

Putting VALUE in STEM Learning



**An Assessment Perspective from the Valid
Assessment of Learning in Undergraduate
Education Project**

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Shared Visions: AAC&U & PKAL

AAC&U Essential Learning Outcomes

- Knowledge of human culture and the physical and social worlds
- Intellectual and practical skills
- Personal and social responsibility
- Integrative learning

PKAL

- Achieving meaningful learning outcomes for STEM learning
- Applied and holistic
- Community building = “Nation of learners & nation of innovators”
- Building the kaleidoscope

Science

Technology

**Inquiry & Analysis
Critical Thinking
Civic Engagement
Teamwork
Integrative Thinking**

Engineering

Mathematics

Overview of VALUE Project



- 2 Goals
 - Create dialogue and develop shared understanding for assessment of essential learning outcomes → 15 rubrics
 - Focus on 21st century implementation format → E-portfolio
- Rubric development
 - 12 leadership campuses
 - ✦ 80 faculty experts & non-experts
 - ✦ Reviewed existing rubrics to identify commonalities, clarify language, and develop broad agreement on outcomes criteria
 - Focus on developmental approach to learning
 - ✦ Learning involves increasingly complex thinking
 - ✦ Learning is non-linear

Rubric Design



- **Definition** of outcome
- **Framing language** – conceptual description of the learning outcome
- **Glossary** of terms used in rubric
- **Criteria** for meeting learning outcome, scaled from 4 (most complex) – 1 (least complex)
 - Scale is not intended to represent class rank

Integrative Learning Rubric

(<http://www.aacu.org/value/index.cfm>)

	4	3	2	1
Connections to experience <i>Connects relevant experience & academic knowledge</i>	Demonstrates fully developed understanding of how experience outside of the formal classroom relates to field of study, moving meaningfully between academic and real-world knowledge, resulting in deeper understandings.	Demonstrates adequately developed understanding of how relevant experience outside of formal classroom relates to field of study, using examples to illuminate the connection between academic and real-world knowledge.	Demonstrates partially developed understanding of how experience outside of formal classroom could relate to field of study, attempting to connect academic and real-world knowledge.	Demonstrates minimally developed understanding of how experience outside of formal classroom relates to field of study.
Connections to discipline <i>Sees (makes) connections across disciplines, perspectives</i>	Synthesizes examples, facts, or theories from more than one field of study or perspective into a coherent whole	Attempts to use examples, facts, or theories from more than one field of study or perspective in a systematic way	Includes examples, facts, or theories from more than one field of study or perspective	Stays within confines of a particular field of study or perspective
Transfer <i>Adapts knowledge, concepts, and/or tools from one situation to another (e.g., between courses, disciplines, coursework to personal, etc.)</i>	Adapts concepts and/or tools gained in one situation to new situations (e.g., takes a tool used in one class and adapts it for use in another course)	Applies concepts and/or tools gained in one situation to new situations (e.g., uses theory gained in one class to help explain concepts explored in another class)	Utilizes concepts and/or tools gained in one situation in new situations. (e.g., relates similarities of one situation to another)	Minimally connects concepts and/or tools gained in one situation to new situations (e.g., strays very little from the given assignment)
Integrated Communication	Use sophisticated communication choices to connect what is being communicated (content) with how it is communicated (form) to meet the needs of the situation	Uses appropriate communication choices to connect what is being communicated (content) with how it is communicated (form) to meet the needs of the situation	Uses adequate communication choices to connect what is being communicated (content) with how it is communicated (form) to meet the needs of the situation	Uses communication choices in a basic way to connect what is being communicated (content) with how it is communicated (form) to meet the needs of the situation
Reflection and Self Assessment <i>Demonstrates a developing sense of self as a learner, building on prior experiences to respond to new and challenging contexts (may be evident in self-assessment, reflective, or creative work)</i>	Envisions a future self by building on experience often across multiple and diverse contexts	Evaluates changes in own learning over time, recognizing complex contextual factors (e.g., works with ambiguity and risk, deals with frustration, considers ethical frameworks)	Articulates elements of performance-including strengths and challenges-to increase effectiveness in different contexts	Describes own performances with general descriptors of success and failure

Assessing Integrative Learning



- **Clarity is Key**
 - Critical to carefully define and articulate concepts
 - Increases accessibility to multiple constituencies
 - Shared language helps foster accountability
- **Assessment as Strategy for Building Communication & Stakeholder Support**
 - Connective tissue to foster discussion across STEM disciplines
 - Connect local learning outcomes within each discipline with global outcomes that span STEM fields
- **The E-portfolio Platform**
 - Assessing learning in text & non-text bound formats
 - Helps to create feedback loop between faculty assessment of student learning and students' own assessment of learning development