Academic-Practice Partnership Builds Innovation and Creative Capacity Following a Human-Centered Design Workshop

Jeana M. Holt, PhD, DNP, MSN, RN, FNP-BC

AkkeNeel Talsma, PhD, RN, FAAN

Jan Irene C. Lloren, MPH, RN

Ilya Avdeev, PhD

Colleen Lawlor Eckert, DNP, MPH, RN

Qiyan Mu, PhD, RN

Florine Ndakuya-Fitzgerald, PhD, RN, NPD-BC

Joann Jastrab, JD

Article

Abstract

Innovation is the capacity of organizational teams to adapt to environmental changes, generate new value, and integrate it into the system. Human-centered design (HCD) centers on empathy and how people interact with the environment, which helps clinicians understand a problem from the user perspective. Nurses do not usually learn about innovation and HCD skills during their education. A recent solution to remedy this was collaboration between a healthcare system and a university innovation center to facilitate training through an academic-practice partnership. A Midwestern Veterans Health Administration (VHA) partnered with an R1 research university school of nursing and innovation center to co-create an 8-hour HCD workshop. This article reports findings from our mixed method, pre-post design study that evaluated creative self-efficacy, psychological empowerment, and traits of design thinkers of the participants (n = 31). Paired t-tests and linear mixed-effects models indicated statistically significant gains post-intervention at the construct level. Qualitative themes emerging from participant narrative reflections aligned with the constructs and sub-constructs in the instruments and added urgency to apply learnings to their work context. Participant reflections often identified a new sense of creative confidence, HCD skill proficiency, and enthusiasm to share their learnings with colleagues. Nurses creatively solve problems in their daily work; however, most do not learn how to apply HCD methodologies to seek a solution. Academic-practice partnerships can maximize the strengths of strong innovation ecosystems at the university and organizational levels, creating multiple courses of support, resources, and perspectives.

Key Words: Academic practice partnership, self-efficacy, creativity, organizational innovation, human-centered design, nursing innovation, United States Department of Veterans Affairs, nursing education, workshop, psychological empowerment, design thinking

Innovation is the capacity of organizational teams to adapt to environmental changes, generate new value, and integrate changes into the system (Schumpeter, 2000; Zuber & Weberg, 2020). In healthcare settings, innovation requires creative thinking and problem-solving to tackle daily and transformational challenges (Zuber & Moody, 2018). Frontline nurses often apply innovative thinking and creative problem-solving as they provide patient care. While nurses create innovative solutions to problems daily, most do not learn the methodologies required to take an issue needing innovative thinking from the problem to the solution space (Bravo, 2023; Isangula et al., 2023). Furthermore, nurses often lack time in their compressed patient care schedule to commit to system redesign (McCord et al., 2022).

These challenges translate to direct care nurses working around the healthcare system to achieve patient care goals instead of redesigning the system to work more effectively and efficiently (Bianchi & Ghirotto, 2022; McCord et al., 2022; Tucker et al., 2020). Preliminary research

> Frontline nurses often apply innovative thinking and creative problem-solving as they provide

results have indicated that, once nurses learn these skills, they are empowered to change inefficiencies, products, and technologies (Kagan et al., 2021). Such innovation skills are not typically taught in a classroom setting. Little is known about the interest and capability of direct care nurses in developing and using innovation skills. This article reports the findings of the study that explored the impact of a training session on practicing nurses' creative self-efficacy (Tierney & Farmer, 2011), psychological empowerment (Menon, 2001), and traits of design thinkers (Blizzard et al., 2015; Coleman et al., 2020).

These challenges translate to direct care nurses working around the healthcare system to achieve patient care goals...

Review of Literature

Human-Centered Design

Human-centered design (HCD) centers on human beings and their interactions with the environment in product and system (re)design (van der Bijl-Brouwer & Dorst, 2017). HCD is based on empathy, and in a healthcare setting, helps the clinician understand a problem from the users' perspective, e.g., Veterans, patients, families, or nurses (Altman et al., 2018; MacFadyen, 2014; Roberts et al., 2016; Rowe, 1991). From the user point of view, clinicians brainstorm various creative strategies or innovative solutions to address the problem. Then, they test these with users.

HCD focuses on understanding fundamental causes of the problem from the user perspective and iteratively tests and validates the solution through rigorous prototyping that engages the users. The cyclical process creates user-driven solutions that can innovate workflows, products, and technologies (Rahemi et al., 2018). The goal of the HCD process is to foster the creation of unexplored solutions. HCD and similar methodologies of user-centered design and design thinking continue to evolve (Altman et al., 2018; Blizzard et al., 2015; Brown & Watt, 2010; Meinel et al., 2010; Rowe, 1991). We broadly define them as "HCD" in this article.

The *Future of Nursing 2020-2030: Charting a Path to Achieve Health Equity Report* (National Academies, 2021) recognizes HCD curricula as a requisite for competency-based nursing education. In addition, the American Association of Colleges of Nursing (AACN) Competencies include competencies specifically related to innovation-related skills. However, HCD and related methodologies are rarely taught in nursing programs (Bravo, 2023). Therefore, limited research indicates the outcomes of HCD training with nursing students or practicing nurses. The authors' previous research has indicated that after participating in HCD experiential learning activities, graduate nursing students reported increased creative capacity, feeling empowered to change healthcare inefficiencies, and possessing design thinking skills (Holt et al., 2022).

The goal of the HCD process is to foster the creation of unexplored solutions.

Academic-Practice Partnerships

One solution for the missing HCD curricula in nursing and healthcare education is collaboration between healthcare systems and university innovation centers to facilitate training through academic-practice partnerships. We purposely built our academic-practice partnership by establishing common goals, mutual respect, and shared knowledge in the context of innovation and HCD (AACN, 2012). Each organization offered the ability to strengthen ideas and innovation through new perspectives and the power of connection.

Each organization offered the ability to strengthen ideas and innovation through new perspectives and the power of connection.

Innovation in isolation, disconnected from outside influences, such as the academic or practice setting, may lead to ineffective solutions. Innovation requires a team (Drach-Zahavy & Somech, 2001; Johnsson, 2017). The mere act of innovation within one setting, with no external touchpoints, potentially misses essential opportunities for valuable connections that co-join ideas or key thoughts to action. Examining innovation using strengths and resources across settings enables innovators to see their ideas from many perspectives. It can open channels of input that may significantly influence design, manufacturing, and dissemination (Thayer et al., 2018).

In this study, an academic institution and a federal healthcare system partnered to deliver HCD training to practicing clinicians and administrators. The partnership offered fluid pathways to expand perspectives and strengthen the understanding of organizational data, information, and knowledge. Consequently, the academic-practice partnership garnered new ideas, innovations, and designs, and motivation to transform patient care. Outcomes from this academic-practice partnership contribute to understanding opportunities for innovation and HCD in nursing and healthcare.

