions

Lessons learned

- Two distinct topic areas used the tiered framework successfully to build nomenclature vetted by content experts and methodologists
 - The framework appears flexible enough to use in other topic areas
- Refining nomenclatures, building in other topic areas, and coding procedures will require further work
 - The specifics of the approach to develop the nomenclature may vary depending on the availability of existing research syntheses
 - Coding guides should consider including mechanisms for documenting variation in implementation to facilitate future efforts to better understand how treatment effects vary
 - Coding components requires adequate training and access to resources or original authors
 - The level of details researchers choose to collect data and report on could limit the use of nomenclature, particularly at the more granular levels

Existing resources provided a good start

- The research team began by identifying 11 existing resources, including taxonomies, theoretical frameworks, and working papers. Notable frameworks included:



- These resources vary in purpose, discipline (e.g., education, medicine), and level of specificity in documenting and describing intervention components
- The team's initial assessment was that no single framework was best suited to meet IES's needs, but they provided a good starting point for further development

Building nomenclature in two topic areas

- Developed and refined a framework and coding system
 - Identified two topic areas for development: *foundational literacy* and *postsecondary developmental math*
 - Convened advisory panel of content experts and methodologists
 - Refined based on expert feedback
- Developed nomenclature for each topic area
 - Used existing literature, focusing largely on IES What Works Clearinghouse Practice Guides
 - Refined based on content expert feedback
- Developed and pilot tested instructions, coding forms and glossaries

Common framework across topic areas

The components of interventions are organized in a hierarchical structure involving four component categories of increasing granularity

Component categories	Description
Component type	Identifies the nature of a particular intervention <ul style="list-style-type: none">• Instructional practices, structures and academic supports• Non-academic student supports• Organizational structures and supports• Educator supports• Assessment and placement
Component domain	Mechanism to organize similar sets of intervention components under a unifying theme
Component	Particular intervention strategy
Component approach	Specific mechanisms or approaches employed to implement a particular component

Coding guide excerpts: Instructional practices, structures and academic supports

Postsecondary developmental education

Component type: INSTRUCTIONAL PRACTICES, STRUCTURES AND ACADEMIC SUPPORTS		
Component domain	Component	Component approach
<input type="checkbox"/> Contextualized course curricula	<input type="checkbox"/> Integration with career and technical education	<input type="checkbox"/> Co-teaching model (team-teaching) <input type="checkbox"/> Engaging local employers as partners
	<input type="checkbox"/> Differentiated math pathways	<input type="checkbox"/> Algebra instruction for STEM majors <input type="checkbox"/> Quantitative literacy math courses for humanities majors <input type="checkbox"/> Statistics for health and social science majors
<input type="checkbox"/> Course redesign	<input type="checkbox"/> Combining developmental courses	<input type="checkbox"/> Combining developmental reading and writing courses <input type="checkbox"/> Other form of combining developmental courses (specify _____)
	<input type="checkbox"/> Compressed courses	<input type="checkbox"/> Eliminating course(s) from a developmental course sequence (e.g., from 4 to 2 semesters) <input type="checkbox"/> Reducing duration to allow for multiple courses in one semester

Beginning reading

Component type: INSTRUCTIONAL PRACTICES, STRUCTURES, AND ACADEMIC SUPPORTS		
Component domain	Component	Component approach
<input type="checkbox"/> Instructional practices to build comprehension skills	<input type="checkbox"/> Teaching how to use a specific reading comprehension strategy	<input type="checkbox"/> Instructing how to activate prior knowledge or predict <input type="checkbox"/> Instructing how to draw inferences <input type="checkbox"/> Instructing how to use monitoring, clarifying, or fix-up strategies <input type="checkbox"/> Instructing how to use questioning strategies <input type="checkbox"/> Instructing how to use summarizing/retelling strategies <input type="checkbox"/> Instructing how to use visualization strategies
	<input type="checkbox"/> Using multiple-strategy formats	<input type="checkbox"/> Incorporating concept-oriented reading instruction <input type="checkbox"/> Incorporating informed strategies for learning <input type="checkbox"/> Incorporating reciprocal teaching methods <input type="checkbox"/> Incorporating transactional strategy instruction

