# A Summary of Underlying Theory and Research Base for Understanding by Design

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Overview

Understanding by Design (UbD) is a framework for improving student achievement through standards-driven curriculum development, instructional design, assessment, and professional development. Developed by nationally recognized educators Grant Wiggins and Jay McTighe and produced by the Association for Supervision and Curriculum Development (ASCD), Understanding by Design is based on the following key tenets:

1. A primary goal of education is the development and deepening of student understanding.
2. Evidence of student understanding is revealed when students apply knowledge and skills within authentic contexts.
3. Effective curriculum development reflects a three-stage design process called "backward design." This process helps to avoid the twin problems of "textbook coverage" and "activity-oriented" teaching in which no clear priorities and purposes are apparent.
4. Regular reviews of curriculum and assessment designs, based on design standards, are needed for quality control, to avoid the most common design mistakes and disappointing results. A key part of a teacher's job is ongoing action research for continuous improvement. Student and school performance gains are achieved through regular reviews of results (achievement data *and* student work) followed by targeted adjustments to curriculum and instruction.
5. Teachers provide opportunities for students to explain, interpret, apply, shift perspective, empathize, and self-assess. These "six facets" provide conceptual lenses through which students reveal their understanding.
6. Teachers, schools, and districts benefit by "working smarter" – using technology and other approaches to collaboratively design, share, and critique units of study.

"Understanding by Design offers a three-stage 'backward planning' curriculum design process, a set of design standards with attendant rubrics, and a comprehensive training package to help teachers design, edit, critique, peer-review, share, and improve their lessons and assessments."

In practice, Understanding by Design offers a three-stage "backward planning" curriculum design process, a set of design standards with attendant rubrics, and a comprehensive training package to help teachers design, edit, critique, peer-review, share, and improve their lessons and assessments. Support materials include the original *Understanding by Design* book (Wiggins & McTighe, 1998), which provides an in-depth look at the Understanding by Design framework, as well as a handbook, a study guide, a three-part videotape series, and a unit builder CD-ROM. The Web site (http://www.ubdexchange.org) provides an intelligent tool for working more effectively and efficiently at the school and district levels and offers an antidote to the isolation so prevalent in the teaching profession. The site features a searchable database of curriculum designs, electronic design tools and templates, and online peer and expert review protocols. These materials provide educators with a powerful set of resources to make their work more focused, engaging, coherent, and effective.

### Research Base for Understanding by Design (UbD)

The recently enacted federal statute No Child Left Behind (NCLB) emphasizes the use of research-based programs that have been proven to help most children learn. Yet responsible educators have always investigated the underlying research base for educational programs and practices before employing them. In this regard, two key questions are appropriately asked of UbD:

- What is the research base underlying Understanding by Design?
- How do we know that Understanding by Design, when appropriately applied, will enhance student achievement?

In responding to these questions, it is important to recognize that since Understanding by Design is not a program with an articulated "scope and sequence" of skills or prescribed teaching activities, it is impossible at this time to provide direct, causal evidence of its effect on student achievement. However, the principles and practices of UbD reflect contemporary views of learning based on research in cognitive psychology and are validated by specific studies of factors influencing student achievement. A number of sources providing the underlying research base for UbD are summarized below.

### Research Findings from Cognitive Psychology

The Understanding by Design framework is guided by research from cognitive psychology. A readable synthesis of these findings is compiled in the book How People Learn: Brain, Mind, Experience, and School (Bransford, Brown, & Cocking, 2002), a recent publication of the National Research Council that summarizes the past 30 years of research in learning and cognition. The book offers new conceptions of the learning process and explains how skill and understanding in key subjects are most effectively acquired. Insights from the research are clustered into five areas: (1) memory and structure of knowledge; (2) analysis of problem solving and reasoning; (3) early foundations; (4) metacognitive processes and self-regulatory capabilities; and (5) cultural experience and community participation.

Key findings relevant to Understanding by Design include the following:

- Views on effective learning have shifted from a focus on the benefits of diligent

drill and practice to a focus on students' understanding and application of knowledge.

- Learning must be guided by generalized principles in order to be widely applicable. Knowledge learned at the level of rote memory rarely transfers; transfer most likely occurs when the learner knows and understands underlying concepts and principles that can be applied to problems in new contexts. Learning with understanding is more likely to promote transfer than simply memorizing information from a text or a lecture.

- Experts first seek to develop an understanding of problems, and this often involves thinking in terms of core concepts or big ideas. Novices' knowledge is much less likely to be organized around big ideas; novices are more likely to approach problems by searching for correct formulas and pat answers that fit their everyday intuitions.

- Research on expertise suggests that superficial coverage of many topics in the domain may be a poor way to help students develop the competencies that will prepare them for future learning and work. Curricula that emphasize breadth of knowledge may prevent effective organization of knowledge because there is not enough time to learn anything in depth. Curricula that are "a mile wide and an inch deep" run the risk of developing disconnected rather than connected knowledge.

- Feedback is fundamental to learning, but feedback opportunities are often scarce in classrooms. Students may receive grades on tests and essays, but these are summative assessments that occur at the end of projects. What is needed are formative assessments, which provide students with opportunities to revise and improve the quality of their thinking and understanding.

- Many assessments measure only propositional (factual) knowledge and never ask whether students know *when, where,* and *why* to use that knowledge. . . . Given the goal of learning with understanding, assessments and feedback must focus on understanding, and not only on memory for procedures or facts.

- Expert teachers know the structure of their disciplines and this provides them with cognitive roadmaps that guide the assignments they give students, the assessments they use to gauge student progress, and the questions they ask in the give and take of classroom life. . . . The misconception is that teaching consists only of a set of general methods, that a good teacher can teach any subject, and that content knowledge alone is sufficient. •

**What is the research base underlying Understanding by Design?**

**How do we know that Understanding by Design, when appropriately applied, will enhance student achievement ?**

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