VA Innovation Ecosystem

The Veterans Health Administration (VHA) is the largest integrated healthcare system in the United States, employing over 119,000 nursing staff in 2023 (Office of Nursing Services, 2024). The 2022-2023 VHA Nursing Workforce Strategic Plan highlights the importance of innovation, research, and evidence-based practice in supporting nursing advancement and healthcare

Examining innovation using strengths and resources across settings enables innovators to see their ideas from many perspectives.

transformation to help VHA nursing serve the nation's Veterans (Office of Nursing Services, 2024). Recognizing the collective power of innovation champions across VHA and academia, VHA must leverage partnerships with academia to develop training and curricula to support VHA nurses' knowledge and skills in innovation and creative problem-solving.

VHA Innovation Ecosystem (VHA IE) drives the discovery and dissemination of mission-focused healthcare innovations that surpass expectations, restore hope, and build trust within the Veteran Community. VHA IE harnesses the collective power of innovation champions across the VA, academia, non-profits, and industry to implement innovation within the nation's largest integrated healthcare system (Vega & Kizer, 2020; Veterans Affairs, n.d.). Innovation is essential, given that VHA is the largest integrated healthcare system in the United States. With over 9 million Veterans eligible for healthcare, the VHA strives to deliver the best care anywhere, utilizing its 370,000+ employees.

Using HCD models, VHA employees take calculated and responsible risks, methodically test assumptions, learn from challenges, and reinvent care models. Previous examples include the first clinically successful implantable cardiac pacemaker and 3D bioprinting. The VA has led the charge to create novel approaches to complex healthcare problems (Veterans Affairs Office of Healthcare Innovation and Learning, n.d.).

Study Aims

Leveraging the strength of the academic and practice partnership, a mid-western VHA healthcare system partnered with an R1 research university school of nursing and innovation center to co-create an HCD workshop and study its outcomes. Our study aims were:

- To evaluate if, in a sample of VHA clinicians and administrators, creative self-efficacy (Tierney & Farmer, 2011), psychological empowerment (Menon, 2001), and traits of design thinkers (Blizzard et al., 2015; Coleman et al., 2020) increased after participating in the 8-hour in-person HCD workshop;

- To understand clinicians and administrators' HCD post-intervention reflections.

Creative self-efficacy measured participant belief that one can create imaginative outcomes (Tierney & Farmer, 2002). Psychological empowerment was measured by evaluating the participants' sense of perceived control, perceived competence, and goal internalization (Menon, 2001). Finally, traits of design thinkers (TDT) measured the participants' affinity towards collaboration, experimentalism, optimism, feedback-seeking, and integrative thinking skills, enabling them to tackle complex, open-ended, and ill-defined real-world problems (Blizzard et al., 2015; Coleman et al., 2020). The university IRB deemed this study as exempt.

Methods

Design, Sample, and Setting

Design. The mixed-method study used a convergent parallel approach (Schoonenboom & Johnson, 2017). Specifically, we used a deductive-simultaneous design, with the quantitative survey as the core component and qualitative post-intervention reflections as the supplemental component (Schoonenboom & Johnson, 2017). The quantitative and qualitative data were analyzed independently and then brought together to explore their convergence and divergence. The convergent parallel approach expands the understanding of the workshop outcomes to multiple paradigms.

Sample and Setting. The study occurred at the innovation center at the largest urban research-intensive R1 university located in the midwestern state. The innovation center provides flexible spaces for students, entrepreneurs, advisers, and the broader community. The 24,000-square-foot facility offers co-working and collaboration spaces to share ideas in a collaborative environment, a flexible instruction classroom that accommodates experiential and engaged learning, innovation labs and "maker" spaces to experiment and prototype products and software, as well as touchdown and launch spaces to work on building new ventures.

Guiding Models

The study was informed by the Inquiry, Improvement, and Innovation (I^3) Model for Advancing Quality Patient-Centered Care developed by Hagle and colleagues (2020). They created the model to recognize and describe how nurses and clinicians improve patient care, quality of care, and patient outcomes. The I^3 model depicts the interconnected and unique steps of healthcare research and evidence-based practice (inquiry), quality improvement, and innovation. It provides steps and decision points based on a clinical issue or problem question. For example, the innovation 'arm' asks, *Is there a new way?;* the inquiry 'arm' asks, *Why are we doing it this way?;* and the improvement arm asks, *How safe are patients? How satisfied are patients? Is there a better way?* (Hagle et al., 2020).

In addition, we used the 5e Instructional Model (i.e., engagement, exploration, explanation, elaboration, evaluation) as the guiding pedagogy for the HCD intervention format (Bybee et al., 2006). The 5e's are an iterative series of methods to organize educational content, where experiential learning (i.e., exploration) occurs before concepts are labeled and defined (i.e., explanation). Exploration provides participants a shared experience to base new knowledge, processes, and skills. Experiential learning activities help participants link prior knowledge to generate new ideas, brainstorm questions, and identify potential problems and solutions (Bybee et al., 2006).

Measurement

We administered an online pre-test survey before and post-test survey after the 8-hour workshop. Participants created a unique code to keep survey responses anonymous, allowing us to pair the pre-and post-test responses at the participant level.

The pre-and post-test surveys included demographic questions, and the three outcome measures: creative self-efficacy (CSE), psychological empowerment (PE), and traits of design thinkers (TDT). CSE is "the belief that one can produce creative outcomes" (Tierney & Farmer, 2002, p. 1138). It has three items measured on a scale ranging from 1 (strongly disagree) to 5 (strongly agree) with good reliability ranging from α = 0.83-0.87.

PE is "a cognitive state characterized by a sense of perceived control, competence, and goal internalization" (Menon, 2001, p.161). It has nine items, three items per sub-scale measured on a 6-point Likert Scale ranging from 1 (strongly disagree) to 6 (strongly agree). PE has a high internal consistency, with Cronbach's alpha values ranging from 0.80 to 0.90 for the overall scale and its subscales, α = subscales: perceived control (.86), perceived competence (.78), and goal internalization (.86).

TDT are "abilities to handle complex, open-ended, and ill-defined real-world problems" (Coleman et al., 2020, p. 3). It has 10 items, two items for sub-scale measured using a 5-point Likert Scale ranging from 0 (strongly disagree) to 4 (strongly agree). The authors report good internal consistency, with Cronbach's alpha values ranging from 0.70 to 0.90 across different dimensions of design thinking traits, i.e., feedback seeking, integrative thinking, optimism, experimentalism, and collaboration) (Coleman et al., 2020). Table 1 includes the outcome measures and items.

