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Health Literacy in Student-Created Occupational Therapy Home Programs

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Abstract

This single site case report examined student-designed client educational materials for integration of health literacy principles in occupational therapy education. Researchers analyzed 16 home programs from first and second year occupational therapy doctorate students using the Health Literacy Advisor (HLA) and the Patient Education Materials Assessment Tool – Printable (PEMAT-P). The HLA provides scores of readability indexes, including Fry, SMOG, Flesch-Kincaid, and Flesch Reading Ease. The PEMAT-P assesses understandability and actionability. Results indicated reading levels near recommended 6th grade reading scores with some improvement from first to second year educational level, though not necessarily useable material. HLA *difficult to understand* words identified as *jargon* or *jargon like* may obstruct client education. Researchers recommend continued inclusion of designing materials in educational curricula. Researchers also recommend face-to-face client contact, including teach back methods and client feedback to support student health literacy practices.

Keywords

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Health Literacy in Student-Created Occupational Therapy Home Programs

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ABSTRACT

This single site case report examined student-designed client educational materials for integration of health literacy principles in occupational therapy education. Researchers analyzed 16 home programs from first and second year occupational therapy doctorate students using the Health Literacy Advisor (HLA) and the Patient Education Materials Assessment Tool – Printable (PEMAT-P). The HLA provides scores of readability indexes, including Fry, SMOG, Flesch-Kincaid, and Flesch Reading Ease. The PEMAT-P assesses understandability and actionability. Results indicated reading levels near recommended 6th grade reading scores with some improvement from first to second year educational level, though not necessarily useable material. HLA *difficult to understand* words identified as *jargon* or *jargon like* may obstruct client education. Researchers recommend continued inclusion of designing materials in educational curricula. Researchers also recommend face-to-face client contact, including teach back methods and client feedback to support student health literacy practices.

INTRODUCTION

Educational practice review is helpful to examine pedagogical outcomes when integrating new concepts within a curriculum. Hutchings and Shulman (1999) defined the Scholarship of Teaching and Learning (SOTL) as systematic inquiry and planned dissemination used to improve teaching. To investigate the usability of health literacy education in graduate healthcare education, researchers assessed, revised, and developed documents within currently established guidelines of health literacy practices. This case report provides an example of assessment of health literacy education in an occupational therapy doctorate (OTD) program. In the case report, researchers describe occupational therapy's role in health literacy promotion, compare first and second year OTD students' skill in creation of patient education materials, and discuss implications for practice, education, and research.

The United States (U.S.) Department of Health and Human Services first defined health literacy as "the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions" (Ratzan & Parker, 2000). The Patient Protection and Affordable Care Act (2010) incorporated direct and indirect provisions for health literacy, including equity in healthcare and communication for all people. More recently, the concept of health literacy is evolving towards a *systems* perspective; one that re-directs the attention from the lack of the consumers' skills toward that of the health system and healthcare professionals' ability to enable active engagement (Pleasant et al., 2016; Rudd, McCray, & Nutbeam, 2012). At this time, multiple organizations have in place action plans, strategies, and benchmarks to address health literacy as a public health issue (Centers for Medicare & Medicaid Services, 2016; Centers for Disease Control, 2018; Office of Disease Prevention and Health Promotion, 2019).

Integrating health literacy content into health professions' curricula is one means to support the community need. In 2018, the Accreditation Council for Occupational Therapy Education (ACOTE) Standards and Interpretive Guide (ACOTE, 2018) included health literacy requirements for current student training. The ACOTE (2018) standard B.4.21. states, "Demonstrate, evaluate, and utilize the principles of the teaching–learning process using educational methods and health literacy education approaches" (p. 32). The Interprofessional Education Collaborative (2016) also identifies health literacy as a required competency within Competency 4, "Communicate with patients, families, communities, and professionals in health and other fields in a responsive and responsible manner that supports a team approach to the promotion and maintenance of health and the prevention and treatment of disease" (p. 10). Research indicates that despite available health literacy protocols and strategies to mitigate low health literacy, both data and narrative experience reports imply healthcare professionals are utilizing these skills at a suboptimal rate (Coleman, Hudson, & Maine, 2013).

