Impactful Assessment Practice

Goal, Overview, and Application

Goal

At Macmillan, our goal is to drive better learner outcomes. A fundamental part of our approach is to apply findings from the Learning Sciences to product design, improvement, implementation, and support.

Overview

Here we provide an evidence-based strategy for assessment practice derived from a synthesis of the research literature. We begin by outlining the importance and benefits of addressing cognitive and noncognitive aspects of learning, then discuss the guiding principles of an effective assessment strategy, best practices in measurement, and features, capabilities of learning experience design that can enhance the assessment strategy and improve learner outcomes.

Application

The Assessment Strategy underpins how we're developing next-generation learning products. However, this strategy may also be applied by institutions, instructors, and instructional technologists to their own learning experiences.

Research Foundation and Process

Foundation

The Assessment Strategy is based upon a thorough literature review of educational, assessment and measurement and cognitive psychology research conducted by learning researchers.

Process

This strategy was developed through a rigorous and comprehensive ten-step research and refinement process that included:

- Primary and secondary literature review and synthesis by Macmillan Learning Research team
- Design of principles by Macmillan Learning Research team
- Internal review by 4 Macmillan Learning scientists
- External review by 7 students
- External review by Macmillan Learning's Learning Research Advisory Board

All of these researchers, contributors and reviewers are listed to the right.

Researchers and Contributors

Macmillan Contributors
Jeff Bergin, PhD, VP Learning Research and Design
Lisa Ferrara, PhD, Manager Learning Research
Becca Runyon, PhD, Manager Learning Research
Erin Scully, MA, Manager Learning Research

Macmillan Reviewers
Adam Black, PhD, Chief Learning Officer
Kara McWilliams, PhD, Sr. Director, Impact Research

Macmillan Learning Research Advisors
Robert Atkinson, PhD, Arizona State University
Chris Dede, EdD, Harvard
Erin Dolan, PhD, University of Georgia
Mark McDaniel, PhD, Washington University in St. Louis
Liz Thomas, PhD, Edge Hill University

Macmillan Student Advisors
Matthew Cherrey, New Jersey Institute of Science
Yasir Choudhury, University of Texas
Asja Lanier, College of Saint Elizabeth
Anthony Nguyen, CUNY Hunter College
Zaynub Siddiqui, Prince George's Community College
Ben Their, Duke University
Starshae Toomer, SUNY Broome Community College

Special Thanks
Philip Conley
Nikki Larsen
John Quick, PhD
Allison Zengilowski

Research Base: Assessment Strategy

Research shows that an evidence-based, learning-objective-driven assessment strategy addressing cognitive and noncognitive aspects of the learning experience can drive better learner engagement, motivation, self-regulation, and performance. Research also shows that active, constructive, and interactive learning activities provide opportunities for learners to be more engaged and support a deeper, more impactful learning experience.

Cognitive Skills

Well-designed formative assessment activities share and help clarify learning goals, enable ongoing monitoring of learner progress, can provide targeted feedback to learners, instructors, and other educational stakeholders, and can facilitate appropriate intervention.

Metacognitive Skills and Engagement

Learners can learn more effectively and efficiently when they actively engage in metacognitive and engagement strategies such as learning goal specification, monitoring, regulation, and reflection. Fostering intrinsic motivation and mastery goal orientation incentivises learning for learning's sake, fosters lifelong learning, and emphasizes the importance of knowledge and skill acquisition, or mastery, beyond achievement of a performance criterion.

Guiding Principles of the Assessment for Learning Strategy

Take a learning-objective-driven, integrated approach to assessment

Assessment that is integrated within a learning-objective-driven, research-based learning model is foundational to an effective learning experience as it improves transparency of learning goals to stakeholders, supports instructional alignment, and enables monitoring of learner progress, and timely, targeted intervention.

Employ sound measurement practices

Sound assessment task development and implementation practices ensure learner knowledge, skills, or attributes are accurately assessed and yield valid, reliable inferences about learners and learning at meaningful time points over the course of a learning experience.

Provide high-quality feedback

An evidence-based approach to the nature, tone, and timeliness of feedback provided to learners in both formative and summative contexts can improve motivation, affect, and metacognitive abilities, can support self-regulated learning strategies, and can improve performance by addressing gaps in understanding.

Assessment Strategy: Sound Measurement

LO alignment: relevant, meaningful KSAs

LO alignment: appropriately cognitively complex KSAs

Psychometrically sound tasks

Selected-response

Constructed-response

Performance-based

Valid and reliable inferences

Considerations

Learning objectives (LOs) should be designed and articulated to support the assessment of meaningful and appropriately complex knowledge, skills, or attributes (KSAs).

Assessment task stakes and goals should be transparent to students, conveying their value and purpose.

Assessment tasks should be designed to be appropriately psychometrically sound given the nature of inferences one wishes to make about learners/learning.

Assessing any given learning objective via multiple tasks and formats helps ensure adequate and accurate assessment by supporting breadth and depth of content coverage.

Thus it's important to 'balance' across task formats whenever appropriate based on the domain, learning experience, and its LOs.