Table 1. Measures, Scale, and Reliability

Creative Self-efficacy (Tierney & Farmer, 2002)
Cronbach's Alpha 0.83-0.87; 7-point Likert Scale 1, very strongly disagree to 7, very strongly agree

Item	Scale	Sub-scale	Item
1	Creative self-efficacy		I have confidence in my ability to solve problems creatively.
2	Creative self-efficacy		I have a knack for further developing the ideas of others.
3	Creative self-efficacy		I feel that I am good at generating novel ideas.

Psychological Empowerment (Menon, 2001)
Cronbach alpha reliabilities of the subscales: perceived control (.86), perceived competence (.78), and goal internalization (.86); 6-point Likert Scale (1 strongly disagree, to 6 strongly agree)

Item	Scale	Sub-scale	Item
1	Empowerment	Goal Internalization	I am inspired by what we are trying to achieve as an organization.
2	Empowerment	Goal Internalization	I am inspired by the goals of the organization.
3	Empowerment	Goal Internalization	I am enthusiastic about working toward the organization's objectives.
4	Empowerment	Perceived Control	I can influence the way work is done in my department.
5	Empowerment	Perceived Control	I can influence decisions taken in my department.
6	Empowerment	Perceived Control	I have the authority to make decisions at work.
7	Empowerment	Perceived Competence	I have the capabilities required to do my job well.

| 8 | Empowerment | Perceived Competence | I have the skills and abilities to do my job |
| 9 | Empowerment | Perceived Competence | I have the competence to work effectively. |

Traits of Design Thinkers (Coleman et al., 2020)
Cronbach's alpha of 0.76; 5-point Likert Scale (0-Strongly disagree" to "4-Strongly agree)

Item	Scale	Sub-scale	Item
1	Design Thinking Traits	Feedback Seeking	I understand the value of seeking feedback while my work is in progress.
2	Design Thinking Traits	Feedback Seeking	I think seeking input from the user is an important part of the design process.
3	Design Thinking Traits	Integrative Thinking	I think about how solutions can be integrated into a larger context.
4	Design Thinking Traits	Integrative Thinking	I like to narrow my focus when deriving solutions.
5	Design Thinking Traits	Optimism	I view challenges as opportunities, not as threats.
6	Design Thinking Traits	Optimism	My attitude worsens when a problem is challenging to solve.
7	Design Thinking Traits	Experimentalism	I ask questions when searching for new approaches to problem-solving.
8	Design Thinking Traits	Experimentalism	Generating ideas is an important part of the design process.
9	Design Thinking Traits	Collaboration	I value the perspectives of my teammates when working in a group.
10	Design Thinking Traits	Collaboration	I find collaborative work is a waste of time.

Notes.
Coleman, E., Shealy, T., Grohs, J., & Godwin, A. (2020). Design thinking among first-year and senior engineering students: A cross-sectional, national study measuring perceived ability. Journal of Engineering Education, 109(1), 72–87.
Menon, S. (2001). Employee empowerment: An integrative psychological approach. Applied Psychology, 50(1), 153–180.
Tierney, P., & Farmer, S. M. (2002). Creative Self-Efficacy: Its Potential Antecedents and Relationship to Creative Performance. Academy of Management Journal. Academy of Management, 45(6), 1137–1148.

Open-Ended Reflection Survey

The research team developed a five-item reflection survey to understand potential change in participant perceptions, feedback about the workshop, and future application of the workshop concepts. Participants completed the reflection survey after the CSE, PE, TDT, and demographic items in the post-test survey. The reflection survey instructed participants to complete the following sentences: Based on your design experience in this workshop, *I used to think...Now I think.* Reflecting on your design experience in this workshop *I liked...,* Reflecting on your design experience in this workshop *I wish...,* Reflecting on your design experience in this workshop *I wonder... and* Reflecting on your design experience in this workshop what actions may you take after the workshop: *"I plan to apply..."*

Recruitment Procedures

The research team at the academic institution collaborated with the team from a midwestern VHA healthcare system for recruitment. The healthcare system has approximately 1200 nurses. The VHA team included the medical center's innovation specialist; the Associate Chief Nurse for the Nursing Education, Research, And Simulation Division; and the medical center's two nurse scientists. Approval was sought from the healthcare system's associate director for patient care services (ADPCS)/nurse executive team. After endorsement, leaders of clinical areas reporting to the ADPCS (including Nursing, Rehabilitation Therapies, Food and Nutrition Services, and Sterile Processing Services) were invited to recommend candidates for the professional development opportunity to expose clinicians to innovation and HCD methods. Leaders provided 40 VHA clinicians and administrators who were supported to attend the training as a professional development day.

The Associate Chief Nurse from the Nursing Education, Research, and Simulation Division contacted the clinical division and program managers to explain the training objectives. The VA Innovation Specialist emailed nurse managers, inviting them to consider who on their team would be good candidates for participating in a professional development opportunity to expose clinicians to innovation and HCD methods. The email included four participant learning objectives, as follows.

After attending the Human-Centered Design Workshop, participants will be able to:

- Describe the principles of Human-Centered Design in healthcare.

- Identify areas in healthcare that need innovations to support and strengthen clinician, patient, and family health outcomes.

- Apply the principles of Human-Centered Design to develop and test solutions to healthcare problems.

- Understand the focus on the user experience and the steps of the Lean Start-Up process in developing an innovation.

The nurse managers provided the VA Innovation Specialist with the names of clinicians and administrators. On the day of the workshop, after arriving at the university innovation center, the principal investigator (PI) approached participants about the optional research study to assess and compare participant experiences before and after participating in an HCD workshop. Recruitment included information about the pre-and post-surveys, including the approximate time for completion, i.e., 10 to 15 minutes, and questions about their creative confidence, design thinking capacity, and feelings of empowerment. The PI informed participants that survey answers were anonymous and voluntary, and their employment or performance would not be affected by their choice to participate.

Workshop Pre-Work

One month before the workshop, the VA Innovation Specialist emailed a brief questionnaire and pre-work to the 40 selected VHA clinicians and administrators. The questionnaire assisted facilitators to understand participant level of knowledge about HCD before the workshop. The pre-work provided a shared level of baseline knowledge of the workshop concepts. Questionnaire items included:

- Are you familiar with any of the principles of Human-Centered Design (HCD), such as empathize, define, ideate, prototype, & test? If so, please identify which principles and enter them into the box below.

- Have you ever used Human-Centered Design (HCD) principles (empathize, define, ideate, prototype, etc.) to develop and test solutions to healthcare problems? (Yes/No)

- When you have a difficult healthcare problem to solve, do you focus on the user experience and then use this information before developing an innovation? (Yes/No)

- Who do you go to when you identify innovative ways to support and strengthen clinician, patient, and family health outcomes? Please enter your response in the box below.

Most participants were not familiar with HCD principles...

