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Jeannine Nonailada

Memorial Sloan Kettering Cancer Center - USA, jeannine.nonailada@nyulangone.org

Natalie C. Gangai

Memorial Sloan Kettering Cancer Center - USA, gangain@mskcc.org

Chrysanne Eichner

Memorial Sloan Kettering Cancer Center - USA, eichnerc@mskcc.org

Rosario Costas-Muniz

Memorial Sloan Kettering Cancer Center - USA, costasmr@mskcc.org

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Abstract

This paper will expound on the findings discovered from efforts made by including an occupational therapist on an interprofessional education initiative charged with developing content to enhance knowledge of geriatrics for health care providers, community-dwelling older adults, and caregivers in medically underserved areas. We will describe the actions of the interprofessional team and present data about the impact of collaborative, systematic input on one educational program taught primarily by the occupational therapist. We will then describe the personal and professional growth opportunities experienced by the occupational therapist on this initiative, and impart the challenges faced and provide recommendations to overcome them. Finally, we will discuss practical implications for advancing interprofessional education and occupational therapy at other institutions.

Keywords

Interprofessional Education, Geriatric Education

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Credentials Display

Jeannine Nonailada, PhD, OTR/L, BCG; Natalie C. Gangai, BS; Chrysanne Eichner, MS, OTR/L, CAPS; Rosario Costas-Muniz, PhD

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As health care systems and client sociodemographics evolve in complexity, the way providers approach care plans cannot be insular, but rather must be delivered jointly with other members of clients' teams of providers (Schreiber & Goreczny, 2013). In response to this, Interprofessional Education (IPE) has received heightened attention in recent years, and students and professionals that experience IPE report positive feedback and increased appreciation for their colleagues in other disciplines (Lawlis, Wicks, Jamieson, Haughey, & Grealish, 2016). The *Framework for Action on Interprofessional Education & Collaborative Practice* describes IPE as the effective collaboration of students from two or more professions who learn from each other to improve health outcomes (World Health Organization, 2010, p. 13). It is essential for providers to embrace IPE as the foundation to ensure optimal outcomes for clients and their caregivers.

The American Occupational Therapy Association (AOTA) recently joined the Interprofessional Education Collaborative, a national initiative formed in 2009 to promote and enhance learning across all disciplines and encourage shared care among providers (AOTA, 2016). The initiative includes representation from the American associations of the professions of nursing, pharmacy, dentistry, medicine, physical therapy, podiatry, veterinary medicine, public health, social work, psychology, and physician assistant programs. By nature, occupational therapy (OT) practitioners have roots in identifying the multi-faceted needs of clients and value the

integration of care from partnering professionals on the team (Moyers & Metzler, 2014). Although this benefit may be inherently clear to OT practitioners, the contributions of OT are not always as transparent to other providers on the team. Therefore, OT practitioners must be staunch advocates for the distinct value they bring to clients' and caregivers' health, and how OT training and expertise complements the treatment recommendation by fellow professions.

This paper describes the efforts set forth by an occupational therapist on an interprofessional team at a comprehensive cancer center in an urban area. The occupational therapist and colleagues were working to develop, disseminate, and sustain education in a Geriatrics Workforce Enhancement Program (GWEP) funded by the United States Health Resources and Services Administration (HRSA) Grant # U1QHP28705 (HRSA, 2015). We will describe the actions of this interprofessional team and present data about the impact of collaborative, systematic input on one educational program taught primarily by the occupational therapist. We will then describe the opportunities for personal and professional growth of the occupational therapist, as well as impart the challenges faced and provide recommendations to overcome them. Finally, we will discuss the practical implications for advancing IPE and OT in other institutions.