Coding guide excerpts: Non-academic supports

Postsecondary developmental education

Component type: NON-ACADEMIC STUDENT SUPPORTS		
Component domain	Component	Component approach
<input type="checkbox"/> Enhanced advising	<input type="checkbox"/> Adjusting to students' schedules	<input type="checkbox"/> Advising during class time <input type="checkbox"/> Advising via video conferences <input type="checkbox"/> Setting up electronic reminders for advisory meetings
	<input type="checkbox"/> Assigning students to a team of advisors	
	<input type="checkbox"/> Developing individualized action plans	
	<input type="checkbox"/> Mentoring	<input type="checkbox"/> Including contractual requirements for mentoring <input type="checkbox"/> Providing incentives for mentoring
	<input type="checkbox"/> Reducing student-to-advisor ratio	
	<input type="checkbox"/> Conducting advising activities in small groups	

Beginning reading

Component type: NON-ACADEMIC STUDENT SUPPORTS		
Component domain	Component	Component approach
<input type="checkbox"/> Social-emotional learning strategies	<input type="checkbox"/> Support development of a growth mindset	<input type="checkbox"/> Incorporating read-alouds that tell stories of overcoming challenges <input type="checkbox"/> Conducting activities where students practice using phrases that promote growth mindset <input type="checkbox"/> Displaying growth-mindset vocabulary in the classroom <input type="checkbox"/> Modeling growth mindset <input type="checkbox"/> Providing feedback using prompts that provide opportunities for self-evaluation <input type="checkbox"/> Providing feedback that focuses on effort and progress
	<input type="checkbox"/> Teaching self-management skills	<input type="checkbox"/> Supporting the development of impulse control <input type="checkbox"/> Supporting the development stress management skills <input type="checkbox"/> Supporting the development self-discipline <input type="checkbox"/> Supporting the development self-motivation <input type="checkbox"/> Supporting the development goal-setting skills <input type="checkbox"/> Supporting the development of organizational skills

Coding guide excerpts: Organizational structures and supports

Postsecondary developmental education

Component type: ORGANIZATIONAL STRUCTURES AND SUPPORTS		
Component domain	Component	Component approach
<input type="checkbox"/> Organizational commitment and oversight	<input type="checkbox"/> Publicized commitment from administration	<input type="checkbox"/> Releasing a formal stated commitment <input type="checkbox"/> Developing a mission statement around developmental education
	<input type="checkbox"/> Centralizing developmental education resources	
	<input type="checkbox"/> Ongoing administrative evaluations conducted of programs and policies	
	<input type="checkbox"/> Creating an integrated, collaborative organizational structure	<input type="checkbox"/> Collaboration between support services staff and instructional faculty <input type="checkbox"/> Collaboration across development education faculty and college-level faculty/departments
<input type="checkbox"/> Student administrative requirements	<input type="checkbox"/> Encouraging year-round course-taking (including summers)	
	<input type="checkbox"/> Offering early registration for developmental ed students	

Beginning reading

Component type: ORGANIZATIONAL STRUCTURES AND SUPPORTS		
Component domain	Component	Component approach
<input type="checkbox"/> Programming to support improvements in school climate	<input type="checkbox"/> Schoolwide efforts to promote positive behaviors	<input type="checkbox"/> Planning for school climate improvements <input type="checkbox"/> Engaging stakeholders (such as family-school partnerships) <input type="checkbox"/> Collecting and reporting school climate data (surveys, focus groups, interviews) <input type="checkbox"/> Monitoring and evaluating school improvement efforts
	<input type="checkbox"/> Implementing multi-tiered systems of support around school climate and behaviors	
	<input type="checkbox"/> Implementing anti-bullying programming	
	<input type="checkbox"/> Providing out-of-school time supports	<input type="checkbox"/> After school programming <input type="checkbox"/> Tutoring outside of school time <input type="checkbox"/> Summer programming <input type="checkbox"/> Partnering with community organizations