Most participants were not familiar with HCD principles (79.4%) and had never used HCD principles to develop and test solutions to healthcare problems (82.4%). However, 94.1% indicated they focused on the user experience and used that information to develop an innovation. They identified their direct or divisional organizational leader, e.g., nurse or program manager or peers as colleagues they approached for support when they identified innovative ways to support and strengthen clinician, patient, and family health outcomes. The pre-work included watching a TEDx Talk by Doug Dietz, titled "Transforming Healthcare for Children and Their Families" (2012), and reading the I-3 Model article by Hagle and colleagues (2020).

Innovation and Human-Centered Design Intervention

Before the workshop began, participants completed the pre-survey. The workshop started with introductions and welcomes from the university and VHA leadership, including the university Chief Innovation and Partnership, Interim Director of the Innovation Center, and Dean of the College of Health Sciences and Professions. The Director of the VHA healthcare system also welcomed participants. The workshop proceeded as follows:

- Part 1 was a Taste of HCD. Participants completed a rapid design thinking challenge to reimagine a travel experience with a partner.

- Part 2 was Design Thinking Drills. This set the stage for participants to notice problems and rapidly brainstorm solutions.

- Part 3 was a working lunch. The VHA nurse executive team invited participants to share any barriers observed in daily work that may need an innovative solution. Afterward, a VHA nurse shared an innovation journey, from experiencing a problem as a patient to finding a solution as an inventor.

- Part 4 was Innovation in Action. The facilitators shared healthcare innovations they had led and described how to interview stakeholders to test a hypothesis.

- Part 5 was Working Groups. Facilitators led small and large group debriefings of the day and action steps going forward. Finally, the participants completed the reflection survey after the CSE, PE, TDT, and demographic items in the post-test survey.

Analysis Methods

Quantitative Data

Pre-and post-test responses were paired using the unique identifier generated by the participant. Where unique identifiers did not match or no unique identifier was entered (n = 6 records), demographic information was manually compared to reconcile the records. The analytic sample comprised 31 reconciled records. Descriptive statistics were calculated and compared to find differences between pre-and post-test demographic responses.

Linear mixed-effects regression was also explored for the mean change in each outcome measure construct in pre- and post-test responses, with the unique identifier as the random effect. A few linear mixed-effect models were assessed using these different fixed effects: (a) the survey variable alone, (b) the survey variable with question items, and (c) a fixed effects model of questions nested in each survey. The model with the smallest Akaike's 'An Information Criterion' (AIC) was used to choose the preferred model. This generally was model (b). The R programming language (version 4.4.1) was used for data management and all analyses (R Core Team, 2023). The supporting R packages used were: dplyr (version 1.1.4), magrittr (2.0.3), nlme (3.1-164), ggplot2 (3.5.1), and ggpp (0.5.7). Statistical tests were considered significant at the Bonferroni-corrected α level ≤ 0.0045.

Qualitative Data

To address study aim 2, to understand clinician and administrator HCD post-intervention reflections, we included five reflection questions in the post-test survey. We used a four-phased process of inductive thematic analysis outlined by Vaismoradi and colleagues (2016). The four phases included: (1) initialization - reading reflections, coding and noting the level of abstractions, and writing notes; (2) construction - organizing codes and comparing their similarities and differences; (3) rectification - relating themes to existing knowledge and coming to consensus among team members; and (4) finalization - aligning the themes to develop a storyline of the results (Vaismoradi et al., 2016).

Results

Quantitative Findings

Most participants (72.4%) were between the ages of 25 and 34, White (83.9%), non-Hispanic (96.8%), and female (77.4%). Most (77.4%) had completed a Bachelor of Science degree in Nursing, and 16.1% had earned a Master of Science in Nursing. About half (48.4%) of participants were first-generation students. Mean years worked was 3.46 (SD = 3.14). Table 2 presents additional participant characteristics.

Table 2. *Descriptive Characteristics of Participants*

		N=31	
		n	%
Age			
	25 to 34 years old	23	74.2
	35 to 44 years old	7	22.6
	55 to 64 years old	1	3.2
Race			
	Asian	2	6.5
	Asian, White	1	3.2

	Black or African American	2	6.5
	White	26	83.9
Ethnicity			
Hispanic/Latin/Spanish = Yes		1	3.2
Gender			
	Female	24	77.4
	Male	6	19.4
	Prefer not to say	1	3.2
Bachelor's degree = Yes		27	87.1
Bachelor of Science in Nursing = Yes		24	77.4
Master's degree = Yes		6	19.4
Master's in Nursing = Yes		5	16.1
Board Certification			
	None	14	45.2
	Adult-Gerontology Clinical Nurse Specialist	2	6.5
	Critical Care Registered Nurse	1	3.2
	Certified Emergency Nurse	2	6.5
	Certified Medical/Surgical Nurse	3	9.7
	Clinical Nurse Leader	3	9.7
	Certified Perioperative Nurse	1	3.2
	Registered Nurse-Certified	3	9.7
	Registered Nurse Certified in Inpatient Obstetric Nursing	1	3.2
	Progressive Care Certified Nurse	1	3.2

Note. Some participants reported multiple academic degrees and professional certifications. Therefore, there are more than 31 responses in those categories.

There were statistically significant increases in post-test responses at the construct level, i.e., Creative Self-efficacy, Psychological Empowerment, and Traits of Design Thinkers ($p<0.001$). The linear mixed effects regression model had the following estimates for the constructs: Creative self-efficacy (Q4-Q6), 0.763 (95% CI: 0.540, 0.988); Psychological empowerment (Q7-Q15), 0.303 (95% CI: 0.203, 0.402); Traits of design thinkers (Q16-Q25), 0.177 (95% CI: 0.068, 0.286). The

Psychological Empowerment sub-constructs and the Traits of Design Thinker sub-constructs of Feedback Seeking and Experimentalism were statistically significant increases in post-test responses. (See Table 3 and the plots in the supplemental material).

Table 3. *Mean Change (post-pre-test) per Construct and Sub-construct*

				Linear mixed effects model	
	Est.	Lower 95% CI	Upper 95% CI		*p*-value
Creative self-efficacy	0.763	0.539	0.988		<0.001
Psychological empowerment	0.303	0.203	0.402		<0.001*
1. Goal Internalization	0.215	0.089	0.341		0.001
2. Perceived Control	0.409	0.240	0.577		<0.001
3. Perceived Competence	0.286	0.143	0.429		<0.001
Traits of Design Thinkers	0.177	0.068	0.286		0.002*
1. Feedback Seeking	0.226	0.075	0.377		0.004
2. Integrative Thinking	0.024	-0.116	0.164		0.732*
3. Optimism	0.161	-0.229	0.426		0.229*
4. Experimentalism	0.351	0.206	0.497		<0.001
5. Collaboration	0.135	-0.151	0.421		0.352*

* Model: The linear mixed effects model has as fixed effects the survey and the question items, while the random effect is the unique identifier. The simpler model (no *) does not account for the question items. When tested with the question items, these did not contribute to the model.