Development and provision of client education materials are an important part of the practitioner-client dynamic. Home programs often serve as part of an ongoing dialogue between health professional and client. However, an individual cannot successfully apply information received if they are unable to understand the information provided (Smith & Gutman, 2011). Data on health literacy suggests that 50% of U.S. adults are unable to understand basic healthcare information or instructions. Actual proficiency in health literacy is demonstrated in only 12% of U.S. adults (Hogan et al., 2013; Kutner, Greenberg, Jin, & Paulsen, 2006). Furthermore, Smith and Gutman (2011) stated, "the average American reads at a 6th-grade level, yet most health information is written or verbally communicated at a 10th-grade level" (p. 367).

Low health literacy is negatively associated with major healthcare indices: health outcomes, hospitalization and re-admission rates, use of healthcare preventive and promotional services, adherence to medication, and lifespan (Kickbusch, Pelikan, Apfel, & Tsouros, 2013). Understanding relevant health information can increase the ability of individuals to actively participate in their own healthcare, and the healthcare of family members. The new direction of health literacy emphasizing health promotion and

contextual factors influencing health outcomes aligns well with foundational values of the education and profession of occupational therapy. The Occupational Therapy Practice Framework: Domain and Process (3rd Edition) describes an occupational focused approach to health promotion and well-being (American Occupational Therapy Association [AOTA], 2014). In their *Societal Statement on Health Literacy*, the AOTA (2011) identified the role of the profession to "promote health through the development and use of health education approaches and materials that are understandable, accessible, and usable by the full spectrum of consumers" (p. S78).

Despite the positive implications and published strategies for health literacy and health promotion, healthcare providers routinely cite lack of competence, time constraints, and limited access to materials and appropriate environments as barriers to effective teaching (Bastable, 2006; Falvo, 2011; London, 2009). Complicated healthcare language compounds usability of information. When describing the assessment of readability levels of healthcare information, Rudd (2017) noted a "clear trend emerging from this strand of research is that the literacy demands of the materials exceed the literacy abilities of the intended audiences" (p. 22). Assessments and recommendations to improve health literacy in healthcare are an ongoing process. Levasseur and Carrier's (2012) scoping review highlighted six ways to integrate health literacy into occupational therapy: 1) be informed about and recognize health literacy, 2) standardize practice, 3) make information accessible, 4) interact optimally with clients, 5) intervene, and 6) collaborate to increase health literacy (p. 308).

One of the recognized methods to improve the health literacy of professionals is to integrate it into the curriculum of health professions' education, enabling newly trained professionals entering the workforce to be health literacy *literate*. One curricular strategy is to focus on written material. In 2007, Stableford and Mettger called for the use of "plain language" communication. This has developed into standards of design that include writing in an active voice, and using simple language void of jargon, value judgment words, or other complex arrangements such as acronyms (Smith, Hedrick, Earhart, Galloway, & Arndt, 2010). Levasseur and Carrier (2012) cited the importance of developing readable client educational materials. Occupational therapy practitioners may foster active client participation by developing and using readable client educational materials. The researchers designed a SOTL study examining this educational strategy for strengths and areas for further development.

METHODS
The study compared patient education materials designed by first year (OTD1) and second year (OTD2) students. The materials, denoted *home programs,* were required course assignments, initially assessed as part of course requirements and routine program evaluation. Students designed home program assignments within two courses, one year apart in the curriculum. OTD1 students were enrolled in a course addressing occupational therapy process for adults with physical disabilities. OTD2 students were enrolled in a course addressing occupational therapy process for older adults. Students engaged in approximately 2 hours of instruction per course related to health literacy, in addition to digital video and print study resources. Home programs addressed various

strategies and techniques for promoting client health and safety. Students received rubrics and reminders regarding plain language writing standards prior to home program development. Learning objectives, assignment, and rubrics were comparable for each course with the intent that student competence would change over time. Participation in the research study and evaluation of health literacy practices had no impact on the students' grades. Researchers' evaluation of home programs was completed after course completion. The University Institutional Review Board approved the study as exempt [1243389-1].

Data Collection
Faculty assigned to the respective courses graded home programs of all enrolled students as part of routine marking. Students were given the option to have their work reviewed as part of the health literacy study. Researchers reviewed home programs only for students who signed consent forms. Course faculty de-identified assignments released to researchers. Researchers reviewed six (6) OTD1 home programs (representing the work of 13 students), and ten (10) OTD2 home programs (representing the work of 20 students).