Coding guide excerpts: Educator supports

Postsecondary developmental education

Component type: EDUCATOR SUPPORTS		
Component domain	Component	Component approach
<input type="checkbox"/> Training advisors	<input type="checkbox"/> Certification training for advisors	
	<input type="checkbox"/> Clearly conceiving and defining the advising process	
	<input type="checkbox"/> Training on how to conduct "advising as teaching"	
	<input type="checkbox"/> Coordinating and communicating across student services	
	<input type="checkbox"/> Developing training manuals with student services information and FAQ	
	<input type="checkbox"/> Incorporating team-building exercises among advisors	
	<input type="checkbox"/> Providing informational details on aspects of advising	
	<input type="checkbox"/> Holding monthly "brown bag" trainings/refreshers	
	<input type="checkbox"/> Recruiting and training outside the counseling department	
	<input type="checkbox"/> Providing training on relationship skills needed to support students' decision-making and planning	

Beginning reading

Component type: EDUCATOR SUPPORTS		
Component domain	Component	Component approach
<input type="checkbox"/> Professional development for teachers	<input type="checkbox"/> Supporting instructional practices	
	<input type="checkbox"/> Supporting the link between student assessment and practice	
	<input type="checkbox"/> Training in technology use	
	<input type="checkbox"/> Utilizing literacy coaches	
	<input type="checkbox"/> Other teacher professional development related to the intervention, specify: _____	
<input type="checkbox"/> Implementing professional learning communities (PLCs)	<input type="checkbox"/> Building grade-level PLCs	
	<input type="checkbox"/> Building multi-grade level vertical teams to support curricular alignment	
	<input type="checkbox"/> Developing cross-functional professional learning communities that meet on a regular basis	
	<input type="checkbox"/> Providing common planning/prep time	

Coding guide excerpts: Educator supports

Postsecondary developmental education

Component type: ASSESSMENT AND PLACEMENT		
Component domain	Component	Component approach
<input type="checkbox"/> Using assessments to place students	<input type="checkbox"/> Using single, high stakes assessment to identify students in need of developmental education	<input type="checkbox"/> Use of standardized assessments <input type="checkbox"/> Use of commercially available diagnostic assessments
	<input type="checkbox"/> Incorporating retesting policies	
	<input type="checkbox"/> Using multiple measures to identify and place students in developmental education courses	<input type="checkbox"/> Exploring additional measures <input type="checkbox"/> Piloting different placement methods <input type="checkbox"/> Lowering cutoff scores <input type="checkbox"/> Using a waiver system to exempt students from developmental education courses based on multiple measures <input type="checkbox"/> Using a weighting scheme of multiple measures to provide course recommendations <input type="checkbox"/> Conducting a diagnostic assessment <input type="checkbox"/> Using nationally standardized assessments such as the SAT/ACT or state tests

Beginning reading

Component type: ASSESSMENT AND PLACEMENT		
Component domain	Component	Component approach
<input type="checkbox"/> Student placement	<input type="checkbox"/> Implementing a multi-tiered system of support or response-to-intervention framework to identify students in need of different levels of supports	<input type="checkbox"/> Creating a building-level team for screening and progress monitoring <input type="checkbox"/> Providing core academic instruction for all youth. <input type="checkbox"/> Providing secondary supports for youth at risk for poor learning outcomes, <input type="checkbox"/> Providing intensive intervention for those who require additional supports. <input type="checkbox"/> Implementing regular progress monitoring for students at elevated risk or require additional supports <input type="checkbox"/> Using data to drive decision-making to identify students' needs for additional supports.
	<input type="checkbox"/> Grouping small literacy groups based on student skill level	
	<input type="checkbox"/> Providing literacy instruction to heterogeneous skill groups	