Supplemental Material PLOTS

Qualitative Findings

Regarding results for Aim 2, most of the emerging themes from participant post-intervention reflections aligned with the constructs and sub-constructs in the instruments. This added urgency to apply learnings to their work context. Reflection narratives often identified a new sense of creative confidence, HCD skill proficiency, and enthusiasm to share their learnings with colleagues. In the summary below and in Table 4, we report these themes by respective prompts.

- Themes from the "*I Used to Think, Now I Think...*" prompt included the value of their newly gained HCD skills and ability to apply the concepts to the work environment with collaborators. They shared a new awareness of leadership support and resources at the VA and the confidence to use HCD skills to create change.

- Themes from the "*I Liked...*" prompt included examples of how the experiential learning format facilitated knowledge acquisition, with many participants naming the brainstorming exercises as particularly valuable. Several participants stated that the stories the facilitators shared of HCD projects resonated with them, as did the demonstration of leadership support.

- Results from the "*I Wish...*" prompt revealed the desire for continued HCD workshops with a shift to solving identified problems. Participants also desired an action plan for the next steps and wanted more team members to receive the HCD training. Several participants wished for more time to apply and further develop their HCD skills.

- Responses to the "*I Wonder...*" prompt included themes of galvanizing interest among colleagues who were not at the training and extending the learnings to their team members.

- Replies to the "*I Plan to Apply…*" prompt included examples of using their HCD skills directly in their team meetings, quality improvement projects, performance improvement projects, unit shared governance, and change management. They also reflected on how they will use the skills to inspire their team to collaborate to develop ideas and solve problems.

Table 4. *Qualitative Themes and Representative Reflection Examples by Prompt*

Reflection prompt	Theme	Representative examples
I used to think… Now I think…		
	Creative confidence	I used to think my ideas for change and innovation had no potential for attainment. Now I know they can.
		I used to think I did not have unique ideas, but now I think I am capable of innovation initiatives.
	Value HCD Concepts	I used to think human-centered design was too complicated for everyday clinical settings, but now I think it can be done with many small wins.
		I used to think most problems had an obvious solution, but now I think there should be many ideas for developing a solution.
	Importance of Collaboration	I used to think brainstorming was fine as a solo operation, but I now see the value of rapid fire and group participation in generating limitless ideas.
		I used to think creativity is difficult now I think it's fun and not so hard when others are involved.
	Leadership Support	I used to think my thoughts were not valued. Now, I think leaders are open to hearing more.
		Now, I think anything can be done with the right support and resources.
I liked…		
	Brainstorming Exercises	I liked brainstorming with others and being creative.
		I liked collaborating and being in person to brainstorm and talk.
	Experiential Learning	I liked being able to act out the concepts in a group setting.
		I liked the drill sessions to apply content.
	Inspirational Stories	I liked the inspiring stories. I liked knowing it can happen, Things can change!
		I liked examples of projects.
	Leadership Support	I liked that the VA invested time outside work on its nurse leaders.
I wish…		
	Real problem solving	I wish we would have worked on a project or come with a problem.
		I wish we could bring a specific project to work toward solutions.
	More team members receive training.	I wish we could find a way to get more direct care nurses involved in this training.

		I wish we could send each program to this with ongoing support.
	Clear next steps	I wish I had a clearer plan for the next steps or an action plan after today.
		I wish we could follow up with an actual project.
	Skill expansion	I wish that I could use this every day and explore this more in detail.
		I wish we had more dedicated time for creativity.
I wonder...		
	Galvanize interest	I wonder if others would be interested in creating a group at the VA to work through innovative solutions.
		I wonder if more people would pursue innovations if they had the information and access to resources.
	Extend learnings	I wonder how I can influence more of my colleagues to be more proactive in our units' innovative changes to work collaboratively.
		I wonder what change(s) we could make if everyone thought this way.
		I wonder how we can tie this into project management.
I plan to apply...		
	Direct applications to team and unit collaborations.	I plan to apply by inspiring my team on the unit.
		I plan to apply these skills, brainstorm, and speak with colleagues to develop ideas that can help fix problems.
		I plan to apply while implementing or assisting others in change and ideas, encouraging staff to work toward their innovations.
		I plan to apply daily! Involve key stakeholders and unit staff in all ideas.
	Direct application to problems	I plan to apply this knowledge to develop my prototype and move further.
		I plan to apply to solve some access problems.

Discussion

This study evaluated the outcomes of a one-day, in-person Human-Centered Design workshop with VHA nurses, clinicians, and administrators at a midwestern university innovation center. We found that participants reported statistically significant increases in the CSE, PE, and TDT outcome measures after completing the workshop. Quantitative findings provide preliminary evidence of a change in CSE, PE, and TDT, attributable to the training. Results from this study suggest that initial findings that the 8-hour HCD workshop increased participant creative self-efficacy, a critical skill needed to build nurses' innovation ability (Tierney & Farmer, 2011). Nurse researchers have explored creative self-efficacy internationally, (e.g., Pakistan (Afsar & Masood, 2018), Taiwan (Liu et al., 2019), and China (Liu et al., 2021); however, researchers have not studied this construct in frontline nurses and clinicians in the United States. When building a patient safety culture, nurses without creative self-confidence and HCD skills may feel unempowered to discover new ways to improve ineffective processes and protocols (Risling & Risling, 2020). This intervention presents one way to build nurses' innovation and HCD capacity to create and influence the tools and processes they use to deliver patient care.

...nurses without creative self-confidence and HCD skills may feel unempowered to discover new ways to improve ineffective processes and protocols

In narrative responses that supported our qualitative findings, participants expressed a sense of urgency for additional workshops on specific healthcare problems and more training for team members. They shared how they planned to apply their new HCD skills in their work settings and desired more support and dedicated time. These reflections align with messages from nurse leaders about the critical need and opportunity for nurses to establish a more significant presence in the innovation and HCD realm (e.g., National Academies, 2021; Risling & Risling, 2020). In this study, participant reflections often aligned with the quantitative constructs that we measured; participants affirmed the need to include HCD content in their professional development.

The HCD approach changes the core structure of systems, processes, or products to manage complex situations by creating solutions centered on people's needs

Traditionally, healthcare interventions and technology use a linear approach without user input (Lyon & Koerner, 2016; MacFadyen, 2014; Roberts et al., 2016). In the HCD process, the end-users are the experts, and innovation emerges from several cycles of empathy, ideation, prototyping, and testing. The HCD approach changes the core structure of systems, processes, or products to manage complex situations by creating solutions centered on people's needs (Göttgens & Oertelt-Prigione, 2021; Zuber & Moody, 2018). As indicated in the pre-workshop questionnaire, most participants in this study were unfamiliar with HCD principles. Nurses' unfamiliarity with HCD principles prevents them from significantly improving workflows, products, and technology using this approach (Risling & Risling, 2020). However, our study results suggest that nurses became more empowered to embark on an innovation journey once they gain innovation and creative capacity.