Formation of the GWEP and the GRIP

As the primary teaching unit driving the work of the GWEP, the Geriatric Resource Interprofessional Program (GRIP) was designed as an interprofessional team. It includes representation

from occupational and physical therapy, pharmacy, nutrition, medicine, nursing, social work, immigrant health, and members from the GWEP's community partners that serve community-dwelling older adults in culturally diverse and medically underserved areas. The community-based organizations include experts in the populations they serve. While each organization has its own mission, all activities focus on improving quality of life for older adults and providing culturally-responsive programming. The GRIP team mission is "to provide evidence-based and culturally-responsive geriatric education to physicians, allied healthcare professionals, patients and caregivers within communities and academic institutions where a significant percentage of older adults receive health care." This mission drives all educational development and dissemination. The vision is "the establishment of a Geriatric Resource Interprofessional Program (GRIP) that will create and disseminate culturally-responsive, sustainable educational materials on geriatric principles to

- optimize the quality of biopsychosocial care of the older adult,
- increase community awareness of geriatric syndromes, and
- minimize barriers to accessing available health care services for older adults and caregivers."

The underlying principle of the GRIP team is that all team members can teach each other about their respective professions through the process of developing community-based and health care provider education. This interprofessional team also affords practitioners the ability to co-teach to

learners, infusing multiple professionals' expertise and perspectives into one educational program. OT has a unique position on this team as the principles of the profession can be applied through the different disciplines represented on the GRIP team. Specifically, the IPE is carried out by a multi-step process:

1. Conducting a needs assessment to determine the precise requests of the target learners.
2. Developing educational content with measurable objectives for those identified needs.
3. Disseminating these educational programs in the community and hospital.
4. Evaluating the impact of the education.

Lastly, the GRIP team employs rapid cycle quality improvement with the Plan-Do-Study-Act tool to continuously evaluate the implementation and execution of the educational programs. The Plan-Do-Study-Act tool is often used in the health care setting to test change (Langley et al., 2009).

Role of the Occupational Therapist on the GRIP Team

The scope of practice for OT includes advocating for the profession and educating not only clients but also colleagues (AOTA, 2014). Educating team members about the scope of OT practice, specifically related to the older adult, was crucial during the development of educational material taught to both health care providers and community members. The occupational therapist continually infused an OT perspective about productive aging with all team discussions.

Advocacy for the role of OT is critical across the health care system (Lamb & Metzler, 2014). Several GRIP team members were well

versed in the role of OT while other team members required continued education about OT scope of practice. The occupational therapist advocated for the profession at each team meeting and during the development of educational material. OT was incorporated into the other team members' education sessions and disseminated to various learners that included older adults in the community, caregivers, and other health care professionals.

Results of OT-led IPE

Each initiative for the GRIP team began with determining the specific needs of the learners. The GRIP team developed a needs assessment survey through which older adults at community organizations identified topics of healthy aging about which they wanted to learn. In response to this needs assessment, the occupational therapist on the GRIP team took a lead role in preparing the content of educational programs on falls prevention through home modification. The occupational therapist developed objectives, including who can help with changes to the home, to discuss the importance of making home modifications to prevent falls and to provide examples of simple and complex changes one could make. Geriatric syndromes, such as low vision, impaired sensation, and physical changes, were addressed during this community education. The educational material

was delivered through a multimedia presentation with the occupational therapist asking the learners to identify positive and negative examples of home modification. The occupational therapist also checked her knowledge throughout the presentation by asking learners questions about proper home modification. The occupational therapist drafted pre and post questions to measure knowledge, and with feedback from the GRIP team the occupational therapist added photos of grab bars and double-sided tape so the learners would be able to identify home modifications easily.

Table 1 lists the sociodemographic characteristics of the learners. A total of 88 community members completed evaluation forms. The majority of the participants (59%) were 60 to 69 years old. Almost two thirds (62%) were male. The vast majority (92%) reported being Asian, 83% spoke Bengali, and 82% were born in Bangladesh. Educational sessions were delivered in both English and Bengali, with live interpretation being provided by the program managers of the community site. Printed materials were also double-sided, with one side in English, and the reverse in Bengali. Before delivering the community-based educational program, the occupational therapist taught a mock educational session to the rest of the GRIP team, allowing the interprofessional members to suggest content, and also comment on teaching style.

