American Association
of Colleges of Nursing

Reverse Engineering:
An Innovative Approach to Course Development

BACCALAUREATE EDUCATION CONFERENCE

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Our time will be marked by:

Exploring the nature of reverse engineering	Determining the relevance of a new approach to course development	Relating the new economy with societal expectations
Using tools for data collection	Linking field-based competencies with course development	Sharing and caring

Reverse Engineering

▶ Merriam-Webster states it is a transitive verb, "to disassemble and examine in detail (a product or devise) to discover the concepts involved in the manufacture usually in order to product something similar." Sometimes it is called back engineering.

How Courses Typically Get Developed

▶ Philosophy & Conceptual Definitions
▶ Program Outcomes or Objectives
▶ Curriculum, with threads, perhaps
▶ Courses are "chunked" to support the curriculum
▶ Course/learning objectives are developed
▶ Assignments and/or clinical experiences to show competencies are specified

The Top-Down Model

- Based on classic reductionism
- May dissociate with field-based needs
- May reflect strengths or limitations of faculty interests
- Has limits in the New Economy

Bottom Up

Top Down

The Benefits of Bottom Up

- **Factors out obsolescence**
- **Reduces the academic-service gap**
- **Enhances course creativity**
- **Improves "selling" the relevance of the course to student-consumers**
- **Provides check and balance about curriculum and course competencies**

Design Thinking

EMPATHIZE
DEFINE
IDEATE
PROTOTYPE
TEST

Field-Based and Course Competencies

Course Competencies

▶ **Focuses on the academic expectations**

▶ **Linked to overall curriculum design and program objectives**

▶ **May not have explicit links to practice demands**

Field-Based Competencies

▶ **Focuses on practice demands and expectations**

▶ **Forms a foundation for "fit" with curriculum design and program objectives**

▶ **May not have explicit link to academic expectations**
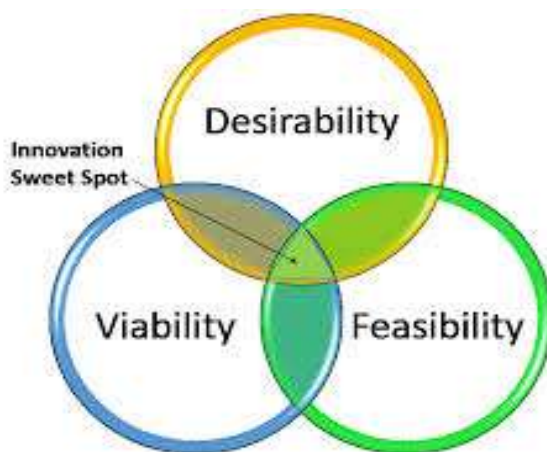
How Does This Shift the Faculty Role?

Let's Take An Example: Leadership Course

- **Program Objective: Our graduates will lead change in the transformation of healthcare**
- **Leadership Course Objectives:**
  - **The student will appropriately delegate work based on staffing availability and patient need**
  - **The student will identify conflict resolution strategies**
  - **The student will show reflective capacity as a leader**

How Does This Look From the Field?

- **The unit leader was seen coaching a staff nurse on time management skills**
- **A staff nurse was seen interacting with a family member who was upset about the lack of care coordination between shifts**
- **When rounding, a physician confronted a nurse about orders not being followed**
- **The unit leader was off the unit most of the shift, reporting that she was in a budget meeting to save FTEs for the unit**

Another Example: Critical Care

- **Program objective: Graduates will show proficiency in the use of technology**
- **Course objectives:**
  - **The student will interpret hemodynamic results**
  - **The student will relate multi-body system failure on morbidity and mortality**
  - **The student will relate pharmacologic interventions used in caring for the critically ill**

How Does This Look From the Field?

- **The staff nurse was managing a patient in sepsis with multiple IV lines, on a ventilator, while interacting with the family, the hospitalist, and a physician infection control specialist**
- **The family of this same patient just flew in from across the country and is in distress**
- **The chaplain and a social worker are interacting with the family**
- **There is a mechanical issue with the ventilator and the respiratory therapist is trying to troubleshoot the problem**
- **There was a code on the unit**

How to Approach Job Analysis

► **Collect and categorize data**
► **Determine the method for gathering data**
► **Look for sources of job information**
► **Determine the unit of analysis**
  ► **Element**
  ► **Activity**
  ► **Task (recommended)**

Step-by-Step Considerations

► **Determine the clinical setting →**
► **Determine the method for analysis, but direct observation is a must →**
► **Determine the job role to be analyzed →**
  ► **Consider individual tasks**
  ► **Consider team functions and critical interactions**
  ► **Consider environmental factors**

► **Collect data that includes:**
  ► **Direct care (actual at-the-point-of-care)**
  ► **Indirect care (activities that lead to direct care**
  ► **Unit-related activities**
  ► **Team and care coordination activities**
  ► **When possible, include the talk-aloud to capture clinical judgement**
  ► **Medical diagnoses, technologies, and concept-based areas of interest**

Data Analysis

- **The end-point vision is to narrate field-based competencies required to fulfill safe and effective care in a given setting**
- **Look for patterns and trends for high volume and high-risk areas**
- **Look for problem-prone areas that may be an outlier**
- **Create a portfolio to take back to the course design**

So What Should You Expect?

- **A very clear idea of what is relevant at the task level, team and environmental level, and care management level**
- **Ideas for starting course modules/lectures with the relevant content, linked to long-term memory retention (tell the story of what was observed)**

- **Ideas for enriched course assignments at the application level**
- **Improved communication between academic-service agencies**
- **And not least, a stronger focus on competencies!**

SUMMARY

Reverse engineering has merit in nursing education

Top-down AND Bottom-up approaches add value to course design

A data collection plan and a population-of-interest requires intentional design and at minimum, direct observation

The job role is most likely at the RN at the point-of-care but may not be limited to that role

Consider team and interactive factors that are present in the environment

BE CREATIVE in finding the sweet spot for course design that balances academic-service specifications

USE the data and stories to influence course design, assignments, and stimulate relevance to students

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