Designing Innovative Higher Education Programs: Insights from Research and Practice

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"It could well be 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." (Duderstadt, 1999)

The theme of the keynote is captured in the Duderstadt quote. The design approach elaborated on is commonly referred to as a "backward design approach" (Wiggins and McTighe, 1998) because the starting place is student learning outcomes, which are followed by evidence of student's achievement of the outcomes, and finally focusing on planning instruction. Three guiding questions provided the framework for the keynote:

- What are we preparing students for?
- How will we know if we succeeded?
- What do we do to prepare them?

Models and resources available to assist in the design process were distributed throughout the presentation. Two key resources mentioned early on were Bransford, Vye and Bateman (2002) – Creating High Quality Learning Environments and Pellegrino (2006) – Rethinking and Redesigning Curriculum, Instruction and Assessment. Overviews of the US National Academy Press books, *How people learn* and *Knowing what students know: The science and design of educational assessment* as well as the key features of the How People Learn model – Learner Centered, Knowledge Centered, and Assessment Centered in a Learning Community – were also provided.

My response to the question, "What are we preparing students for?", was we are preparing students for an interdependent world. Numerous authors, scholars, and politicians have argued that we are in an age of interdependence (Friedman, 2006; Cohen and Prusak, 2001; Clinton, 2000; for example) and Lynn and Salzman (2006, 2007) argue that we need to prepare graduates to work for global collaborative advantage. Several lists of graduate attributes or student learning outcomes were presented, including the HKUST graduate attributes.

In response to the question, "How will we know if we succeeded?", a range of types of assessment strategies were mentioned, we probed the question about the nature of understanding, and explored a variety of taxonomies of learning outcomes, including the recently updated Bloom Taxonomy (Anderson and Krathwohl, 2001). Some strategies for managing the trade-offs between "meaningful" and "manageable" assessment as well as

research and practice insights from David and Roger Johnson's Assessing Students in Groups: Promoting Group Responsibility and Individual Accountability (Corwin, 2004) were highlighted.

Finally, we explored instructional strategies for achieving the desired learning outcomes, and I especially argued for cooperative learning and similar pedagogies of engagement. Cooperative learning is theoretically grounded (social-interdependence theory) and supported by extensive empirical evidence (Johnson, Johnson and Smith, 1998; Johnson, Johnson and Smith, 2007; Smith, Sheppard, Johnson and Johnson, 1995).

Cooperative Learning is instruction that involves people working in teams to accomplish a common goal, under conditions that involve both positive interdependence (all members must cooperate to complete the task) and individual and group accountability (each member is accountable for the complete final outcome). Five theory and research based key elements are essential to the successful implementation of cooperative learning:

- Positive Interdependence
- Individual and Group Accountability
- Face-to-Face Promotive Interaction
- Teamwork Skills
- Group Processing

The overall goal of the report to the US National Science Foundation, *Shaping the Future: New Expectations for Undergraduate Education in Science, Mathematics, Engineering and Technology*, "All students have access to supportive, excellent undergraduate education in science, mathematics, engineering, and technology, and all students learn these subjects by direct experience with the methods and processes of inquiry" was presented to provide further support for the notion of thoughtfully and carefully designing learning programs, environments and opportunities" (Rosser, Sanchez, and Meyer, 1996).

Note 1: Please see video of keynote for elaboration and illustration of these points.

Note 2: Shortly after the Symposium, Duderstadt's (2008) new position paper – *Engineering for a Changing World A Roadmap to the Future of Engineering Practice, Research, and Education* – was published.

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