Implications for Academic-Practice Partnerships

The positive findings from this study indicated that outcomes of the one-day HCD training workshop led to increased creative self-efficacy, psychological empowerment, and traits of design thinkers for our participants. The workshop has translated into the rapid application of the HCD skills with a robust response and downstream effect for the flagship VHA innovation programs at the midwestern VHA healthcare system setting for this study (e.g., 2024 VHA National iNET Spark, Seed, Spread Program Application Cycle; IE VA Innovation Fellowship Applications; and VHA MIT Catalyst Fellowship Applications).

As an example, in 2023, three VHA employees from this site submitted ideas to the National iNET Spark, Seed, Spread Program Application Cycle. As of the application deadline, two months after the HCD workshop, 14 VHA employees from this site submitted applications to the various VHA Innovation programs this year. Furthermore, within two months of the HCD workshop, two nurse-led VHA teams enrolled in the National Science Foundation's I-Corps™ Great Lakes Hub program hosted at the university (Walter, 2024). The continued engagement between these academic and clinical partners provides preliminary evidence for application of HCD skills to improve technology, products, or processes to improve patient safety and care.

VHA researchers have offered several recommendations to cultivate innovation in large healthcare systems that align with our findings (Vega & Kizer, 2020; Zuber & Moody, 2018; Zuber & Weberg, 2020). Vega and Kizer (2020) described essential innovation elements as a workforce capable of driving innovation, a culture that fosters innovation, and strategic external partnerships and collaborations that provide new perspectives and resources. Zuber and Weberg (2020) reported that an empowered network of clinicians, similar to what this study developed, can create innovation microclimates within the larger organizational entity. These innovation microclimates can test and iterate solutions before implementation across the system. Zuber and Moody (2018) advised harnessing curiosity and learning by creating a psychologically safe environment where innovators are seen as problem solvers, not troublemakers. Finally, researchers have suggested providing academic-practice opportunities to link clinicians who experience healthcare system problems with resources and guidance on discovering the root causes of an issue to empower clinicians to change the system (Zuber & Moody, 2018). Future studies can validate further and explore the impact of this training program within the participating institutions and other external academic and healthcare organizations.

Study Limitations

This study occurred within one Midwestern, urban city; therefore, the results may not be generalizable to other geographical areas. The homogenous sample may not represent the diversity of the broader population, further limiting generalizability. There is also the potential for selection bias because the nurse and program managers identified employees who were asked to participate in the professional development opportunity. Chosen participants may not accurately represent the studied population, leading to skewed results. Finally, the results need to be replicated in future studies with larger, more diverse samples to enhance the reliability of the findings.

Conclusion

Nurses creatively solve problems in their daily work; however, most do not learn how to apply human-centered design methodologies (Göttgens & Oertelt-Prigione, 2021; Harte et al., 2017) to seek a solution. Academic-practice partnerships offer one powerful venue to address this knowledge gap and empower participants to pursue innovation. These partnerships are a clever strategy to build HCD skill sets of clinicians and increase the capacity to address nursing practice and health system problems. Academic-practice partnerships maximize the strengths of strong innovation ecosystems at both the university and organizational levels, creating multiple sources of support, resources, and perspectives.

> Nurses creatively solve problems in their daily work; however, most do not learn how to apply human-centered design methodologies

Authors

Jeana M. Holt, PhD, DNP, MSN, RN, FNP-BC
Email: jmholt@uwm.edu
ORCID ID: 0000-0003-3392-0164

Jeana M. Holt is an assistant professor in the College of Health Professions and Sciences School of Nursing at the University of Wisconsin-Milwaukee. She is a nurse scientist, nurse practitioner, and Kellner Entrepreneurship Fellow at UWM. Dr. Holt uses human-centered design (HCD) methodologies to develop and evaluate creative innovation and entrepreneurship models with autistic youth and young adults. Dr. Holt also co-develops, facilitates, and evaluates HCD interventions that empower graduate nursing students and clinicians to influence healthcare system change.

AkkeNeel Talsma, PhD, RN, FAAN
Email: Talsma@uwm.edu

AkkeNeel Talsma an associate professor in the College of Health Professions and Sciences School of Nursing at the University of Wisconsin-Milwaukee. Her research focus is the implementation of efficient, effective, and sustainable (technical) strategies for high quality of care and better outcomes for our patients and families. Dr. Talsma works on innovating clinical practices and healthcare systems by applying emerging technologies to support best practices and research evidence.

Jan Irene C. Lloren, MPH, RN
Email: jclloren@uwm.edu
ORCID ID: 0000-0002-4854-9057

Jan Irene C. Lloren is a Biostatistics PhD student at the Joseph J. Zilber College of Public Health at the University of Wisconsin-Milwaukee. Ms. Lloren assists researchers in evaluating project outcomes.

Ilya Avdeev, PhD
Email: avdeev@uwm.edu

Ilya Avdeev is the Director of the Lubar Entrepreneurship Center and Kellner Entrepreneurship Fellow at UWM. He leads campus-wide efforts of expanding learning opportunities for students around innovation and entrepreneurship. Dr. Avdeev is also a Professor in Mechanical Engineering and Director (PI) of the Milwaukee NSF I-Corps™ Program.

Colleen Lawlor Eckert, DNP, MPH, RN
Email: colleen.eckert@va.gov

Colleen Eckert serves as the VA Associate Chief Nurse for the Nursing Education, Research and Interprofessional Simulation Division. Dr. Eckert earned a Doctor of Nursing Practice -Executive Track from University of Wisconsin at Milwaukee, a Master of Public Health degree from the University of Illinois at Chicago and a Bachelor of Nursing Science degree from Marquette University College of Nursing.

Qiyan Mu, PhD, RN
Email: qiyan.mu@va.gov

Dr. Mu is the Co-Director of the VA Advanced Fellowship in Women's Health and a clinician, educator, and researcher focusing on women's sexual, fertility, and reproductive health.

Florine Ndakuya-Fitzgerald, PhD, RN, NPD-BC

Email: florine.ndakuya-fitzgerald@va.gov

Florine Ndakuya-Fitzgerald is a nurse scientist and the director of the VA Advanced Fellowship in Interprofessional Patient Safety. Dr. Ndakuya-Fitzgerald facilitates, leads, and supports clinicians in advancing veteran care through quality improvement, evidence-based practice and research.

Joann Jastrab, JD

Email: joann.jastrab@va.gov

Joann Jastrab has a Bachelor of Arts degree from the University of Wisconsin-Madison and a Juris Doctor from New England School of Law. She is a Change Management Practitioner and an Innovation Specialist. In this role, she identifies and evaluates new technologies and innovations that align with VA strategic goals, assessing their potential impact and feasibility for implementation; develop and manage pilot projects to test the viability of proposed innovations; establish partnerships with academic institutions, and other external entities to co-develop innovative products or services; and lead the creation of a culture of innovation within the VA by organizing educational events, sharing success stories, and recognizing team and individual contributions to innovation efforts.

