Promoting person-centered measurement using keyform maps within an occupational therapy curriculum

Dr. Cynthia L Sears
Hawaii Pacific University

Dr. Brad E. Egan
DePaul University

ABSTRACT

Person-centered approaches to measurement are needed to more fully reach the goals of person-centered practice. Keyform maps, derived from Rasch analysis and principles of person-centered measurement, are thought to be an important tool for translating person-centered measurement into clinical practice. The purpose of this study was to understand the impact of keyform map use in a variety of learning activities embedded across multiple courses in an entry-level occupational therapy curriculum. This paper includes a description of 3 keyform map learning activities and corresponding results. The effects of keyform maps as a signature instructional strategy within entry-level occupational therapy education and implications for future studies are also discussed.

Keywords: person centered care, Rasch, measurement, keyform maps, curriculum

INTRODUCTION

The idea of providing person-centered, holistic care has been widely promoted and recognized as the gold standard approach to service delivery across many different health professions. Often used synonymously with "client-centered", "patient-centered", "resident-centered", or "consumer-centered", person-centered care refers to a way of making health care decisions that reflects an understanding of a patient as a whole person (not their diagnosis) and prioritizes their autonomy, mutual respect, expertise in living with a condition, and personal values, beliefs, and needs (Wallengren et al., 2022). While there is no universally accepted definition of person-centered care, most health organizations, researchers, policymakers, and clinicians agree that the term "person-centered care" reflects a broader perspective than the term "patient-centered care" and reinforces a shift which centers the person rather than the practitioner in the primary healthcare decision-making role. (American Geriatrics Society Expert Panel [AGSEP], 2016; Park & Choi, 2020).

Person-centered care has been lauded as a primary practice for enhancing and improving the quality of care within a variety of healthcare settings (Louw, Marcus, & Hugo, 2020; Schwind et al., 2014; Wallengren et al., 2022). The core attributes of person-centered care (i.e. positive regard for personalized care, individuality, personal preferences, and holistic care) have been associated empirically with positive health outcomes for both the clients and providers alike. For example, strong evidence exists to substantiate that person-centered care is associated with improved blood pressure, psychological wellbeing, shorter hospital stays, better functional performance, and improved quality of care (Wallengren et al., 2022). Benefits for healthcare workers include decreased workload, increased job satisfaction, fewer complaints from patients, and lowered costs associated with providing care (Louw, Marcus, & Hugo, 2020). Despite such promising outcomes, research overwhelmingly suggests that clinicians face many challenges and barriers to fully integrating person-centered into their practice (Schwind et al., 2014).

One barrier, among many, that researchers have identified is the lack of person-centered approaches to evaluation and measurement. According to Penrill (2018), "person-centred care needs person-centred measurement" (p.1), especially if traditional outcome measures are to fully inform person-centered care. Rasch models, based on Item Response Theory rather than Classical Test Theory, provide an approach to measurement that is based on the probabilistic relationship between the person's ability and the test item's difficulty level. Classical approaches to measurement focus on group data and making numbers meaningful at the group level, thereby virtually ignoring the individual client (Velozo, 2021). Conversely, Rasch models generate an interval measure scale that focuses on the client and more clearly reflects what they can and cannot do relative to the actual items on an assessment (Sears & Egan, 2022).

The occupational therapy profession identified client-centered practice as an explicit cornerstone of practice, suggesting that all outcomes in some way depend significantly upon the degree to which clinicians translate this into their practice (American Occupational Therapy Association [AOTA], 2020). As such, the profession has identified a clear need for a measurement model that focuses on the individual rather than group data (Velozo, 2021). In fact, in the 2020 Eleanor Clarke Slagle Lecture, Dr. Craig Velozo (2021) urged the profession to embrace a person-centered approach to measurement that "focuses on the client and provides a picture or pattern of the client's performance on our instruments" (p. 1) which can be used to inform daily person-centered care practice. Additionally, he suggested the use of keyform maps

as one possible method for translating person-centered measurement into practice with individual clients (Velozo, 2021).

Keyform maps are generated from Rasch analysis and graphically illustrate an individual client's performance and skills relative to an assessment's item difficulty hierarchy. Rather than presenting the items on the assessment in order of administration, a keyform generally visually orders the items statistically easier to perform or endorse on the bottom to those most difficult on top. Keyform maps reveal two critical pieces of person-centered information: their performance or ratings and their response pattern to items. Thus, a clinician can look at a keyform and immediately visualized how an individual's measure directly corresponds to their ability relative to the assessment's easy-to-difficult item hierarchy. Moreover, clinicians can easily identify skills that are emerging to plan just-right challenge interventions, collaborate with the client to identify short- and long-term goals, and personalize rehabilitation decision-making (Grattan, Velozo, Skidmore, Page, & Woodbury, 2019; Sears & Egan, 2022; Velozo, 2021).