Table 1*Sociodemographic Characteristics of Learners*

	Site 1		Site 2		Site 3		Site 4		Site 5		Total (N = 88)	
	n	%	n	%	n	%	n	%	n	%	n	%
Age												
49 years and younger	0	(0)	0	(0)	1	(1.4)	0	(0)	0	(0)	1	(1.2)
50-59 years	0	(0)	0	(0)	6	(8.3)	0	(0)	0	(0)	6	(7.2)
60-69 years	2	(50)	1	(20)	45	(62.5)	1	(50)	0	(0)	49	(59)
70-79 years	1	(25)	3	(60)	17	(23.6)	0	(0)	0	(0)	21	(25.3)
80-89 years	1	(25)	1	(20)	1	(1.4)	0	(0)	0	(0)	3	(3.6)
90 years and older	0	(0)	0	(0)	2	(2.8)	1	(50)	0	(0)	3	(3.6)
Gender												
Men	3	(75)	5	(100)	35	(61.4)	0	(0)	0	(0)	43	(61.4)
Women	1	(25)	0	(0)	22	(38.6)	3	(100)	1	(100)	27	(38.6)
Race and Ethnicity												
White	1	(25)	0	(0)	0	(0)	2	(66.7)	0	(0)	3	(3.6)
Asian	3	(75)	6	(100)	68	(95.8)	0	(0)	0	(0)	77	(91.7)
American Indian	0	(0)	0	(0)	2	(2.8)	0	(0)	0	(0)	2	(2.4)
Native Hawaiian	0	(0)	0	(0)	1	(1.4)	0	(0)	0	(0)	1	(1.2)
Hispanic or Latino	0	(0)	0	(0)	0	(0)	1	(33.3)	0	(0)	1	(1.2)
Primary Language												
English	1	(25)	0	(0)	3	(4.1)	3	(100)	0	(0)	8	(9.2)
Hindi	2	(50)	5	(100)	0	(0)	0	(0)	1	(100)	7	(8.0)
Bengali	0	(0)	0	(0)	71	(95.9)	0	(0)	0	(0)	71	(81.6)
Mandarin/Cantonese	1	(25)	0	(0)	0	(0)	0	(0)	0	(0)	1	(1.1)
Birthplace												
USA	1	(25)	0	(0)	0	(0)	2	(66.7)	0	(0)	3	(3.5)
Bangladesh	0	(0)	0	(0)	70	(95.9)	0	(0)	0	(0)	70	(82.4)
India	2	(50)	5	(100)	0	(0)	0	(0)	0	(0)	7	(8.2)
China	1	(25)	0	(0)	0	(0)	0	(0)	0	(0)	1	(1.2)
Guyana	0	(0)	0	(0)	3	(4.1)	0	(0)	0	(0)	3	(3.5)
Puerto Rico	0	(0)	0	(0)	0	(0)	1	(33.3)	0	(0)	1	(1.2)

The team uses the Patient Education Materials Assessment Tool (PEMAT) as a systematic method to evaluate and compare the effectiveness and quality of patient education materials. With the use of the PEMAT, the GRIP team members evaluated the effectiveness of the educational program for understandability, where

consumers of diverse backgrounds and varying

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levels of health literacy can process and explain key messages, and on actionability, where consumers of diverse backgrounds and varying levels of health literacy can identify what they can do based on the information presented (Shoemaker, Wolf, & Brach, 2016). For the program on falls prevention through home modification, the GRIP team rated 82% understandability and 70% actionability. After

discussion and suggestions from the GRIP team, the occupational therapist revised the program to reflect these recommendations. Once the updates were completed, the GRIP team scored the program again using the PEMAT. Figure 1 displays the PEMAT scores both before and after content revision:

understandability of the program increased to 90% and actionability increased to 75%. By evaluating the content twice using the PEMAT, the GRIP team made real-time changes that were necessary for program success, rather than waiting until the occupational therapist taught this several times.