Instruments
Researchers reviewed home programs using the Health Literacy Advisor (HLA; Health Literacy Innovations, 2018), and the Patient Education Materials Assessment Tool – Printable (PEMAT-P; Shoemaker, Wolf, & Brach, 2014). The HLA is an interactive health literacy software tool that scores readability of word documents, highlights difficult terms, and suggests plain language word replacements. This tool objectively measures with common readability indexes such as the Fry, SMOG (Simple Measure of Gobbledygook), Flesch-Kincaid Grade Level (FKGL), and Flesch Reading Ease Scale (FRES) (Health Literacy Innovations, 2018). Readability indexes provide rough estimates of the level of written material, however, do not identify medical terms, jargon, length of sentences, or complex words. The Fry readability score, SMOG Index, and FKGL score each estimate the grade level needed to understand text. For these measures, a lower score is better, meaning text material is easier to read. The FRES calculates text complexity on a scale of 0 to 100. For the FRES, a higher score is better, with a score 60-70 typically understandable for a teen. There is great variability among these measures, and no one accepted standard.

Readability indexes do not assess usability of the document, clarity of visuals, or measure how well people understand what they are reading (McGee, 2010). In addition, scores produced through computer analysis may be 2-3 grade levels lower than hand scoring (Ohio State University College of Medicine, 2007). The Agency for Healthcare Research and Quality (AHRQ), designed the PEMAT-P as a guide to help ascertain if clients will be able to understand and act upon shared information (Shoemaker, Wolf, & Brach, 2014). The PEMAT-P offers subjective assessment of user ease regarding understandability and actionability of materials.

Data Analysis
Researchers calculated objective readability scores using the HLA. Researchers used the social science statistics calculator to compare OTD1 and OTD2 as independent samples for each readability index using the Mann Whitney U test. A Mann Whitney is commonly used to compare two independent samples that are not normally distributed. Researchers used the *scan and highlight* feature in the HLA software tool to objectively identify *difficult to understand* health and non-health terms (HLI, 2018). Researchers further categorized difficult words using *words to watch* categories from the Partnership for Clear Health Communication (National Patient Safety Foundation [NPSF], 2016). Categories include medical words (describes health); concept words (describes ideas); category words (describes a group); and value judgment words (requires an example to convey meaning). Researchers used the social science statistics calculator Mann Whitney U test to compare OTD1 and OTD2 as independent samples for each difficult to understand terms: health, non-health, and total. To review usability, researchers applied the PEMAT-P for subjective, systematic assessment of the understandability and actionability of home programs. Researchers compared standard deviations for clustering. They completed no statistical analysis for this subjective hand scored material.

RESULTS
Table 1 details HLA objective readability. Students' overall writing averaged near the recommended 6th grade level for readability. HLA results indicate median readability index levels of OTD1 home programs: Fry 7.3, SMOG 9.6, Flesch-Kincaid 5.7, and Flesch Reading Ease 69.6; and median readability index levels of OTD2 home programs: Fry 6.3, SMOG 8.2, Flesch-Kincaid 5.6, and Flesch Reading Ease 76.5. OTD2 home programs on average across the four index measures show an improvement in readability from OTD1 of approximately 10%. The average Fry improved from grade level 7.3 to 6.3. The average SMOG improved from grade level 9.6 to 8.2. The average Flesch-Kincaid improved from grade level 5.7 to 5.6. The average Flesch Reading Ease improved from reading ease 69.2 to 76.5. While there is a suggestion of clinical significance, no Mann Whitney U values were significant at the $p < .05$. level comparing OTD1 to OTD2 for Fry, SMOG, Flesch-Kincaid or Flesch Reading Ease.

