This document provides a summary of Recommendation 7 from the WWC practice guide *Organizing Instruction and Study to Improve Student Learning*. Full reference is on the last page.

CONTENT **General**

GRADE LEVEL(S) **K-12**

LEVEL OF EVIDENCE **Strong**

Recommendation

Help students build explanations by asking and answering deep questions.

When students have acquired a basic set of knowledge about a particular topic of study and are ready to build a more complex understanding of a topic, teachers should find opportunities to ask questions and model answers to these questions in order to help students build deep explanations of key concepts. Deep explanations mean explanations that include causal mechanisms, planning, well-reasoned arguments, and logic. Examples of deep explanations include those that inquire about causes and consequences of historical events, motivations of people involved in historical events, scientific evidence for particular theories, and logical justifications for the steps of a mathematical proof. Examples of the types of questions that prompt deep explanations are *why, why-not, how, what-if, how does X compare to Y, and what is the evidence for X*? These questions and explanations can occur during classroom instruction, class discussion, and during independent study.

How to carry out the recommendation

1. Model the asking and answering of deep questions.

South Carolina standards alignment

TEACHERS: INST.Q.1, INST.Q.7, INST.PIC.3
ACADEMIC STANDARDS: ELA.K-12.I.1, M.k-12.MPS.AJ.1, SCI.K-12.S.1.1

The quality of self-explanations improves when students are exposed to high-quality explanations provided by teachers. Teachers should model the asking and answering of deep questions during read-alouds or in other opportunities to interact with text. Model the use of question stems to train students on asking these kinds of questions. These stems may include questions like: why, what caused X, how did X occur, what if, what-if-not, how does X compare to Y, what is the evidence for X, and why is X important?

2. Encourage students to "think aloud" by asking and answering deep questions.

South Carolina standards alignment

TEACHERS: INST.Q.1, INST.Q.7
ACADEMIC STANDARDS: ELA.K-12.I.1, M.k-12.MPS.AJ.1, SCI.K-12.S.1.1

Explanations can be elicited in a classroom environment when the teacher assigns a challenging text and invites a student to think aloud by asking questions about the content as they read. The think-aloud encourages the student to develop subjective explanations that go beyond the explicit material and that link the material to personal knowledge and experiences. As students find answers to their own questions, they should construct an answer for their own questions and explain how they derived that answer. Students can engage in peer feedback by responding to other students' explanations and give explanations of their own. Students can also be asked to write questions and answers and share them with other students for feedback. It is important to give a student enough time to think and prepare responses rather than quickly providing the correct answer.

3. Provide opportunities for peer feedback on explanations.

South Carolina standards alignment

TEACHERS: INST.AF.5, INST.AM.7
ACADEMIC STANDARDS: ELA.K-12.I.1, M.k-12.MPS.AJ.1, SCI.K-12.S.1.1

Students can engage in peer feedback by responding to other students' explanations and give explanations of their own. The quality of self-explanations improves when students are exposed to high-quality explanations provided by peers. These examples

give students feedback and guidance on appropriate content. Allow students to explore multiple explanations, viewpoints, and paths of reasoning.

4. Ask deep questions when teaching, and provide students with opportunities to answer deep questions.

South Carolina standards alignment

TEACHERS: INST.Q.1, INST.Q.7
ACADEMIC STANDARDS: ELA.K-12.I.1, M.k-12.MPS.AJ.1, SCI.K-12.S.1.1

After modeling the asking and answering of deep questions, teachers should take every opportunity to ask deep questions and allow students to grapple with the response. Teachers should ask questions that stimulate deep explanations, such questions about causal mechanisms, and answers that require logical thought, a well-crafted argument, and evidence to support the argument. Teachers should also ask questions that challenge students' beliefs or assumptions about the content.

Potential roadblocks and how to address them

Roadblock	Suggested Approach
Some students do not have sufficient subject knowledge to construct an explanation, ask a deep question, or answer a question. Consequently, the learning is disappointing and/or the student loses motivation to learn.	Solution. Teachers will need to determine when their students have acquired sufficient subject knowledge in order to benefit from participating in the deep question-asking and answering process. Teachers can use the quizzing techniques described in Recommendations 5 and 6 to help with ascertaining how well foundational subject knowledge has been acquired. Teachers should also provide ample opportunities for students to observe modeling of the question-asking and answering techniques described in this recommendation prior to asking students to use these techniques independently.
In response to teacher prompts, some students may generate explanations, questions, or answers that are shallow or tangential to the problem at hand.	When the student generates shallow content, the teacher or learning environment can give feedback or present examples that model the desired explanations, questions, or answers.
Some students are not motivated to invest the cognitive effort to generate deep explanations, questions, or answers.	Teachers can present problems that challenge students' beliefs. Another approach is to present problems that are anchored in the real world for which there is some obvious utility in solving the problem. For example, students in a high school chemistry course may be challenged to figure out how to reduce the calcium, chlorine, or pollutants in a water system. They would need to know why such substances are a hazard, how to measure the concentration of the chemicals, and methods for lowering the concentration. Identifying the potential hazards and solutions would motivate some students because it solves a problem in the community and/or may challenge the government, a corporation, or some authority.

For more information on the research evidence and references to support this recommendation, please refer to sources cited here:

Pashler, H., Bain, P., Bottge, B., Graesser, A., Koedinger, K., McDaniel, M., and Metcalfe, J. (2007) *Organizing Instruction and Study to Improve Student Learning* (NCER 2007-2004). Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://ncer.ed.gov.