Stronger inferences about student learning can be made when high-quality, varied, and learning-objective-aligned tasks are leveraged.

Assessment Tasks
Provide multiple assessment tasks and, whenever possible/appropriate, multiple formats per learning objective

SELECTED-RESPONSE TASKS:
Assessment tasks that require learners to select the correct response(s) from response options provided.

CONSTRUCTED-RESPONSE TASKS:
Assessment tasks that require learners to create their own response(s) or product(s) rather than select the correct response(s) from response options provided.

PERFORMANCE-BASED TASKS:
Assessment tasks that require learners to engage in an extended process of knowledge, skill, or attribute (KSA) application to create their own product(s). Performance-based assessments are typically complex tasks situated in real-life contexts (or designed to emulate real-life contexts or situations) relevant to a particular domain.

Assessment Strategy: Features and Capabilities

There are a number of features and capabilities that the learning science research suggests can enhance the effectiveness of an assessment strategy:

Reports and Dashboards	Collaboration Opportunities	Personalized and Adaptive Experiences	Student Success Elements
Reporting learning performance against learning objectives to the instructor and learner, providing holistic insights, and enabling data-driven recommendations for actions.	Instructor-to-learner and learner-to-learner social and collaborative functionality to enable interaction that supports assessment tasks.	Personalized or adaptive feedback and learning-objective-driven support based on learner performance.	Monitoring learner motivation, providing self-regulated learning strategies, self-efficacy and supports as needed.

Assessment Strategy
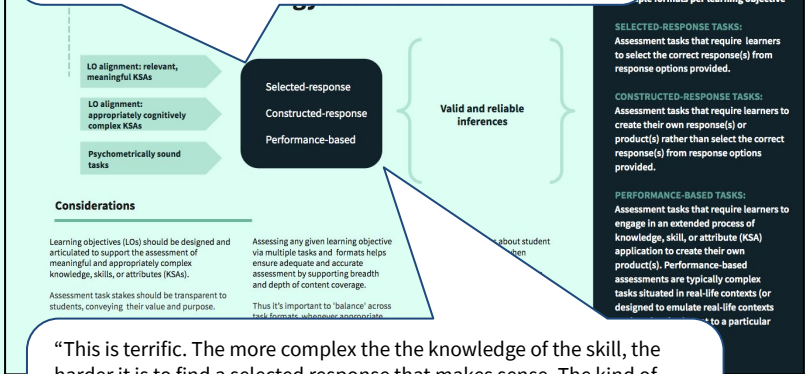
Instructor and Student Feedback

Assessment Strategy: Features and Capabilities

There are a number of features and capabilities that the learning science research suggests can enhance the effectiveness of an assessment strategy:

Reports and Dashboards	Collaboration Opportunities	Personalized and Adaptive Experiences	Student Success Elements
Reporting learning performance against learning objectives to the instructor and learner, providing holistic insights, and enabling data-driven recommendations for actions.	Instructor-to-learner and learner-to-learner social and collaborative functionality to enable interaction that supports assessment tasks.	Personalized or adaptive feedback and learning-objective-driven support based on learner performance.	Monitoring learner motivation, providing self-regulated learning strategies, self-efficacy and supports as needed.

"Providing professors with metrics/analytics about general class performance for them to address in class could be a good signal to students that the professor cares about progress. If the professor has time, he/she can meet individually with individual students who want to know more about personal progress." - Student Codesign Group Member

"Questions should be objective-driven, but also be designed to assess varying levels of students' knowledge and skill acquisition. A test that is overall too easy or hard is essentially useless when it comes to determining the objectives students actually grasped." - Student Codesign Group Member

Considerations

Learning objectives (LOs) should be designed and articulated to support the assessment of meaningful and appropriately complex knowledge, skills, or attributes (KSAs).

Assessment task stakes should be transparent to students, conveying their value and purpose.

Assessing any given learning objective via multiple tasks and formats helps ensure adequate and accurate assessment by supporting breadth and depth of content coverage.

Thus it's important to 'balance' across task formats, whenever appropriate.

LO alignment: relevant, meaningful KSAs

LO alignment: appropriately cognitively complex KSAs

Psychometrically sound tasks

Selected-response
Constructed-response
Performance-based

Valid and reliable inferences

Assessment Tasks

...multiple assessment tasks ...whenever possible/appropriate, ...multiple formats per learning objective

SELECTED-RESPONSE TASKS:
Assessment tasks that require learners to select the correct response(s) from response options provided.

CONSTRUCTED-RESPONSE TASKS:
Assessment tasks that require learners to create their own response(s) or product(s) rather than select the correct response(s) from response options provided.

PERFORMANCE-BASED TASKS:
Assessment tasks that require learners to engage in an extended process of knowledge, skill, or attribute (KSA) application to create their own product(s). Performance-based assessments are typically complex tasks situated in real-life contexts (or designed to emulate real-life contexts ... to a particular ...

