Tucker, C., Jacobs, S., & Moreno, K. (2024). Branches from the same tree: A scoping review of learning outcomes frameworks. *Intersection: A Journal at the Intersection of Assessment and Learning, 5*(4), 53-82.

Branches from the Same Tree: A Scoping Review of Learning Outcomes Frameworks

Constance Tucker, Ph.D., Sarah Jacobs, M.Ed., Kirstin Moreno, Ph.D.

Author Note

Constance Tucker, https://orcid.org/0000-0002-6507-8832
Sarah Jacobs, https://orcid.org/0000-0003-0406-3386
Kirstin Moreno, https://orcid.org/0000-0002-1725-5494

We have no conflicts of interest to disclose

Intersection: A Journal at the Intersection of Assessment and Learning
Vol 5, Issue 4

Abstract: Learning outcomes and assessment frameworks guide educators in curricular decision-making, impact assessment, gap identification, and equity evaluation, aligning with anticipated learning objectives. Common frameworks include Bloom's taxonomy, Kirkpatrick's model, Fink's taxonomy, and Moore's Outcomes model. The authors identified a lack of focus on learners' impact and social justice in these frameworks and developed the Evidence of Learning and Impact Framework to address these gaps. They conducted a scoping review, creating a crosswalk between existing frameworks and identifying additional gaps. Findings from the review and crosswalk are presented, discussing the challenges of incorporating frameworks from the Global South into a more rigid structure. The review synthesizes previous knowledge and highlights the importance of multidisciplinary approaches and diverse ways of knowing.

Keywords: *assessment, framework, scoping review, evidence of learning, equity, diverse ways of knowing*

Introduction and context

Whether educators realize it or not, the theoretical and conceptual frameworks that they hold to be true inform their praxis. For example, Bloom's taxonomy as a framework often informs how educators write their learning outcomes, Fink's taxonomy emphasizes concepts critical to successful learning, such as metacognition, interpersonal relationships, and communication, and Kirkpatrick's Model can help curriculum planners evaluate the impact of training (Adams, 2015; Bloom et al., 2001; Kirkpatrick & Hawk, 2006; Uribe Cantalejo & Pardo, 2020). At an academic health sciences university where the authors lead institutional assessment, two frameworks were used at the institutional level to measure and broaden programmatic assessment activities: Bloom's taxonomy and Moore's Outcome Framework. Many other frameworks are used by individual academic and/or student affairs programs to evaluate assessments (Moore et al., 2018). Upon trial, at the institutional level, none of these frameworks allowed for the alignment of all academic program assessments and the institutional goals, so we went through a process of mapping out commonly used frameworks via a crosswalk (Tucker et al., 2021), and then created a synthesis of these frameworks to help academic programs meet institutional goals (Tucker et al., 2021). After the use of the newly synthesized framework through three programmatic assessment cycles, we gathered feedback from institutional assessment partners

on how to improve the synthesized framework. From this process of feedback and examining programmatic assessment activity alignment to the framework, it became clear that a baseline literature review was needed to expand and refine the assessment framework, determine unknown or missing perspectives and practice, determine gaps in knowledge both in the literature and in the authors' assessment practice, and to ground the synthesized framework in evidence-based-practice. To this end, a scoping review approach was chosen to identify missing systematic approaches to examining learner outcomes assessment and to spotlight the gaps that challenge our ability to develop and refine "good" assessment systems that are coherent, continuous, comprehensive, feasible, purpose-driven, acceptable, and equitable (Klein et al., 2019; Low et al., 2019; Miller, 1990).

What is a learning outcomes assessment framework and why should one be used?

For the purposes of this study, authors define learning outcomes assessment frameworks as structured and systematic approaches used to design, implement, and evaluate assessment processes and practices (Nilsen, 2015). An outcomes assessment framework can be used to assess student learning but is not limited to assessment. It could be used to help evaluate instructional effectiveness, programs, and learning outcomes. For example, while Bloom's taxonomy was not designed to evaluate learning outcomes, it is used to assess learning and, therefore, is considered an outcomes assessment framework by the author's definition. Because assessment practitioners often use more than one assessment activity to be able to effectively judge learner competence (Miller, 1990), the use of effective outcomes assessment frameworks can help assessment practitioners examine their assessment practices, make explicit that learning happens in a variety of ways and levels, and determine curricular gaps and overlap. Additionally, an effective assessment framework supports evidence-based decision-making, promotes student learning and development, and helps educational institutions maintain and enhance the quality of their programs.

In contrast, unexamined assessment practices can cause harm, whether intentionally or unintentionally (Lundquist & Henning, 2021). Assessment that is performed with the goal of providing more equitable learning experiences for learners has the possibility of helping to address inequities in higher education (Henning et al., 2022). An equity-minded outcomes assessment framework can help provide a shared assessment vocabulary, clarify our implicit assumptions, increase interdisciplinary collaboration, and acknowledge forward-thinking assessment practices and perspectives (Lundquist & Henning, 2021). While assessment frameworks aid in determining the value and impact of interventions in student learning outcomes attainment, they also help identify and expose gaps in current understanding. With the goals of understanding and exposing current gaps in interdisciplinary assessment frameworks and discovering how assessment frameworks make space for diverse perspectives, we developed three research questions.