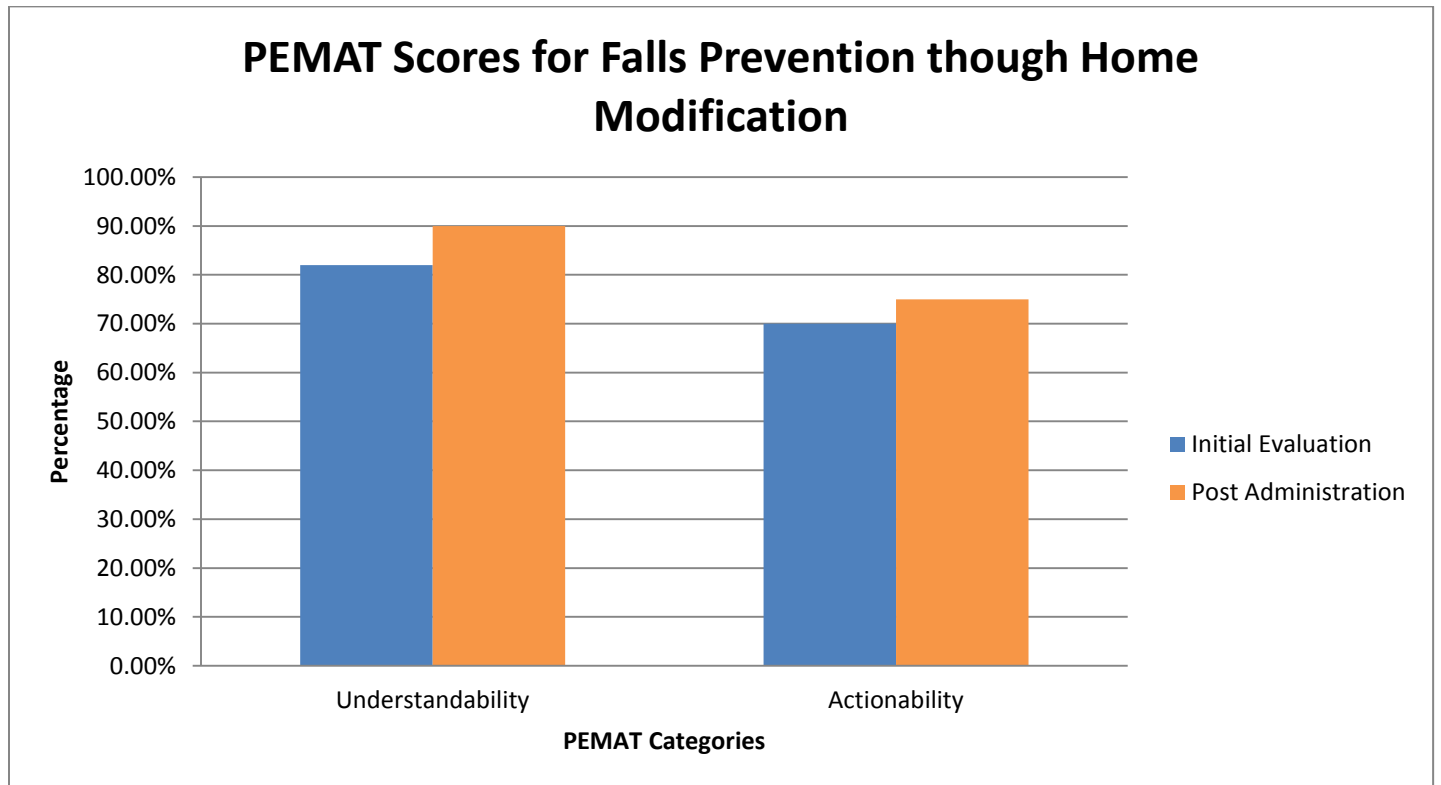


Figure 1. PEMAT scores for falls prevention through home modification.