Capturing supporting information

- **Grouping categories** that, when combined, determine the appropriate nomenclature
 - Target population and subpopulation
 - Topic area and subtopic areas
- **Target outcome domains and target outcomes** that identify the intended goal(s) of the intervention
- **Delivery mechanisms** that describe how interventions are implemented
 - Duration
 - Setting
 - Instruction (who provides instruction or support)
 - Group size

Pilot test of coding

- Eight interventions included in the pilot coding

Postsecondary developmental education	Beginning reading
<ul style="list-style-type: none">▪ Accelerated Study in Associate Programs (ASAP)▪ Multiple math pathways▪ Summer Bridge▪ Linked Learning Communities	<ul style="list-style-type: none">▪ Peer-Assisted Learning Strategies (PALS)▪ Sound Partners▪ Lexia Reading▪ Success For All

- Between one and three studies per intervention (N=16)
- Interventions were coded by internal and external reviewers
 - All studies were double-coded by internal reviewers
 - External coders (developers/researchers) submitted one coding form per intervention and provided additional feedback, including an assessment of which components they considered to be “core”

A note on what is considered a “core” component

- The term “core components” means different things to different people. They can be:
 - Hypothesized: Developer or provider believes component is necessary to achieve its goals
 - Evidence-based: Empirical evidence suggests the component impacts outcomes
- Strategy for nomenclature:
 - Describe as a “components nomenclature” as opposed to “core components”
 - For external coders, we offered an opportunity for developers/researchers to list all intervention components and then document whether they believe a particular component or approach is “a critical and necessary element of the intervention”
- This documentation can help facilitate future empirical research to identify *evidence-based* core components, such as through meta-regression

Example in postsecondary developmental education coding form

Component type: INSTRUCTIONAL PRACTICES, STRUCTURES AND ACADEMIC SUPPORTS				
Component domain	Component	Component approach	Core?	NOTES
<input type="checkbox"/> Contextualized course curricula	<input type="checkbox"/> Integration with career and technical education	<input type="checkbox"/> Co-teaching model (team-teaching) <input type="checkbox"/> Engaging local employers as partners	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
	<input type="checkbox"/> Differentiated math pathways	<input type="checkbox"/> Algebra instruction for STEM majors <input type="checkbox"/> Quantitative literacy math courses for humanities majors <input type="checkbox"/> Statistics for health and social science majors	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
<input type="checkbox"/> Course redesign	<input type="checkbox"/> Combining developmental courses	<input type="checkbox"/> Combining developmental reading and writing courses <input type="checkbox"/> Other form of combining developmental courses (specify _____)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
	<input type="checkbox"/> Compressed courses	<input type="checkbox"/> Eliminating course(s) from a developmental course sequence (e.g., from 4 to 2 semesters) <input type="checkbox"/> Reducing duration to allow for multiple courses in one semester	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

Materials provided to coders

Memo highlighting purpose of nomenclature, intended use, and specific questions for feedback and a **glossary** defining terms used in the nomenclature

Instructional practices to build comprehension skills:

- **Teaching how to use a specific reading comprehension strategy:** "explain to students how to use several strategies that have been shown to improve reading comprehension because different strategies cultivate different kinds of thinking." PG 2010, p. 12.
 - **Instructing how to activate prior knowledge or predict:** "Students think about what they already know and use that knowledge in conjunction with other clues to construct meaning from what they read or to hypothesize what will happen next in the text. It is assumed that students will continue to read to see if their predictions are correct." PG 2010, p. 12.
 - **Instructing how to draw inferences:** "Students generate information that is important to constructing meaning but that is missing from, or not explicitly stated in the text." PG 2010, p. 13.