Research questions

1. What assessment or evaluation frameworks are used to inform educators' assessment of student learning?

2. What are the purposes, levels, and usefulness of these assessment and evaluation frameworks?
3. What elements of assessment frameworks make space for diverse ways of knowing and the centering of learners, especially through social justice and equity lenses?

Materials and Methods

Scoping review

The aim of systematic reviews is to synthesize the best of "what we know" about a particular phenomenon with the goal of moving forward with a data-informed intervention (Pham et al., 2014). Conversely, a scoping review is not focused on producing focused guidance for decision-making but instead more broadly on mapping evidence, key concepts, and gaps in the available literature (Crotty & Allyn, 2001; Thomas et al., 2020). Based on these parameters, we chose to conduct a scoping review instead of a systematic review of the literature. The project's aim was not to determine the best assessment framework in existence and recommend its use but to understand, categorize, and synthesize which approaches to assessment frameworks exist to inform refinement of our existing model. In addition, the research questions listed in the previous section are amenable to scoping reviews as they, by nature, explore and describe the broad and rich perspectives within the literature and focus less on the quality of evidence provided (Crotty & Allyn, 2001; Thomas et al., 2020). Epistemologically, we took a subjectivist approach to analysis, in which we co-created our understandings based on interactions with the phenomenon, the context in which the research was generated, and our positionality.

Search methods

The first step of the scoping review was to determine the appropriate search terms, to make sure we captured frameworks often overlooked in literature and the frameworks they knew people were using already. Researchers conducted a preliminary search using Google Scholar and assessed white papers and books. The preliminary data informed the search terms that were used in the final search to ensure the identification of a broad range of keywords and increase the number of results.

Researchers, in consultation with a university librarian, conducted a systematic search in December 2022 across four readily available electronic databases: ERIC, Dissertations and Theses, PubMed, and SCOPUS, to be able to capture a broad spectrum of manuscripts from Education but also other disciplines' journals where teaching, learning, and assessment may be discussed, including in the health professions (e.g., PubMed). This search used Boolean operators and was limited to journal articles, grey literature (i.e., position papers, opinion pieces), book chapters, and abstracts published in English during the years 2000-2022. The reference lists of the articles retrieved were manually reviewed by researchers. Throughout 2023, additional handsearching occurred by the authors to identify frameworks not found through our traditional method but through dissemination within academic social media threads or from other readings. Table 1 shows the search terms used in consultation with a university librarian to inform the search.

Table 1

Key terms to inform the final search for research questions 1, 2, and 3

Research questions 1 and 2:
• Assessment OR evaluation OR learn* OR outcomes OR performance • Framework OR approach OR lenses OR taxonomy* OR model OR domain • Higher education or continuing education or college or professional school or technical • Miller's, Blooms, Kirkpatrick, Fink, Medicine Wheel, Moore's, SOLO
Research question 3: Continue previous terms and add at least one word from the list below.
• Diverse OR Indigenous ways of knowing/knowledge OR social justice OR equity lenses • Reflection* OR emotion* OR affective OR spiritual

Note: Search terms (Combined with Boolean operator AND)

Search criteria

Inclusion and exclusion criteria were developed to identify relevant publications and maintain focus on the research questions (Aveyard, 2011). Table 2 outlines the inclusion and exclusion criteria applied in this study. In an effort to provide room for alternative narratives throughout this work, we attempted to make room for unfamiliar perspectives, dissent, and pluralism. As a result, we made exceptions to following the precise criteria to include perspectives that were perceived as 'fringe' (to North American ways of thinking) or that were forward-thinking and provided additional unexpected insights. These particular exceptions were only made when the proposed assessment framework addressed question 3 better than questions 1 and 2.

Table 2

Inclusion and exclusion criteria

Inclusion criteria:	**Exclusion criteria:**
• Must be in higher education • Must be human studies • Must be on the topic of assessment frameworks • Frameworks that are forward thinking approaches to specialty-specific assessment • Must be published in English • Framework has been or is being applied to student learning • Between 2000-2023 • Addresses research questions 1, 2 or 3	• Early childhood or K-12 education • Animal studies • Frameworks that are conventional approaches to specialty-specific assessment • Published in languages other than English • Frameworks that are not or cannot be applied to student learning (i.e., research-informed teaching) • Assessment methods • Prior to 2000 • Full text not available