References

Afsar, B., & Masood, M. (2018). Transformational leadership, creative self-efficacy, trust in supervisor, uncertainty avoidance, and innovative work behavior of nurses. *TheJournal of Applied Behavioral Science, 54*(1), 36–61. https://doi.org/10.1177/0021886317711891

Altman, M., Huang, T. T. K., & Breland, J. Y. (2018). Design thinking in health care. *Preventing Chronic Disease, 15*, E117. https://doi.org/10.5888/pcd15.180128

American Association of Colleges of Nursing. (2012). *The guiding principles for academic-practice partnerships.* Our Initiatives. https://www.aacnnursing.org/our-initiatives/education-practice/academic-practice-partnerships/the-guiding-principles-for-academic-practice-partnerships

Bianchi, M., & Ghirotto, L. (2022). Nurses' perspectives on workarounds in clinical practice: A phenomenological analysis. *Journal of Clinical Nursing*, *31*(19-20), 2850–2859. https://doi.org/10.1111/jocn.16110

Blizzard, J., Klotz, L., Potvin, G., Hazari, Z., Cribbs, J., & Godwin, A. (2015). Using survey questions to identify and learn more about those who exhibit design thinking traits. *Design Studies*, *38*, 92–110. https://doi.org/10.1016/j.destud.2015.02.002

Bravo, K. (2023). Design thinking in nursing education and health sciences education. *Nursing Education Perspectives*, *44*(3), 164–168. https://doi.org/10.1097/01.NEP.0000000000001055

Brown, T., & Watt, J. (2010). Design thinking for social innovation. *Stanford Social Innovation Review*. https://ssir.org/articles/entry/design_thinking_for_social_innovation

Bybee, R. W., Taylor, J. A., Gardner, A., Van Scotter, P., Powell, J. C., Westbrook, A., & Landes, N. (2006). *The BSCS 5E instructional model: Origins and effectiveness.* https://www.fremonths.org/ourpages/auto/2008/5/11/1210522036057/bscs5efullreport2006.pdf

Coleman, E., Shealy, T., Grohs, J., & Godwin, A. (2020). Design thinking among first-year and senior engineering students: A cross-sectional, national study measuring perceived ability. *Journal of Engineering Education*, *109*(1), 72–87. https://doi.org/10.1002/jee.20298

Dietz, D. (2012, May 19). *Transforming healthcare for children and their families: Doug Dietz at TEDxSanJoseCA 2012*. Tedx Talks. https://www.youtube.com/watch?v=jajduxPD6H4&t=960s

Drach-Zahavy, A., & Somech, A. (2001). Understanding team innovation: The role of team processes and structures. *Group Dynamics: Theory, Research, and Practice, 5*(2), 111–123. https://doi.org/10.1037/1089-2699.5.2.111

Göttgens, I., & Oertelt-Prigione, S. (2021). The application of human-centered design approaches in health research and innovation: A narrative review of current practices. *JMIR mHealth and uHealth*, *9*(12), e28102. https://doi.org/10.2196/28102

Hagle, M., Dwyer, D., Gettrust, L., Lusk, D., Peterson, K., & Tennies, S. (2020). Development and implementation of a model for research, evidence-based practice, quality improvement, and innovation. *Journal of Nursing Care Quality*, *35*(2), 102–107. https://doi.org/10.1097/NCQ.0000000000000422

Harte, R., Glynn, L., Rodríguez-Molinero, A., Baker, P. M., Scharf, T., Quinlan, L. R., & ÓLaighin, G. (2017). A human-centered design methodology to enhance the usability, human factors, and user experience of connected health systems: A three-phase methodology. *JMIR Human Factors*, *4*(1), e8. https://doi.org/10.2196/humanfactors.5443

Holt, J. M., Talsma, A., Woehrle, L. M., Klingbeil, C., & Avdeev, I. (2022). Fostering innovation and design thinking in graduate programs. *Nurse Educator, 47*(6), 356-357. https://doi.org/10.1097/nne.0000000000001206

Isangula, K. G., Pallangyo, E. S., & Ndirangu-Mugo, E. (2023). Improving nursing education curriculum as a tool for strengthening the nurse-client relationships in maternal and child healthcare: Insights from a human-centered design study in rural Tanzania. *Frontiers in Public Health*, *11*, 1072721. https://doi.org/10.3389/fpubh.2023.1072721

Johnsson, M. (2017). Innovation enablers for innovation teams - A review. *Journal of Innovation Management*, *5*, 75–121. https://doi.org/10.24840/2183-0606_005.003_0006

Kagan, O., Littlejohn, J., Nadel, H., Leary, M. (2021). Evolution of nurse-led hackathons, incubators, and accelerators from an innovation ecosystem perspective. *Online Journal of Issues in Nursing*, *26*(3), Manuscript No. 3. https://doi.org/10.3912/OJIN.Vol26No03Man03

Liu, H.-Y., Wang, I.-T., Han, H.-M., Huang, D.-H., & Hsu, D.-Y. (2019). Perceived Self-Efficacy of Teaching for Creativity Among Nurse Faculty in Taiwan: A Preliminary Study. *Nursing Education Perspectives*, *40*(6), E19. https://doi.org/10.1097/01.NEP.0000000000000570

Liu, T., Yu, X., Liu, M., Wang, M., Zhu, X., & Yang, X. (2021). A mixed method evaluation of an integrated course in improving critical thinking and creative self-efficacy among nursing students. *Nurse Education Today*, *106*, 105067. https://doi.org/10.1016/j.nedt.2021.105067

Lyon, A. R., & Koerner, K. (2016). User-centered design for psychosocial intervention development and implementation. *Clinical Psychology: Science and Practice*, *23*(2), 180–200. https://doi.org/10.1111/cpsp.12154

MacFadyen, J. S. (2014). Design thinking. *Holistic Nursing Practice*, *28*(1), 3–5. https://doi.org/10.1097/HNP.0000000000000008

McCord, J. L., Lippincott, C. R., Abreu, E., & Schmer, C. (2022). A systematic review of nursing practice workarounds. *Dimensions of Critical Care Nursing: DCCN*, *41*(6), 347–356. https://doi.org/10.1097/DCC.0000000000000549

Meinel, C., Leifer, L., & Plattner, H. (Eds.). (2010). *Design Thinking: Understand – Improve – Apply*. Springer.