Process Evaluation

Throughout the series of programs, the participants showed an increase in knowledge. After the implementation of four educational sessions, the pre and post questions were assessed in regard to their difficulty index. The difficulty index is a measure of how many learners answered the questions correctly at baseline out of the entire group (Zainudin, Ahmad, Ali, & Zainal, 2012). For falls prevention through home modification, only one question was too easy for learners (greater than

75% of the learners answering correctly). The other questions were identified as being very difficult (less than 10% of the learners answered correct at baseline). Thus, the OT and other GRIP team members updated the pre and post questions to include less jargon and clearer wording related to the objectives of the program.

Personal and Professional Growth of Occupational Therapist and Challenges Faced

Personal Growth

The occupational therapist received new opportunities for personal and professional growth by being part of an IPE team. In preparation for educating older adults in underserved communities, the members of the immigrant health program on the GRIP team provided in-depth feedback regarding health care literacy, interpretation, and translation, which improved the way the occupational therapist communicated during educational sessions. In turn, this improved her daily practice as she adopted these knowledge aspects into routine client-practitioner interactions. To optimize the quality of biopsychosocial care of older adults, the education had to be easily understood. When the occupational therapist first created the falls prevention through home modification education, it was complex and filled with “med-speak”. The GRIP team helped identify the jargon and improve the understandability of the education. By reviewing and changing this complex jargon, the occupational therapist improved communication during community education and on a one-to-one basis with clients. Working on this IPE program enhanced the professional identity of the occupational therapist and improved her advocacy and communication skills.

By developing comprehensive educational material for various audiences, the occupational therapist enhanced her visual media skills. The education level of the learners varied greatly in each

of education to older adults from more rural areas of foreign countries that had only completed a few years of elementary school. Creating PowerPoint presentations and other materials enabled another learning opportunity. Initially, the presentation was far too complex and covered too much information. For example, when teaching falls prevention through home modification, the occupational therapist addressed the entire house, covering every room, including outdoor entryways, with recommendations for safety. Through suggestions from the PEMAT, the occupational therapist modified the presentation to better fit the needs and educational level of the learners, by separating the material into smaller aspects. For example, bathroom and kitchen safety were emphasized, followed by identifying potential hazards of other areas of the home.

In addition, the occupational therapist pursued continuing education to improve teaching techniques and PowerPoint creation. In doing this, materials were not only changed to meet the education level of the learners, they were also updated and adapted to become more engaging and action-oriented. Other members of the GRIP team also attended continuing education classes to improve their multi-media creation skills, and then transferred their knowledge to the rest of the team members, as did the occupational therapist. Transfer of knowledge was vital to improving the educational material for all team members, leading to improved educational sessions.

Professional Growth

As a clinician at an in-patient comprehensive cancer center, the occupational

therapist on the GRIP team advocates daily for the needs of the client and the role of OT to family members and other health care providers. Thus, infusing content regarding the scope of OT practice into other team members' educational programs was an essential process for the occupational therapist to accomplish. When teaching in the community, great care was given to promote OT services.

The occupational therapist on the GRIP team advocated for the profession by offering expertise on the content for several of the educational programs that were led by other GRIP members. Each team member provided knowledge to complement and improve the education given by the other team members. For example, when the team pharmacist prepared educational material regarding medication management, the occupational therapist addressed the possible physical, cognitive, and sensory-perceptual deficits that may impact older adults' independence and compliance with their medications. In addition, OT services were added to a list of resources to ease the burden of caregivers in the community through interprofessional discussions with the team members. By advocating for the role of OT, the occupational therapist was able to expand the knowledge of the interprofessional team and inform colleagues about the profession. The occupational therapist's participation on this IPE team strengthened the content knowledge of all GRIP members, enhanced teamwork, and increased professional identity, which is consistent with prior reported outcomes of IPE initiatives (Sergakis et al., 2016). Conversely, working with the GRIP team allowed the occupational therapist to develop a

better understanding of the roles of the other team members.