The Pediatric Balance Scale is a common rehabilitation measure that assesses client balance deficit challenges. Table 1 (Appendix) is an illustration of a keyform map created using a Rasch analysis study of the Pediatric Balance Scale (Darr et al., 2015), a modified version of the Berg Balance Scale for children with non-severe motor delays (Franjoine et al., 2003). Often assessment item administration is designed for efficiency and convenience of administration, not item task difficulty. To this end, the items on a keyform are not in assessment administration order, but instead in order of easiest skills assessed at the bottom of the map to the hardest skills at the top of the map. In this case specifically, eight of the 14 test items on the Pediatric Balance Scale are not administered in order from easy to hard. Another feature of the keyform maps illustrated here is that the columns are color coded; ratings of 4 indicate mastery of the task (green), ratings of 3 on a task require minimal support (yellow) and ratings of 1 or 2 indicate impairment or inability to complete the task (red). Clients are more likely to get higher ratings on the easy items and lower ratings on the higher items. Items in the "transition zone" are coded in yellow and signify tasks that are at the just-right challenge for the individual. Sears and Egan (2022) investigated the use of keyform maps in OT education with preservice learners and found that these features showed them two things more clearly: (1) the just right challenge for the client and (2) a task hierarchy that helps personalize the occupational therapy process to the client.

Velozo's (2021) call to rethink measurement in occupational therapy was wide, extending to practitioners in every setting, including academia. His message provided clinical faculty with an invitation to consider new pedagogies and instructional methods to support learners in developing habits and practices around person-centered measurement. Although the use of keyform maps in occupational therapy practice had been explored in previous studies, its application to education was limited to a doctoral capstone project (Sears, 2021). Since then, additional studies have explored occupational therapy students' qualitative experiences of using keyform maps in class (Sears & Egan, 2022) and their impact on students' clinical reasoning relative to selecting treatment goals and the just-right challenge (Egan & Sears, 2022). This call to action and initial positive impacts with occupational therapy students opens up ideas for considering new pedagogies and instructional methods to encourage pre-service learners to develop a personalized-measurement mindset to support person-centered care in occupational therapy practice.

Recent evidence identified that occupational therapy educators tend to utilize a narrower repertoire of instructional methods compared to educators in other professions and need to better understand how instructional methods can be used effectively to support the development of

clinical reasoning (Henderson, Coppard, & Qi, 2017) Shifts in teaching and pedagogy within professional programs are often carefully considered against external accreditation and professional education standards. Entry-level occupational therapy education within the United States is governed by standards developed and evaluated the Accreditation Council for Occupational Therapy Education (ACOTE®). These standards are routinely updated to reflect the mission and vision of the profession, expected student outcomes that translate into competent practitioners, and interpretive guidelines to support educational programs in developing curricula and learning activities that reflect current best practices and emerging areas of practice (ACOTE, 2018). Currently there are four distinct standards that address evaluation and intervention planning, which are listed in Table 2 (Appendix). These standards may be effectively addressed pedagogically through explicit instruction on keyform maps and learning activities that support learners in adopting habits around using them in practice to ensure that person-centered measurement informs person-centered practice.

PURPOSE

This article has three primary aims: first, to demonstrate how keyform maps were used instructionally in several different courses across an entry-level occupational therapy master's (MSOT) program; second, to share outcomes associated with each instructional learning activity described; and third, to continue the exploration of keyform map use in an educational context with pre-service learners to support habit development of person-centered measurement practices. Although these three objectives are mutually reinforcing, each is somewhat separable. As such, this article includes distinct sections that relate back to different components of these aims. This article also intends to add to the current literature by exploring this across an entire curriculum rather than in isolation to a discrete learning activity (Egan & Sears, 2022) or to an optional elective course (Sears & Egan, 2022).

METHODS

Participants and Setting

This study includes data collected on graduate students enrolled in an entry-level, full time Master of Science in Occupational Therapy program at a small, regional liberal arts university with a satellite campus location. An identical, 27-month, 70 credit hours curriculum was used at both locations as indicated in Table 3 (Appendix). Sample sizes vary throughout this report based on whether a course was taught simultaneously to both cohorts and student attrition. This study was approved by the institution's IRB where both authors were previously employed. Some students participated in structured follow-up interviews and surveys. The qualitative results of have been reported elsewhere (Sears & Egan, 2022).

