

Mini Workshop - Aligning Content, Assessment, and Pedagogy in the Design of Engineering Courses

Ruth A. Streveler, Karl A. Smith, and Mary K. Pilotte
 streveler@purdue.edu, ksmith@umn.edu, mpilotte@purdue.edu

Abstract - The purpose of this workshop is to introduce participants to the integration and alignment of content (or curriculum), assessment, and pedagogy (or instruction) for learning module, course, and program design and provide some essential methods for designing courses and curricula in this way. Rather than treat each of these areas separately, this workshop strives to help participants consider all three elements together in a systematic way. The workshop framing is an engineering design approach, that is to say, it begins with requirements or specifications, emphasizes metrics, and then evolves into preparation of prototypes that meet the requirements. Participants interested in developing rationale, and learning and practicing a model of how to align course content with assessment and pedagogy that they can use to inform the design or re-design of engineering courses are encouraged to attend.

Index Terms – Assessment, Curriculum alignment, Instruction, Pedagogy.

MINI-WORKSHOP OVERVIEW

Utilizing concepts described in Pellegrino’s “Rethinking and redesigning curriculum, instruction and assessment: What contemporary research and theory suggests” (2006), and embracing engineering professor Jim Duderstadt’s argument that “faculty members of the twenty-first century college or university will find it necessary to set aside their roles as teachers and instead become designers of learning experiences, processes, and environments.” (2008), this workshop will engage participants by introducing the integration and alignment of content, assessment and pedagogy for learning module, course, or program design.

MINI-WORKSHOP OUTCOMES

The desired outcomes for this workshop revolve around four primary objectives. The first objective is for workshop participants to develop and articulate an integrated design approach for content, assessment and pedagogy. Secondly, participants will be able to critically describe the research-based features of each of the design elements – content, assessment, and pedagogy. Third, participants will have an opportunity to apply the principles and theories to the design of a course, module, lesson plan, or other instructional setting. Finally, the workshop will use reflection and

dialogue as a tool of self-discovery for shaping and refining personal philosophies for the design of instruction.

MINI-WORKSHOP ACTIVITIES AND ORGANIZATION

To accomplish the desired outcomes, workshop activities will involve the following:

- Exploration of content, assessment and pedagogy – via presentation, handouts and print resources – and through reflection, writing and dialogue.
- Reflection on and discussion of the integration of content, assessment and pedagogy.
- Initiation of a preliminary curriculum design project for a class session, learning module, laboratory session, etc.

The workshop is organized into three sections:

1. Overview and Framing: The “big picture” of the workshop based on Pellegrino (2006), Wiggins and McTighe (1998), Pellegrino, Chudowsky, and Glaser (2001), and Svinicki (2004).
2. Synthesis: Demonstration of a curriculum project – designing an entrepreneurship course for engineers.
Application: Participants begin to apply the model to their own curriculum design projects.

SESSION AGENDA

Table 1 provides an outline of the workshop agenda, listing both planned activities and time allotted for each:

TABLE I

Activity	Time (min)
Introduction of session and facilitators	5
Overview and Framing	
Background Knowledge Survey	5
Integrated Course Design Model- Pellegrino (2006)	5
Introduce methods to help curr.designers integrate content, assessment and pedagogy: (a) curr. priorities, (b) concept mapping, (c) assmt. triangle, (d) assmt. wksht., (e) pedagogies of engagement	25
Example: usage of a-e in actual curriculum design project	25
In small groups, participants apply the model to their own curriculum design projects. Participant’s select aligned assessment strategy	20
Wrap Up	5

ANTICIPATED AUDIENCE

The anticipated audience for the workshop includes educators who are interested in focusing on learner-centered instead of teacher-centered instruction, and advancing the state of the art of engineering education through an integrated engineering design approach to aligning content, assessment and pedagogy. Participants interested in developing rationale and learning, and practicing a model of how to align course content with assessment and pedagogy that they can use to inform the design or re-design of engineering courses are encouraged to consider attending.

WORKSHOP RESOURCES

Workshop leaders and participants will refer to the following texts and articles throughout the event:

- Duderstadt, J. J. (2008). Engineering for a changing world: A roadmap to the future of engineering practice, research, and education. The Millennium Project, The University of Michigan. (<http://milproj.dc.umich.edu/>)
- Fink, L. D. (2003). A Self-Directed Guide to Designing Courses for Significant Learning. (Notes based on Fink, L. Dee. 2003. *Creating significant learning experiences: An integrated approach to designing college courses*. San Francisco: Jossey-Bass).
- Pellegrino, J. W. (2006). Rethinking and redesigning curriculum, instruction and assessment: What contemporary research and theory suggests. Paper commissioned by the National Center on Education and the Economy for the New Commission on the Skills of the American Workforce. <http://www.skillscommission.org/commissioned.htm>
- Pellegrino, J. W., Chudowsky, N., and Glaser, R. (editors). (2001). *Knowing what students know: The science and design of educational assessment*. Washington, DC: National Academy Press.
- Smith, K., Sheppard, S., Johnson, D., & Johnson, R. (2005). *Pedagogies of engagement: classroom-based practices (cooperative learning and problem based*

learning). *Journal of Engineering Education*, 94(1), 87-101.

- Svinicki, M. D. (2004). *Learning and motivation in the postsecondary classroom*. Bolton, MA: Anker Publishing Company.
- Wiggins, G. & McTighe, J. (1998). *Understanding by Design*. Chapter 1. "What is backward design?" Alexandria, VA: ASCD.

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- Pellegrino, J. W. (2001) Chudowsky, N., and Glaser, R., "Knowing what students know: The science and design of educational assessment."
- Streveler, R. A., Smith, K. A. (2010) "Content, Assessment and Pedagogy: An Integrated Engineering Design Approach", Syllabus for Purdue University School of Engineering Education PhD Foundation Course.
- Streveler, R. A., Smith, K. A., and Pilotte, M. (2011) "Aligning Course Content, Assessment, and Delivery: Creating a Context for Outcome-Based Education." In Outcome-Based Education and Engineering Curriculum: Evaluation, Assessment and Accreditation, 2010.
- Svinicki, M. D. (2004) "Learning and motivation in the postsecondary classroom".
- Wiggins, G. & McTighe, J. (1998). "Understanding by Design", Ch1

AUTHOR INFORMATION

Ruth A. Streveler, Purdue University, streveler@purdue.edu

Karl A. Smith, Purdue University/University of Minnesota, ksmith@umn.edu

Mary K. Pilotte, Purdue University, mpilotte@purdue.edu