Since participating in IPE, the occupational therapist has also become an advocate for the other professions on the GRIP team. She has educated fellow occupational and physical therapists, both formally and informally, about the importance of other team members for successful client education. Furthermore, her teaching sessions resulted in several other GRIP team members working to decrease the risk of falls through educational avenues in their own professional expertise, including medication management, increasing strength and endurance, improving nutrition, or addressing geriatric syndromes related to falls. Working as a clinician who has participated in IPE, the occupational therapist is now better suited to advocate for other professions and improve the quality of care for her clients daily. Being part of the GRIP team allowed the occupational therapist to become a better advocate for clients, the profession of OT, and for the role of the interprofessional members of the team. This IPE effort led to improved communication skills, presentation skills, and advocacy efforts both professionally and personally.

The occupational therapist also strengthened the visibility of OT's role in specific practice areas, such as falls prevention. She focused on improving community members' awareness of the implications of falls on their health and how to modify their environment to allow them to age in place. To ensure a culturally-responsive, low-cost resource list, the occupational therapist met with leaders from the community organizations to determine

which resources were appropriate for the intended learners. By meeting with a diverse group of community organizations and learning about what resources best meet the needs of their members, the occupational therapist is well-equipped to work with clients from these communities in all settings.

Challenges Faced

As with any new program or initiative, there were barriers to overcome. Although OT service had been well-established for decades at this hospital and the occupational therapist on the GRIP team had been working in this setting for several years, it was often the case that the inclusion of OT was omitted from oral presentations that were made by other team members when describing other services from which older adults may benefit. The occupational therapist on the GRIP team proactively addressed this by interjecting in real time that OT is a valuable service, and she also took the opportunity to educate the audience, providing practical examples of the impact of OT for older adults.

Working in one practice setting can present limitations on the clients that you reach and interact with daily. Through this IPE effort, the occupational therapist learned how to implement and execute successful educational programs in diverse communities with which she had not previously worked. Although the occupational therapist was intimidated at first, she broadened her communication skills by working closely with these older adults in their own communities.

Furthermore, the occupational therapist gained increased sensitivity to diverse client needs. For example, when providing education about falls

recommendation of wearing rubber-soled footwear in the house, the occupational therapist realized that for her learners in certain communities, it was not customary to wear any footwear in the house. Another example is the familiarity with certain recommended adaptive equipment, like double-sided tape. Such items were not common to all communities taught in this IPE effort, and to address this the occupational therapist provided pictures and displayed the actual items to better demonstrate her recommendations for safety.

Implications for the Future

This paper highlights the steps that OT practitioners can take to be effective and valuable leaders in IPE. In this case, health care providers and community members in underserved areas were the learners; however, this model can be replicated for any intended audience of learners and their specific learner needs and the educational setting. OT practitioners must feel adequate and be empowered to promote their distinct training and expertise to any interprofessional curriculum development initiative. By having the GRIP team collaborate on curriculum development and critique the teaching methods, the occupational therapist improved the educational programs, both those led by her and those led by other team members. Finally, IPE offers personal growth and development for those who experience it. Team collaboration, effective delivery methods, and reflective critique are all aspects of IPE in the initiative described in this paper that fostered enhanced development for the occupational therapist on the GRIP team. As the changing landscape of education continues to evolve, OT

practitioners should remain true to their unique contributions to IPE and be both proud and confident to participate in IPE efforts.

Dr. Jeannine Nonaillada is Assistant Dean of Curriculum and Faculty Development directing teaching and learning initiatives for undergraduate, graduate and continuing medical education at NYU Winthrop Hospital in Mineola, New York, which provides a clinical campus for Stony Brook University School of Medicine. Dr. Nonaillada currently serves on the Commission of Continuing Competence and Professional Development for the American Occupational Therapy Association (AOTA), and she is the immediate past Chair of the AOTA Gerontology Special Interest Section. Since 2007, Dr. Nonaillada has been Board Certified in Gerontology by AOTA, and is one of 27 occupational therapists nationally holding this credential.

*Dr. Jeannine Nonaillada was the Project Manager for this HRSA grant at Memorial Sloan Kettering Cancer Center at the time the work in this article was conducted.