Table 1

Health Literacy Advisor (HLA) Index Scores: Readability Index

Home Program (OTD1)	Fry	SMOG	Flesch-Kincaid	Flesh Reading Ease
		Readability Index		
Topic 1	7.0	9.0	5.9	63.8
Topic 2	7.0	9.4	6.1	72.8
Topic 3	7.0	9.6	6.8	71.1
Topic 4	5.0	8.3	4.7	84.6
Topic 5	11.0	12.5	5.0	54.1
Topic 6	7.0	9.0	5.7	71.0
OTD1 - average	**7.3**	**9.6**	**5.7**	**69.6**
OTD1 - standard deviation	1.8	1.3	0.7	9.2
Home Program (OTD2)	Fry	SMOG	Flesch-Kincaid	Flesch Reading Ease
		Readability Index		
Topic 8	6.0	9.3	5.8	74.4
Topic 9	12.0	11.1	8.7	50.8
Topic 10	5.0	6.4	4.5	84.2
Topic 11	9.0	11.0	8.6	63.9
Topic 12	3.0	3.1	2.5	95.2
Topic 13	6.0	9.2	5.6	78.5
Topic 14	6.0	8.4	5.0	71.2
Topic 15	3.0	5.8	3.2	93.7
Topic 16	5.0	7.2	4.3	85.4
OTD2 - average	**6.3**	**8.2**	**5.6**	**76.5**
OTD2 - standard deviation	2.6	2.5	2.1	13.1
Change	Fry	SMOG	Flesch-Kincaid	Flesch Reading Ease
		Readability Index		
OTD1 to OTD2 % change	**-14%**	**-15%**	**-1%**	**10%**

Table 2 describes HLA difficult to understand terms with a 50% reduction in total number of terms used from OTD 1 to OTD 2. The average total number of difficult to understand terms improved from 63.7 to 32.1. There was an observable change in the use of difficult to understand words between OTD1 and OTD2 home programs, however, the average OTD2 program still had more than 30 identified difficult to understand words. Appendix A provides a non-inclusive list of HLA difficult to understand words used in the home programs, organized by *words to watch*: medical, concept, category, and value judgment words (NPSF, 2016).

Table 2

Health Literacy Advisor (HLA) Difficult to Understand Terms (Health, Non-Health, and Total)

	Difficult to Understand Terms		
Home Program (OTD1)	Health	Non-Health	Total
Topic 1	19.0	56.0	75.0
Topic 2	17.0	73.0	90.0
Topic 3	5.0	99.0	104.0
Topic 4	5.0	39.0	44.0
Topic 5	-	18.0	18.0
Topic 6	6.0	45.0	51.0
OTD1 - average	**8.7**	**55.0**	**63.7**
OTD1 - standard deviation	6.9	25.8	29.1
	Difficult to Understand Terms		
Home Program (OTD2)	Health	Non-Health	Total
Topic 7	22.0	48.0	70.0
Topic 8	9.0	72.0	81.0
Topic 9	-	28.0	28.0
Topic 10	2.0	21.0	23.0
Topic 11	3.0	41.0	44.0
Topic 12	1.0	7.0	8.0
Topic 13	-	9.0	9.0
Topic 14	12.0	40.0	52.0
Topic 15	-	6.0	6.0
Topic 16	-	-	-
OTD2 - average	**4.9**	**27.2**	**32.1**
OTD2 - standard deviation	6.9	21.8	27.0
	Difficult to Understand Terms		
	Health	Non-Health	Total
OTD1 to OTD2 average % change:	-43%	-51%	**-50%**

Table 3 describes PEMAT-P subjective scores showing a negligible decline (-1%) from OTD1 to OTD2 in understandability, and a slight decline (-10%) from OTD1 to OTD2 year in actionability. PEMAT-P scores show a negligible decline (-1%) from OTD1 to OTD2 in understandability with the average of 86.7 and 86.2, and a slight decline (-10%) from OTD1 to OTD2 in actionability from 94.3 to 85.3.

Table 3

Patient Education Materials – Printable (PEMAT-P) Scores

Home Program (OTD1)	PEMAT-P	
	understandability	actionability
Topic 1	81.0	83.0
Topic 2	88.0	100.0
Topic 3	81.0	100.0
Topic 4	88.0	100.0
Topic 5	88.0	83.0
Topic 6	94.0	100.0
OTD1 - average	**86.7**	**94.3**
OTD1 - standard deviation	4.5	8.0
Home Program (OTD2)	PEMAT-P	
	understandability	actionability
Topic 8	73.0	100.0
Topic 9	64.0	33.0
Topic 10	87.0	100.0
Topic 11	94.0	100.0
Topic 12	83.0	40.0
Topic 13	94.0	100.0
Topic 14	88.0	100.0
Topic 15	93.0	100.0
Topic 16	93.0	80.0
OTD2 - average	**86.2**	**85.3**
OTD2 - standard deviation	9.7	25.2
Change	PEMAT-P	
	understandability	actionability
OTD1 to OTD2 % change	**-1%**	**-10%**

DISCUSSION

Occupational therapists and students are responsible for developing and providing client-centered, readable, and useful information to support health promotion. In the healthcare environment, occupational therapists are often mediators of the interface between the health system and the client. There is a responsibility to provide information in a way that is accessible. Accessible means it is both understood and in support of client education: the active engagement of people in their own health.