Instruments

This study utilized the keyform maps derived from the Berg Balance Scale, the Occupational Self-Assessment (OSA), and the ABILHAND-Kids. The keyforms for the Berg Balance Scale and the ABILIHAND-Kids were taken from www.patientprogress.org, an open

source and growing repository of keyform maps. The OSA keyform was taken directly from the assessment manual.

Design and Data Analysis

This study used a quantitative design to analyze the impact of keyform use on learner outcomes. All data was collected during the 2021-2022 academic year and analyzed the semester after each course was finished using SPSS version 21. A paired t-test was used to compare the group's performance with and without a Berg Balance keyform map. Respectively a chi-square test was conducted to compare performance between learners who and learners who did not use keyform maps to answer clinical case questions.

Instructional Interventions

OCC 503 Procedures and Results

The first introduction to keyform map use occurred in a first-semester foundational course, *OCC 503: Principles of Occupational Therapy*. It was taught simultaneously to two cohorts, one in person and one receiving streaming instruction at satellite campus location. The course addressed critical topics around activity analysis, grading for ease and difficulty, and determining interventions that accurately reflect a client's just-right challenge. Learners were asked to review a case study including a client's Berg Balance scores and make decisions about whether certain activities would be easy or hard for the client to complete and to select appropriate just-right challenge activities. Immediately following, learners were provided with a lecture and explicit instruction on keyform maps and asked to complete the activity a second time using a Berg Balance keyform. Egan and Sears (2022) reported that the results of a t-test showed students' ability to determine the level of difficulty and just-right challenge interventions were statistically significantly better (p< 0.01) when using the keyform.

OCC 514 Procedures and Results

The second opportunity was embedded in *OCC 514: Mental Health,* a second semester course. Learners were provided explicit instruction on administering, scoring, and interpreting assessment data from the Occupational Self-Assessment (OSA; Baron, Kielhofner, Iyenger, Goldhammer, & Wolenski, 2006).   Additionally, students completed a quiz on the OSA keyform associated with the assessment. In a final course practicum, a keyform map was made available at the station but learners were not explicitly instructed to use it to answer case questions. Thirty-seven learners completed the practicum. Twenty-one learners elected to use the OSA keyform map and 18 answered the question correctly. Conversely, 16 learners did not notice and/or use the OSA keyform to inform their case response and only five answered the question correctly. A chi-square analysis revealed a statistically significant association between using the keyform map and answering the person-centered measurement question correctly (p<0.01).

OCC 524 Procedures and Results

During the third semester of the first didactic year, occupational therapy students used keyform maps in the core course *OCC 524 Pediatrics* to support developing a person-centered home program and to guide the process of developing and documenting a person-centered discharge summary. A standardized client case study highlighting a child with hemiplegia following an AV malformation rupture was used for both assignments as indicated in Table 4 (Appendix). Client information was offered which included the option to click a link to access the child's ABILIHAND (Arnould et al., 2004) keyform map as a support tool. For step 1, the client was being discharged from the outpatient setting and the assignment was to create a home program. Thirty-five of the 36 (97.2%) enrolled in the course accessed the link and accurately created a home program that incorporated person-centered measurement data to recommend just right challenges. A chi-square analysis significantly suggested a strong, statistically significant relationship (p=0.0036) between keyform map use and home program activities at the client's just right challenge level.

Additionally, the assignment challenged learners to document progress at the time of discharge for a receiving occupational therapist in a different setting. Specifically, the case presented a child who was moving from an outpatient setting to school systems practice. This assignment was more challenging because it required the student to contextualize keyform map information to occupations, goals, and models of service delivery that are customarily associated with school systems practice. Results indicated that the ABILIHAND (Arnould et al., 2004) keyform map was accurately used to create an appropriate discharge summary by 30 of the 36 students. Successful students selected personalized recommendations and progress updates specific for the new treatment setting. Again, a chi-square analysis revealed a statistically significant relationship (p=0.0006) between keyform map use and person-centered practice recommendations.

CONCLUSION

This study revealed that a curriculum embedded with keyform map activities supported learners in using person-centered measurement to inform their clinical decisions and practice. When learners used keyform maps to support their clinical reasoning and reflect on the relationships between the client's performance and the item difficulty hierarchy, they more accurately assessed the level of difficulty of potential intervention activities, selected interventions that reflected the client's just right challenge, identified short- and long-term goals, and determined discharge recommendations. These findings were corroborated qualitatively in another study which focused on the learners' experiences of using keyform maps during their educational training (Sears & Egan, 2021). The embedded nature of keyform map use also supported learners in developing habits of use, as evidenced by the continued increase in the percentage of learners who accessed keyform maps when completing learning activities. Finally, this study provides initial support for the feasibility of using keyform map activities as a signature instructional strategy across an entry-level graduate professional occupational therapy program. Occupational therapy educators are encouraged to not only teach learners about keyform maps but also to teach them how to reason clinically with the data.