Natalie Gangai is the Project Coordinator on the Geriatric Workforce Enhancement Program at Memorial Sloan Kettering Cancer Center (MSKCC). Natalie executes all community education programs and conducts data and process evaluation. She holds a Bachelor's of Science in Public Health from American University in Washington, DC and will be pursuing a Master's of Public Health in Epidemiology from the City University of New York Graduate School of Public Health in the fall of 2017.

Chrysanne Eichner is a Senior Occupational Therapist at Memorial Sloan Kettering Cancer Center (MSKCC). She was awarded her Master's degree in occupational therapy by the University of Scranton in 2011. Chrysanne specializes in the geriatrics and oncology populations. Chrysanne is the occupational therapist on the Geriatric Workforce Education Program grant awarded to MSKCC. Through this grant she focuses on educating community members and providers.

References

- American Occupational Therapy Association (AOTA). (2014). Occupational therapy practice framework: Domain and process (3rd ed.). *American Journal of Occupational Therapy*, 68(Suppl. 1), S1-S48. <https://doi.org/10.5014/ajot.2014.682006>
- American Occupational Therapy Association (AOTA). (2016). AOTA joins interprofessional educational collaborative. Retrieved from <http://www.aota.org/Publications-News/AOTANews/2016/Interprofessional-Educational-Collaborative.aspx>
- Health Professions Networks Nursing & Midwifery Human Resources for Health. (2010). *Framework for action on interprofessional education & collaborative practice*. Geneva: World Health Organization.

Retrieved from

http://www.who.int/hrh/resources/framework_action/en/

- Health Resources & Services Administration. (2015, July). *HHS awards \$35.7 million to improve care for older adults*. Retrieved from <https://www.hrsa.gov/about/news/pressreleases/150713geriatricworkforce.html>
- Lamb, A. J., & Metzler, C. A. (2014). Defining the value of occupational therapy: A health policy lens on research and practice. *American Journal of Occupational Therapy*, 68(1), 9-14. <http://dx.doi.org/10.5014/ajot.2014.681001>
- Langley, G. L., Moen, R. D., Nolan, K. M., Nolan, T. W., Norman, C. L., & Provost, L. P. (2009). *The improvement guide: A practical approach to enhancing organizational performance* (2nd ed.). San Francisco: Jossey-Bass.
- Lawlis, T., Wicks, A., Jamieson, M., Haughey, A., & Grealish, L. (2016). Interprofessional education in practice: Evaluation of a work integrated aged care program. *Nurse Education in Practice*, 17, 161-166. <http://dx.doi.org/10.1016/j.nepr.2015.11.010>
- Moyers, P. A., & Metzler, C. A. (2014). Interprofessional collaborative practice in care coordination. *American Journal of Occupational Therapy*, 68(5), 500-505. <http://dx.doi.org/10.5014/ajot.2014.685002>
- Schreiber, J. L., & Goreczny, A. (2013). Instructional insight into interprofessional education (IPE). *Occupational Therapy In Health Care*, 27(2), 180-185. <http://dx.doi.org/10.3109/07380577.2013.778443>
- Sergakis, G., Clutter, J., Holthaus, V., Nahikian-Nelms, M., Rohrig, L., Legg, J., . . . Wilcox, J. (2016). The impact of interprofessional clinical simulation on attitudes, confidence, and professional identity: The influence of respiratory therapy participation. *Respiratory Care Education Annual*, 25, 11-16.
- Shoemaker, S. J., Wolf, M. S., & Brach, C. (2016). The patient education materials assessment tool (PEMAT) and user's guide. *Agency for Healthcare Research and Quality*. Retrieved from <http://www.ahrq.gov/professionals/prevention-chronic-care/improve/self-mgmt/pemat/index.html>
- Zainudin, S., Ahmad, K., Ali, N. M., & Zainal, N. F. A. (2012). Determining course outcomes achievement through examination difficulty index measurement. *Procedia - Social and Behavioral Sciences*, 59, 270-276. <http://dx.doi.org/10.1016/j.sbspro.2012.09.275>