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Teaching Engineers That Nursing is a STEM Discipline

Daniel B. Oerther, PhD, PE, FAAN, ANEF

Department of Civil, Architectural, and Environmental Engineering, Missouri University of Science and Technology, Rolla, MO, USA

While Rita Colwell was the Director of the US National Science Foundation (1998-2004), she coined the acronym “STEM” to describe the interdependency among and centrality of science, technology, engineering, and math to discovery, economic development, and national security. Repeatedly, studies by expert panels claimed that future economic growth and military superiority will be based in knowledge transactions heavily dependent upon STEM, and therefore, growing a pipeline of future STEM workers is essential to the ascendancy of developing countries and maintaining the competitive advantage of developed countries. A hallmark of these studies is the recognition of long-standing gender-bias with an overabundance of males studying and working in STEM fields, and a clarion call to dramatically increase the number of women and historically underrepresented minorities in STEM.

Recently, STEM has been criticized for lacking innovation that comes from “creativity”. Concerted efforts are afoot to incorporate “art” into STEM to create “STEAM” with the aspiration of promoting greater innovation through “design thinking” – a solution-based approach to problem-solving based upon “building-up” rather than “breaking-down” through reductionist approaches. STEM also has been criticized for failing to yield promised economic gains as artificial intelligence increasingly replaces low-level knowledge workers. Identifying jobs within STEM that uniquely depend on the “human touch” have been coined as “STEMpathy” jobs – with a renewed promise that the economic future is bright for those who hold “STEMpathy” skills.

Although nurses clearly have both deep and broad knowledge of science and technology, the profession of nursing has been denied entry into the STEM dialogue. Perhaps this is because the inclusion of the female dominated profession of nursing would immediately upset the arguments about gender bias or the arguments calling for training more people in STEM? Or perhaps male dominated STEM policy has overlooked nursing? Whatever the historical reason for nursing’s exclusion from STEM, it is clear that nursing is the best positioned field to deliver on the promise of “STEMpathy”, and the profession of engineering has the most to gain from the inclusion of nursing as a STEM discipline.

Science drives basic discovery. Math provides the language for science. And technology represents successful applications of science to meet the needs of humanity. Engineering is the profession that bridges science and technology (ie “engineers build things”); and includes the regular use of mathematics (ie “engineers are good at math”). As the focus shifts from “building things” to “designing systems”, there is an ever-increasing necessity to include “people” as part of the “system”. Just as technology represents successful applications of science, it can be argued that “healthcare” also represents successful applications of science to meet the needs of humanity. And similar to the bridging role of engineers, it can be argued that nursing is

the profession that bridges science and healthcare (ie “nurses explain”); and includes the regular use of empathy (ie “nurses care”).

The parallel roles (ie “bridging”) and similar professional struggles (ie “severe gender bias” and “gender profiling”) create an unexplored kinship among the professions of nursing and engineering. Exploring this relationship – and the mutual benefits to nurses and engineers from catalyzing interprofessional collaboration is a long-standing goal of the author. Healthcare practice and policy stand to gain from the systematic connection of the professions of nursing and engineering with the long-term goals of promoting wellness and reducing illness to the better health of all, local to global.

Title:

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Keywords:

STEAM, STEMpathy and engineering

References:

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Abstract Summary:

As STEM morphs into “STEMpathy” (adding empathy), the profession of engineering will benefit most from the recognition of the profession of nursing as a STEM discipline because the holistic, patient-centered approach to caring embedded within nursing offers the best evolution of people-centered engineering design.

Content Outline:

1) What is STEM and how is it changing?

1. The origin of Science, Technology, Engineering, and Math (ie from SMET to STEM at the US National Science Foundation)

2. From STEM to STEAM through the addition of “art”

3. From STEM to “STEMpathy” as defined by Thomas Friedman

2) Nursing’s uncomfortable relationship with STEM

1. Attracting more women to STEM (ie US National Academy of Engineering “Changing the Conversation” campaign)

2. The threat of STEMM through the addition of “medicine” (ie Dr. Jill Biden, Second Lady of the US and the work of UNESCO)

3. The number of nursing professionals – the world’s single largest healthcare profession – dwarfs the number of STEM professionals

3) People-centered engineering

1. from lower case “d”esign to uppercase “D”esign (ie D-school, E-school, and B-school competition)

2. the emergence of STI – science, technology, and innovation

3. the future of STIP – science, technology, innovation, and partnerships (ie UN SDG 17 and the role of “Finance for Development”)

4) The future is closer than we think

1. Artificial intelligence, advanced manufacturing, and the global rise in unemployment from “machine-sourcing”

2. Obvious benefits from the collaboration of the professions of engineering and nursing

First Primary Presenting Author

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Daniel B. Oerther, PhD, PE, FAAN, ANEF

Missouri University of Science and Technology

Department of Civil, Architectural, and Environmental Engineering

Professor

Rolla MO

USA

Author Summary: Professor Dan Oerther (pronounced O’thur) is an award-winning professor of environmental health engineering at the Missouri University of Science and

Technology. For his support of nursing – as a non-nurse – in 2011, Dan was inducted as a lifetime honorary member of Sigma. In 2016, Dan was inducted as an honorary Fellow of the American Academy of Nursing and in 2018 as an honorary Fellow of the Academy of Nursing Education.