Component type: INSTRUCTIONAL PRACTICES, STRUCTURES, AND ACADEMIC SUPPORTS		
Component domain	Component	Component approach
<input type="checkbox"/> Instructional practices to build comprehension skills	<input type="checkbox"/> Teaching how to use a specific reading comprehension strategy	<input type="checkbox"/> Instructing how to activate prior knowledge or predict <input type="checkbox"/> Instructing how to draw inferences <input type="checkbox"/> Instructing how to use monitoring, clarifying, or fix-up strategies <input type="checkbox"/> Instructing how to use questioning strategies <input type="checkbox"/> Instructing how to use summarizing/retelling strategies <input type="checkbox"/> Instructing how to use visualization strategies
	<input type="checkbox"/> Using multiple-strategy formats	<input type="checkbox"/> Incorporating concept-oriented reading instruction <input type="checkbox"/> Incorporating informed strategies for

Lessons learned: A flexible framework seems possible

- A common framework for articulating components across topic areas is possible
 - The framework organized components across two widely different topic areas
 - Developers and coders believed the nomenclature and coding guide made intuitive sense
 - The framework allows for flexibility—level of granularity varied across the two topic areas
- Future nomenclature development could examine how well the framework works in other topic areas
 - Apply the framework in additional, very different topic areas (e.g., behavioral or educator-focused interventions) to determine whether it continues to make intuitive sense
 - Apply the framework in similar or adjacent areas (e.g., adolescent literacy; specific subject matter in postsecondary education) to examine the degree of overlap in nomenclature

Lessons learned: Building nomenclature may be easier when there is a good starting point

- The pilot effort described here purposefully focused on topic areas where WWC practice guides were available
- Future efforts may be more resource intensive depending on availability of existing syntheses and practice guides

Scenario 1: For topics where existing practice guides exist

1. Work with content experts to identify resources and consider major categories of components
2. Develop draft nomenclature
3. Share draft with panel of experts
4. Pilot test and refine
5. Verify with panel
6. Periodic review and updates

Scenario 2: For topics where no similar resource exists

1. Convene panel to discuss an approach for organizing components and uncovering source materials
2. Review source materials (manuals, curricula, PD documentation)
3. Steps 3-6 in Scenario 1

Lessons learned: Training and supports are needed to support accurate components coding

- The coding process was relatively straightforward for coders
 - Coders appreciated the initial training and ongoing supports
 - An accompanying glossary and supporting materials helped inexperienced coders
- Coders found some aspects of the coding experience to be challenging
 - Coders found it challenging designating what might be considered “core”
 - Coders wanted more flexibility to note when a component is optional or varies across settings
 - Information in published articles or reports was often limited and author queries were needed
- Suggestions for future piloting and coding efforts and implications for granularity
 - More training and reliability checks are needed to ensure consistency in coding
 - Reducing the level of granularity could increase consistency and efficiency in coding, but need to consider the purpose/use-case

Ongoing work on nomenclature

- Refined nomenclature and coding forms for beginning reading and postsecondary developmental education
- The WWC has sponsored a separate team to modify the coding form and use it in meta-analysis project to explore core components of early reading interventions
 - Revised coding form to focus on less granular characteristics and align with study goals
 - Altered the coding procedures to improve internal consistency of coding
 - Preparing memo to IES on challenges and lessons learned in coding components

Potential next steps

- Continued refinement and testing of current nomenclature and coding guides, including:
 - Reconvening and broadening the advisory panel
 - Reducing granularity of codes
 - Improving coding training procedures
 - Converting the coding guide into a spreadsheet or online tool
- Using the nomenclature to identify evidence-based core components
 - Expand upon existing WWC meta-regression work
 - Code at the level of granularity that is appropriate to answer research questions
 - Design research studies to rigorously test the contribution of specific components
 - Develop analysis plans to document the degree to which components are implemented with fidelity
- Developing additional nomenclatures in other topic areas
- Dissemination and training to encourage further components work

Questions or thoughts?

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