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EDITORIAL

Comparing oranges versus grapes as a metaphor of the nurse+engineer

The concept of the nurse+engineer recently has been promoted as an example of convergence research where new paradigms of problem solving emerge at the interface of two or more existing disciplines (Oerther & Glasgow, 2021). For example, in private hospitals with affluent patients, bedside collaboration might include tech-savvy engineers co-designing whiz-bang gizmos jointly with nurses who understand both the nuanced product preferences of the patient and the minimum product performance specifications demanded by a healthcare provider. These innovations might include hi-tech solutions such as a nickel-metal hydride battery-powered pressure sensor embedded in a silicone nipple on a polycarbonate feeding bottle to measure nutritive sucking of infants with data delivered via Bluetooth to a software application operating on a hand-held smart phone device with a 5G connection to a blockchain encrypted cloud server with a secondary data display embedded in the contact lens worn by a nurse (and yes, this example is intentionally elaborate).

Beyond the bedside, in economically disadvantaged communities, different types of innovation may be predominant. For example, engineers may provide instructions for building homemade porous pot clay drinking water filters while nurses educate new mothers about the importance of maternal hydration and the proper use of U-hold, C-hold or V-hold to promote successful latching. In these two examples, at the bedside and in the community, the knowledge needed to practice nursing (i.e. supporting mother-infant dyads to achieve successful breastfeeding) could be viewed as very similar in both instances. In contrast, the knowledge needed to practice the computer-electrical-mechanical engineering to create the battery-powered nipple sensor with wireless telemetry at the bedside would be significantly different from the knowledge needed to practice the chemical-civil-environmental engineering to provide an impoverished mom a disease-free drink of clean water at an affordable price. Therefore, one must inquire, 'is the concept of the nurse+engineer a legitimate expression, or does the term nurse+engineer represent the marriage of two very dissimilar disciplines?'

Fortunately, the struggle to understand disciplines, and their relationships, has been well described using the common wisdom of fruit (Nissani, 1995). For example, consider the idiomatic expression, 'comparing apples to oranges', versus the idiomatic expression, 'comparing apples to apples'. In the first case, the expression is meant to show that two items are insufficiently similar to merit a legitimate comparison, whereas in the second case, a comparison is justified. As described in Nissani's article entitled, 'Fruits, salads and smoothies: A working definition of interdisciplinarity', the relationships

among disciplines are explored in the realms of knowledge, research, education and theory (Nissani, 1995).

Knowledge identifies distinction between disciplines. For example, the nursing process of assessment, diagnosis, planning, implementation and evaluation is distinct from the process of engineering design, which includes problem definition, brainstorming, optimisation and communication.

Research creates new knowledge through the combination of the distinctive components of disciplines. For example, the intentional practice of judgement-free centring of the autonomous preferences of the patient during nursing assessment may be combined with the iron triangle of fast, good or cheap—pick two of the three—which often dominates the selection process during design optimisation by the engineer.

Education introduces students to a blending of the distinctive components of multiple disciplines through a single program of instruction (Oerther et al., 2020). Interdisciplinary education may include pre-service students of two disciplines enrolling in and simultaneously attending the same lecture-discussion course, or it may include continuing education of licensed professionals attending the same presentation at a research symposium.

Leveraging Nissani's approach using fruit to explain interdisciplinarity, we propose that nursing is exemplified using the metaphor of an orange while engineering is exemplified using the metaphor of a bunch of grapes.

Nursing is like an orange in that the variety of clinical practice within the breadth of the discipline of nursing is enclosed within a single peel (i.e. a single license obtained through a common examination). In other words, a licensed nurse is authorised to practice paediatrics, geriatrics, critical care or emergency care; a licensed nurse is authorised to move from clinic to clinic focusing on diverse diseases such as cardiovascular illness, respiratory illness or oncology; and a licensed nurse is authorised to work on a hospital ward, an outpatient rehabilitation facility, or to practice home healthcare nursing. Furthermore, nursing is like an orange in that the high degree of similarity among sub-specialisations of nursing is like the observation that each separate section within one orange shows little variation in size, shape, colour or taste from carpel to carpel (i.e. a licensed nurse is a licensed nurse, is a licensed nurse...).

In contrast to the metaphor of nursing as an orange, we propose that engineering is like a bunch of grapes. Thus, while civil engineers, mechanical engineers and aerospace engineers all are involved in the study of mechanical forces and movement, a civil engineer has a

unique approach to design a skyscraper built from concrete and steel to withstand the movement of an earthquake. A mechanical engineer has a unique approach to design an automobile built from steel and plastic to withstand the sudden shock from a head-on collision. In addition, an aerospace engineer has a unique approach to design a military helicopter built of aluminium and fibreglass to avoid a surface to air missile fired by hostile enemy forces. Each grape in a bunch may have a different size, shape, colour or flavour, but yet each grape in a bunch is still a part of the bunch. In contrast to nursing, a licensed engineer is only authorised to practice in specific areas of competency and separate subject matter examinations are offered for each of the sub-disciplines of engineering (i.e. a licensed civil engineer is not a licensed mechanical engineer, is not a licensed aerospace engineer...).

Despite the differences noted between nursing as an orange and engineering as a bunch of grapes, we note also an important truth, namely oranges and grapes both are tasty, nutritious fruit that contribute to a healthy diet. Thus, we remain optimistic that the concept of the nurse+engineer is a legitimate expression, a marriage of two similar disciplines.

For example, nurses and engineers are co-contributors to achieving the United Nations Sustainable Development Goals (UN SDGs). In particular, nursing and engineering share a common calling to care for human welfare and planetary health through the application of math, science and technology (Oerther & Glasgow, 2021). Both nurses and engineers share a professional obligation to help people to live within the sustainable bounds of planetary ecosystems while promoting the equitable distribution of resources to support health and wellness for the most vulnerable (Oerther, 2021). Nursing, for most of its existence, as well as engineering, increasingly, can be characterised as 'caring professions' where the practitioner assumes a responsibility to listen attentively to another person with non-judgemental acceptance for the purpose of providing comfort in-line with the autonomous preference of the individual, family, community or public-at-large (Oerther et al., forthcoming).

For nursing, these shared goals with engineers are well described in recent publications such as the State of the World's Nursing Report published by the United Nations World Health Organization or The Future of Nursing report published by the United States National Academy of Medicine. These goals include aspirations such as addressing both the social and the environmental determinants of health. For engineers, these shared goals with nurses are beginning to emerge in updates to various body of knowledge documents produced by sub-disciplines of engineering (Oerther et al., 2021).

When we consider the idiomatic expression, 'comparing apples to oranges', versus the idiomatic expression, 'comparing apples to apples', we speculate that the commonalities of professional practice among nursing and engineering are sufficient to overcome the particular differences in how each profession trains up and credentials its future generation of practitioners. Only time and tide will tell if oranges and grapes are worth comparing, but for now the approach we advocate is the development of robust theory of knowledge, research and education at the interface of nursing and engineering for the purpose of leaving the world a better place than we found it (Oerther & Oerther, 2021). The promise of convergence to create

new solutions to age-old problems justifies our hope in the value of the nurse+engineer.

KEYWORDS

convergence, engineering, interdisciplinary, interprofessional, metaphor, nursing

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