Menon, S. (2001). Employee empowerment: An integrative psychological approach. *Applied Psychology*, *50*(1), 153–180. https://doi.org/10.1111/1464-0597.00052

National Academies of Sciences, Engineering, and Medicine. (2021). *The future of nursing 2020-2030: Charting a path to achieve health equity*. The National Academies Press. https://doi.org/10.17226/25982

Office of Nursing Services. (2024, July 31). *Office of Nursing Services (ONS) 2023 Annual Report*. U.S. Department of Veteran Affairs. https://www.va.gov/nursing/

Rahemi, Z., D'Avolio, D., Dunphy, L. M., & Rivera, A. (2018). Shifting management in healthcare: An integrative review of design thinking. *Nursing Management*, *49*(12), 30–37. https://doi.org/10.1097/01.NUMA.0000547834.95083.e9

Risling, T. L., & Risling, D. E. (2020). Advancing nursing participation in user-centred design. *Journal of Research in Nursing: JRN*, *25*(3), 226–238. https://doi.org/10.1177/1744987120913590

Roberts, J. P., Fisher, T. R., Trowbridge, M. J., & Bent, C. (2016). A design thinking framework for healthcare management and innovation. *Healthcare*, *4*(1), 11–14. https://doi.org/10.1016/j.hjdsi.2015.12.002

Rowe, P. G. (1991). *Design thinking*. MIT Press.

Schoonenboom, J., & Johnson, R. B. (2017). How to construct a mixed methods research design. *Kolner Zeitschrift Fur Soziologie Und Sozialpsychologie*, *69*(Suppl 2), 107–131. https://doi.org/10.1007/s11577-017-0454-1

Schumpeter, J. A. (2000). Entrepreneurship as innovation. In R. Swedberg (Ed.), *Entrepreneurship: The social science view.* (pp. 51–75). Oxford University PressOxford. https://doi.org/10.1093/oso/9780198294627.003.0003

Thayer, A. L., Petruzzelli, A., & McClurg, C. (2018). Addressing the paradox of the team innovation process: A review and practical considerations. *American Psychologist*, *73*(4), 363–375. https://doi.org/10.1037/amp0000310

Tierney, P., & Farmer, S. M. (2002). Creative self-efficacy: Its potential antecedents and relationship to creative performance. *Academy of Management Journal. Academy of Management*, *45*(6), 1137–1148. https://doi.org/10.2307/3069429

Tierney, P., & Farmer, S. M. (2011). Creative self-efficacy development and creative performance over time. *The Journal of Applied Psychology*, *96*(2), 277–293. https://doi.org/10.2307/3069429

Tucker, A. L., Zheng, S., Gardner, J. W., & Bohn, R. E. (2020). When do workarounds help or hurt patient outcomes? The moderating role of operational failures. *Journal of Operations Management*, *66*(1-2), 67–90. https://doi.org/10.1002/joom.1015

Vaismoradi, M., Jones, J., Turunen, H., & Snelgrove, S. (2016). Theme development in qualitative content analysis and thematic analysis. *Journal of Nursing Education and Practice*, *6*(5). https://doi.org/10.5430/jnep.v6n5p100

van der Bijl-Brouwer, M., & Dorst, K. (2017). Advancing the strategic impact of human-centred design. *Design Studies*, *53*, 1–23. https://doi.org/10.1016/j.destud.2017.06.003

Vega, R. J., & Kizer, K. W. (2020). VHA's innovation ecosystem: Operationalizing innovation in health care. *NEJM Catalyst Innovations in Care Delivery*, *1*(6). https://doi.org/10.1056/cat.20.0263

Veterans Affairs. (n.d.). *VHA innovation ecosystem*. Home. https://www.innovation.va.gov/ecosystem/views/home.html

Veterans Affairs Office of Healthcare Innovation and Learning. (n.d.). VHA 2023 state of innovation report. https://innovation.va.gov/hil/assets-3-5/documents/OHIL_State_of_Innovation_Report_2024.pdf

Walter, D. (2024, July 11). *Milwaukee VA nurse seeks patent for innovative drain clip*. VA Miwaukee Health Care. https://www.va.gov/milwaukee-health-care/stories/milwaukee-va-nurse-seeks-patent-for-innovative-drain-clip/

Zuber, C. D., & Moody, L. (2018). Creativity and innovation in health care: Tapping into organizational enablers through human-centered design. *Nursing Administration Quarterly*, *42*(1), 62–75. https://doi.org/10.1097/NAQ.0000000000000267

Zuber, C., & Weberg, D. (2020). Frameworks for leading frontline innovation in health care: Failure, microclimates, and leadership. *Nurse Leader*, *18*(3), 290–295. https://doi.org/10.1016/j.mnl.2020.03.005

Citation: Holt, J.M., Talsma, A., Lloren, J.I.C., Avdeev, I., Eckert, C.L., Mu, Q., Ndakuya-Fitzgerald, F., Jastrab, J., (January 31, 2025) "Academic-Practice Partnership Builds Innovation and Creative Capacity Following a Human-Centered Design Workshop" *OJIN: The Online Journal of Issues in Nursing* Vol. 30, No. 1, Manuscript 5.

Related Articles

ARTICLE

Future-Proof Healthcare Professionals: Innovative Approaches from Canada, The Netherlands, and The United States of America

Marjolein E.M. den Ouden, PhD; Sjors Groeneveld, MSc; Monique M.J. Engelbertink, PhD; AkkeNeel Talsma, PhD, RN, FAAN; Adriana Ríos Rincón, PhD, OT (Reg. AB); Lili Liu, PhD, (OT Reg)

ARTICLE

Creating a Phenotype and Taxonomy of Nurses Engaging in Innovative Behaviors

Marion Leary, PhD, MSN, MPH, RN; George Demiris, PhD, FACMI; J. Margo Brooks Carthon, PhD, RN, FAAN; Pamela Z. Cacchione, PhD, CRNP, FAA; Subhash Aryal, PhD, MS; Jose A. Bauermeister, PhD, MPH

ARTICLE

Evaluation of a Synchronous Online Innovation and Design-Thinking Module for Graduate Nursing Students

AkkeNeel Talsma, PhD, RN, FAAN; Jeana M. Holt, PhD, DNP, MSN, RN, FNP-BC; Jan I. C. Lloren, MPH, RN; Carol Klingbeil, DNP, RN, CPNP-PC, CNE; Murad Taani, PhD, MPH, RN; Ilya Avdeev, PhD

ARTICLE   January 30, 2025

The ANA Innovation Accelerator: Galvanizing the Future of Nursing

Olivia Lemberger, PhD, RN, NPD-BC; Oriana Beaudet, DNP, RN, FAAN; Kasey Bellegarde-Armstrong, DNP, MPH, RN, CGNC, FFNMRCSI

ARTICLE   January 30, 2025

Building, Sustaining, and Sunsetting Innovation Programs in Higher Education: Lessons Learned

Tim Raderstorf, DNP, RN; Taura Barr, PhD, RN; Kate Trinter, MHI, RN; Michael Ackerman, PhD, RN