This case report reviewed OTD student-developed home programs, measured for readability and usability. Data suggests that student awareness of health literacy changes over time in response to curricular content, but implementation needs practice. While there is substantial limitation due to sample size in this report, SOTL studies provide insight into effectiveness of teaching strategies. Overall trends of student behavior provide relevant and actionable information for educational consideration.

A reduction in HLA difficult to understand terms is notable from OTD1 to OTD2, though it is only part of the usability of home programs. HLA readability indexes indicate reading level without a direct connection to the home program being useable. Results showed that client educational materials were created at a high or difficult level of readability by both OTD1 and OTD2 writers. When researchers assessed home programs using the PEMAT-P, the data revealed a complex picture. The most illuminating information is in regard to the use of language, suggesting a potential blind spot in the profession. Occupational therapy relies on teaching and interacting with clients, often using jargon such as *energy conservation*, *devices*, and *fall prevention*. Jargon may decrease the usability of essential health information for clients. Students develop such a strong grasp of medical vernacular during their education that they forget how to communicate using plain language. As seen in Table 2, the standard deviation was large in the difficult to understand term use indicating inconsistency in students' health literacy skills within each class. The researchers concurred with Brown and Bourke-Taylor (2012) who highlighted language, specifically jargon, as a potential bridge or divide for health professionals and clients.

Educational theory advises that providing corresponding information through various formats improves understanding (Paivio, 1990). Written home programs and spoken review in plain language may be incorporated into teach-back, a method of ensuring information is explained to the client in a way that was understood (Brega et al., 2015).

Implications for Occupational Therapy Education
Educational theory supports occupational therapy students' understanding of health literacy through various formats. Researchers recommend additional strategies to incorporate health literacy content into educational curricula. Researchers recommend students interact with clients directly following design of home programs. Students could apply teach back concepts, observe how clients receive and act on information, check for client understanding, and incorporate client feedback into development of patient education material. Collaboration with clients under faculty mentorship will help occupational therapy students to hone health literacy communication skills.

CONCLUSION
The researchers recommend incorporation of health literacy concepts into practice, education, and research. Ongoing SOTL inquiry into innovative health literacy education within occupational therapy and occupational therapy assistant programs can improve teaching strategies and curricula. Inquiry could examine longitudinal outcomes within different settings and populations. Applying health literacy concepts have the potential to better prepare practitioners for a team approach in health promotion and prevention.

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Appendix

Sample of HLA difficult to understand words: organized by "words to watch" classification (NPSF, 2016).

Medical Words	
• abdomen	• medication
• abduction	• "medication management"
• CMC, MCP, PIP	• mobility
• exhale	• Occupational Therapist / therapist
• extension	• osteoarthritis
• "fall prevention"	• "pain management"
• flexibility	• practitioner
• flexion	• provider
• hormones	• "sleep hygiene"
• inhale	

Concept Words		
• access	• incorporate	• prioritize
• alleviate	• independent/	• processing
• balance	independence	• recovery
• conservation	• interactions	• relaxation
• contracts	• maintain	• release
• diagonally	• mindfulness	• stimulate
• elevation	• perform / performance	• subscribe
• "energy conservation"	• personal / personalized	• utilizing
• engagement	• prevent / prevention	
• functions		

Category Words	
• artificial	• guidelines
• comprehensive	• instructions
• device / devices	• precautions
• exercises	• service
• factors	• utensils

Value Judgment Words	
• achieve	• pain tolerance / "within pain tolerance"
• alternate	• pleasurable
• consistently	• preference
• convenient	• recommend
• correctly	• regularly
• efficiently	• significant
• meaningful	• strenuous
• "moderate" rate	• tolerance
• optimal	