IMPLICATIONS

Future implications of promoting person-centered measurement using keyform maps within an Occupational Therapy curriculum include consideration for adopting a course devoted to the instructional use of keyform maps, Rasch analysis and person-centered measurement versus micro dosing the instructional support tool embedded across specific courses in a curriculum. Studies have shown support for use of keyforms during student didactic coursework and future studies should be considered to explore the role of keyform use during clinical fieldworks to better understand how this training may translate into practice. Additionally, studying the strengths and barriers of using keyform maps in entry level practice and investigating any biases experienced from more experienced colleagues who are less familiar with keyform map use and consider their clinical experiences sufficient in meeting the challenge of person-centered assessments is warranted.

LIMITATIONS

Limitations of this study include the convenient sampling of student participants enrolled in the program in which both authors were instructors. The sample size of the participants in each learning activity was relatively small. Furthermore, the process for embedding keyform map use was mostly based on courses that authors were assigned to teach. A more intentional and systematic approach that considers curricular threads and goals may have identified alternative course opportunities in which to incorporate keyform map training and practice.
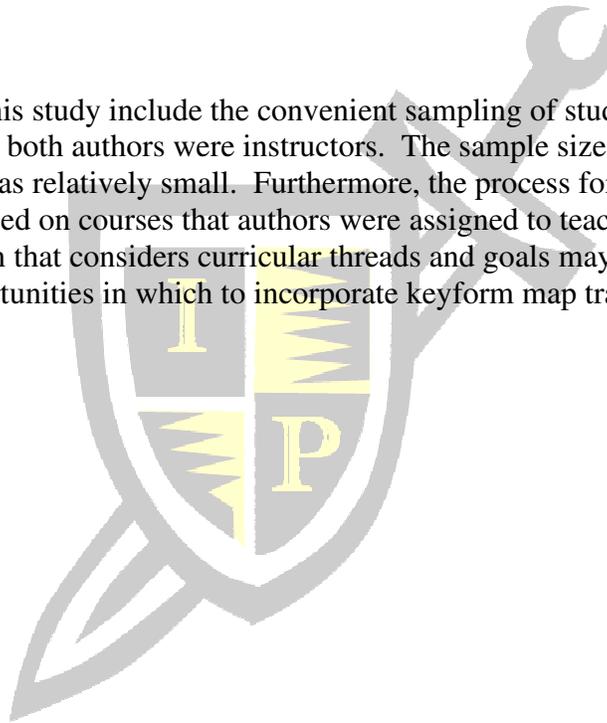
APPENDIX

Table 1:

Rasch Analysis Keyform of the Pediatric Balance Scale Item Difficulty Hierarchy (Darr et al., 2015)	
Task Item	Score:
Client: JR	
#8 Standing with one foot in front	1
#9 Standing on one foot	2
#14 Reaching forward with outstretched arm	3
#10 Turning 360 degrees	2 Just right challenge zone
#6 Standing unsupported eyes closed	3
#13 Placing alternate foot on stool	3
#4 Standing unsupported	4
#2 Stand to sit	4
#11 Turning to look behind	4
#12 Retrieving object from floor	4
#1 Sit to stand	4
#3 Transfers	4
Scoring is on a scale of 0-4 with 0 being low ability and 4 being high ability. The score criteria is specific for each task. *See Appendix B for the complete Berg Balance Scale items, administration, and scoring interpretation	TOTAL: 38 This keyform functional map reflects the client would benefit from a short-term goal of safely participating in ballet or other form of preferred dance. This client would benefit from consideration of a long-term goal to address

	improving balance when a narrow base of support is required like walking a balance beam in PE class.