"This is terrific. The more complex the the knowledge of the skill, the harder it is to find a selected response that makes sense. The kind of data that flows out of sophisticated analytics makes possible the use of more Constructed-Response & Performance-Based assessments because you have a rich enough set of evidence that you actually can interpret what the learner is doing." - Dr. Dede

References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

Bennett, R. E. (2011). Formative assessment: A critical review. *Assessment in Education: Principles, Policy, & Practice*, *18*, 5-25.

Burton, S. J., Sudweeks, R. R., Merrill, P. F., & Wood, B. (1991). How to prepare better multiple-choice items: Guidelines for university faculty. Brigham Young Testing Center and The Department of Instructional Science. Provo, UT: Brigham Young University.

Butler, A. C., Karpicke, J. D., & Roediger, H. L. (2008). Correcting a metacognitive error: Feedback increases retention of low-confidence correct responses. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *34*, 918-928.

Chase, J. A., & Houmanfar, R. (2009). The differential effects of elaborate feedback and basic feedback on student performance in a modified, personalized system of instruction course. *Journal of Behavioral Education*, *18*, 245-265.

Chi, M. T., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist*, *49*(4), 219-243.

Deci, E. L., & Ryan, R. M. (2000). The" what" and" why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. Retrieved from http://www.tandfonline.com/doi/abs/10.1207/S15327965PLI1104_01

Devi, V., Mandal, T., Kodidela, S., & Pallath, V. (2012).Integrating students' reflection-in-learning and examination performance as a method for providing educational feedback. *Journal of Postgraduate Medicine*, *58*, 270-274.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*(2), 256–273. doi:10.1037//0033-295X.95.2.256

Dweck, C. S., & Master, A. (2008). Self-Theories Motivate Self-Regulated Learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and Self-Regulated Learning: Theory, Research, and Applications* (pp. 31–51). New York, NY, USA: Routledge.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, *77*, 81-112.

Hays, M. J., Kornell, N., & Bjork, R. A. (2010). The costs and benefits of providing feedback during learning. *Psychonomic Bulletin & Review, 17*, 797-801.

Johnson, R. L., Penny, J. A., & Gordon, B. (2009). *Assessing performance: Designing, scoring, and validating performance tasks*. New York, NY: The Guilford Press.

Lee, H. W., Lim, K. Y., & Grabowski, B. L. (2010). Improving self-regulation, learning strategy use, and achievement with metacognitive feedback. *Education Tech Research Dev*, *58*, 629-648.
Lipnevich, A. A., & Smith, J. K. (2008). *Response to assessment feedback: The effects of grades, praise, and source information* (Research Report No. ETS-RR-08-30). Retrieved from: http://www.ets.org/Media/Research/pdf/RR-08-30.pdf

Lipnevich, A. A., & Smith, J. K. (2009). Effects of differential feedback on students' examination performance. *Journal of Experimental Psychology: Applied*, *15*, 319-333.

Looney, J. W. (2011). Integrating formative and summative assessment: Progress toward a seamless system?, *OECD Education Working Papers*, No. 58, OECD Publishing.

Miller, T. (2009). Formative computer-based assessment in higher education: the effectiveness of feedback in supporting student learning. *Assessment & Evaluation in Higher Education*, *34*, 181-192.

National Research Council. (2001). *Knowing What Students Know: The Science and Design of Educational Assessment*. Washington, DC: The National Academies Press. https://doi.org/10.17226/10019

Nicol, D. J., & Macfarlane-Dick, D. M. (2006). Formative assessment and self-regulated learning: a model of seven principles of good feedback practice. *Studies in Higher Education*, *31*, 199-218.

Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research*, *31*(6), 459–470. doi:10.1016/S0883-0355(99)00015-4

References

Shavelson, R. J., Young, D. B., Ayala, C. C., Brandon, P. R., Furtak, E. M., Ruiz-Primo, M. A., Tomita, M. K., & Yin, Y. (2008). On the impact of curriculum-embedded formative assessment on learning: A collaboration between curriculum and assessment developers. *Applied Measurement in Education*, *21*, 295-314.

Schunk, D. H., Meece, J. L., & Pintrich, P. R. (2014). *Motivation in Education: Theory, Research, and Applications* (4th ed.). Upper Saddle River, NJ, USA: Pearson.

Shute, V. J. (2007). *Focus on formative feedback* (Research Report No. ETS-RR-07-11). Retrieved from: http://www.ets.org/Media/Research/pdf/RR-07-11.pdf

Van der Kleij, F. M., Feskens, R. C. W., & Egen, T. J. H. (2015).Effects of feedback in a computer-based learning environment on students' learning outcomes: A meta-analysis. *Review of Educational Research*. Advance online publication. **doi:10.3102/0034654314564881**

Wiliam, D. (2006). Formative assessment: Getting the focus right. *Educational Assessment*, *11*, 283-289.

Wiliam, D. (2007). Five "key strategies" for effective formative assessment. The National Council of Teachers of Mathematics. *Assessment Research Brief*, 1-4.

Wiliam, D. (2007). What does the research say the benefits of formative assessment are? The National Council of Teachers of Mathematics. *Assessment Research Brief*, 1-3.