Responding to Administrative Priorities

Decision Support for Instructional Design Efforts With Respect to the Evaluation of "Promising Practices"

***Capsule*:** A method for rating instructional practices along dimensions pertinent to main constituencies in the university community is discussed. An example using "promising practices" is provided.

***Summary*:** Froyd (2008) discusses eight promising instructional practices and evaluates them according to standards from the institution/faculty (implementation) and student (performance) points of view. The intention is to provide a method whose results can be used to support decisions as to which practices to implement in undergraduate STEM course and curriculum development and reform efforts. The assumption is that student-centered promising practices are usually, but may not always be, preferable to a status quo of faculty-centric practices. He acknowledges that the list is not an exhaustive one, but sufficient enough to make robust contributions to such efforts.

The practices are labeled "promising" due to their demonstrated ability to affect student performance positively and their ability to serve as positive alternatives to widespread, entrenched "traditional" practices; however, further research may be needed to ensure that outcomes remain positive and interventions can be generalized. Examples of traditional processes are briefly discussed within the context of a decision-based framework for instructional design activities. The eight *decision categories* (with a representative traditional practice parenthetically noted) are *expectations* (topically organized syllabi), *student activity organization* (faculty chosen; default is individual), *content organization* (faculty chosen set of topics based on priority criteria and organized by prerequisite chain), *feedback decision* (grades), *gathering evidence for grading* (assignments such as lab reports and homework), *in-class learning activities* (lecture), *out-of-class learning activities* (homework), and *student-faculty interactions* (initiated by students with issues/problems during predefined times) (pp. 3 – 4).

The implementation standards are based on Felder, *et al*. (2000). A practice is evaluated on the number of STEM courses to which it's relevant, the amount of additional resources needed to implement it, and the degree to which implementation requires training or otherwise requires additional adjustments from the faculty. The ratings and associated rubrics are *strong/high* (high number, feasible without additional resources, and minimum adjustments, respectively), *good* (midlevel assessments for the three items), and *fair/low* (few courses, significant additional resources, and significant adjustments, respectively).

With respect to student performance standards, the degree to which a practice is effective in engaging students and resulting in positive learning outcomes is determined through a review of published research results. Studies in which performance is evaluated through comparison are preferable to application studies, which may tend towards the anecdotal report of an intervention. The number of available studies is also considered. The ratings and associated rubrics are *strong/high* (multiple high-quality comparison studies available), *good* (some high-quality comparison studies or multiple studies with conflicting findings available), and *fair/low* (mostly application studies available) (pp. 4 – 5).

The results of the evaluation process are summarized in the following table, which is based on a discussion of the practices (pp. 5 – 14) and Table 4 (p. 15; permission for use has been given by the author).

How decision makers should use this information is not directly addressed. Rating acceptability thresholds are typically institution- and situation-dependent. In general, though, a decision to adopt practices 2 and 6 based on the "strong" rankings in both evaluative dimensions would be supported. Recalling that "*fair*" ratings with respect to student performance are influenced by the paucity of appropriate, relevant studies, decisions to implement practices rated "*strong/fair*" or "*strong/good*" could also be supported.

Additional information on specific practice- based interventions can be found in the suite of CASEE products.

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		Ranking With Respect To	
Practice	**Brief Description/Examples**	**Implementation**	**Student Performance**
1. Prepare a set of learning outcomes	Student-oriented performance expectations (e.g., SMART or Mager format)	Strong	Good
2. Organize students in small groups	Cooperative learning, peer instruction, and inquiry-based learning	Strong	Strong
3. Organize students in learning communities	Group or associate like courses (e.g., calculus and physics) together	Fair	Fair to Good
4. Scenario-based content organization	Case studies, PBL, *Chemistry in Context*, and *Physics by Inquiry*	Good to Strong	Good
5. Providing students feedback through systematic formative assessment	Classroom response systems and minute papers	Strong	Good
6. Designing in-class activities to engage students actively	Active learning strategies	Strong	Strong
7. Providing undergraduate research experiences	Supplemental (summer or intersession) v. regular/integral	Strong (supplemental) or Fair (regular)	Fair
8. Faculty-initiated student-faculty interactions	Faculty proactively connect with students through various channels	Strong	Fair

***Implications for Engineering Education*:** Instructional design activities, whether on the course or curriculum level, have a better chance of resulting in success if effective practices are included, faculty buy-in can be easily elicited, and resources are available and appropriately used. Administrators can lead by policy and example by encouraging the use of evaluative information developed with these factors in mind when making decisions. It is likely easier to champion development and reform efforts if a certain practice can be shown objectively to be both promising and effective. Such knowledge can be especially critical when calls for educational reform meet resource constraints.

References: Richard M. Felder, Donald R. Woods, James E. Stice, and Armando Rugarcia (2000). "The Future of Engineering Education II: Teaching Methods That Work." In *Chemical Engineering Education* 34(1), pp. 26 – 39.

Jeffrey E. Froyd (2008). "White Paper on Promising Practices in Undergraduate STEM Education." Commissioned paper for the Workshop on Linking Evidence and Promising Practices for Undergraduate Science, Technology, Engineering, and Mathematics (STEM) Education held June 30, 2008 in Washington, DC and sponsored by the National Academies' National Research Council Board on Science Education. [Available at http://www7.nationalacademies.org/bose/PP_Commissioned_Papers.html and accessed March 9, 2009]

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