Table 2:

ACOTE (2018) Standards addressing Evaluation and Intervention Planning Skills:	
Accreditation Standard Number	Standard for Master's-level OT program
B.4.2	Demonstrate clinical reasoning to evaluate, analyze, diagnose, and provide occupation-based interventions to address client factors, performance patterns, and performance skills.
B.4.4	Interpret evaluation findings of occupational performance and participation deficits to develop occupation-based intervention plans and strategies. Intervention plans and strategies must be client centered, culturally relevant, reflective of current occupational therapy practice, and based on available evidence.
B.4.7	Interpret criterion-reference and norm-referenced standardized test scores on the basis of an understanding of sampling, normative data, standard and criterion scores, reliability, and validity
B.4.9	Design and implement intervention strategies to remediate and/or compensate for functional cognitive deficits, visual deficits, and psychosocial and behavioral health deficits that affect occupational performance (Accreditation Council for Occupational Therapy Education [ACOTE], 2018, pp. S39, S41).

Table 3:   CURRICULUM SEQUENCE (70 credits)

Year 1	<u>Summer I Semester:</u> 12 **OCC 503 Principles of Occupational Therapy (4)*** OCC 574 Musculoskeletal Anatomy and Movement Analysis (4) OCC 584 Applied Neuroscience for Rehab (4)	<u>Fall Semester:</u> 14 OCC 504 Physical Rehabilitation with Lab and FW (5) OCC 505 Health Systems (2) **OCC 514 Mental Health with Lab and FW (5)*** OCC 623 Assistive Technology (2)	<u>Spring Semester:</u> 15 OCC 502 Research and Evidenced Based Practice (3) OCC 512 Therapeutic Processes for Orthopedic Functioning (2) **OCC 524 Pediatrics with Lab and FW (5)*** OCC 534 Gerontology with Lab and FW (5)
Year 2	<u>Summer II Semester:</u> 3 OCC 571 FWIIA (3)	<u>Fall Semester:</u> 11 OCC 602 Grand Rounds I (2) OCC 603 Treatment & Assessment (3) OCC 633 Administration and Program Development (3) **OCC 651 Therapeutic Processes for Cognitive and Neurological Functioning (3)**	<u>Spring Semester:</u> 12 OCC 612 Grand Rounds II (2) OCC 613 Treatment & Assessment (3) OCC 691 Professional Reasoning (2) OCC 692 Leadership (2) **OCC 693 School Systems Practice (3)**
	<u>Summer III Semester:</u> 3 OCC 672 FWIIB (3)		

An * indicates courses associated with this study. Bolded titles indicate courses in which keyform map learning activities and assignments were embedded.

Table 4: Polly's Case Study

Polly is a five-year-old Hispanic female referred to outpatient pediatric OT six months post-operative for a surgical repair of a left-sided Arteriovenous Malformation (AVM) repair that ruptured causing bleeding and seizures. Following surgical repair, Polly presents with right-sided hemiparesis with upper extremity involvement being greater than lower extremity involvement. Polly is able to ambulate independently with a limp while wearing a right foot AFO, however, her right upper extremity use has been limited. Prior to her brain bleed, Polly was demonstrating a right-hand preference for functional activities. You have been her Occupational Therapist for the past year.

Polly lives in Phoenix, Arizona and she loves Dora the Explorer. She is transitioning to school based OT intervention next week as she enters Kindergarten. Mom has completed the ABILHAND Kids (Arnould et al., 2004) screener of Polly's functional skills. She reports Polly is able to:

- Take off her shoes and her overhead t-shirts
- She can open and close pull drawers using holding the knob with her left hand
- She can turn a light switch and lamp on and off
- She can take objects out of her pockets using her left hand
- She can open candy wrappers but struggles with chips and crackers and cookie packages
- She needs help with bathing but attempts to do as much as she can
- She attempts to remove caps and tops by assisting with her legs and teeth
- She loves to brush her teeth with her Dora the Explorer vibrating toothbrush
- Dressing is a challenge, however, she can zip up her pants when prompted
- Polly's eye-hand coordination is limited due to a visual field cut on the left side
- Her left upper arm strength is limited

Here is a copy of Polly's ABILIHAND (Arnould et al., 2004) keyform map to use to write a discharge summary from outpatient OT to advise the new school systems OT of her current skills and your recommendations for skills to continue to address. The discharge summary should include a home program for Mom to facilitate Polly's success as a Kindergarten student.
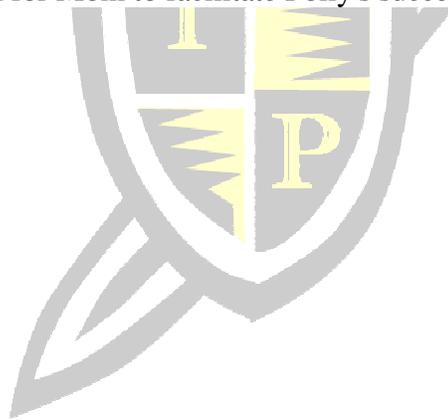
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