Search process

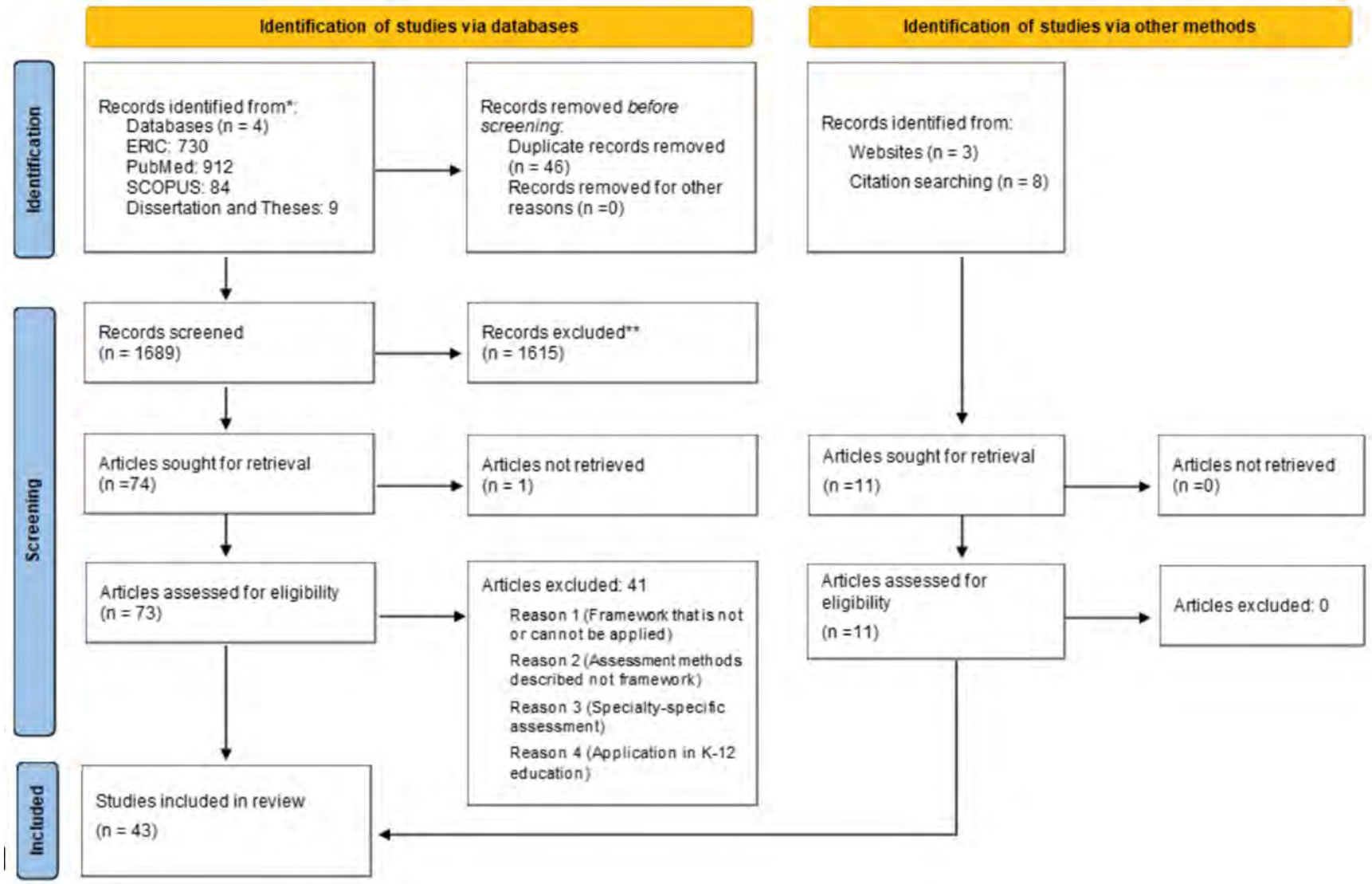
The initial search revealed 1,734 records (1,689 with duplicates removed), which were screened by title and abstract by the lead author and organized in EndNote (The EndNote Team, 2013). Following this, 1,689 articles were screened by the lead author, which resulted in further exclusion of 1,607 articles. A second author reviewed all excluded 1,607 articles and advocated for reconsideration, a handful of which were ultimately added back into the pile to be used for the scoping review. A third author read all 73 remaining articles to confirm the previous authors' findings. The research team then convened to discuss and resolve dissonance and further exclude articles that did not really match the scope until 43 articles were ultimately selected and retrieved as part of the final set of articles for the review. The process of study selection is illustrated as a Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flow diagram (Page et al., 2021) (Figure 1). In an effort to increase trustworthiness in our analysis process, we had at least two authors read every one of the 1,689 abstracts, and at least two authors read the full version of the 73 articles ultimately fully considered for inclusion. We consistently referred to our inclusion criteria, checked in about our understanding of those criteria, and re-read articles as needed to inform our discussion of them. We reached a consensus for each of the articles included at the end of the process.

Data analysis: Charting, summarizing, and reporting the results

We analyzed the research evidence that emerged from the 43 included articles by mapping the frameworks to identify gaps, commonalities, and differences in the results. The data was organized on two spreadsheets. The goal for the first spreadsheet was to chart how the scoping review's assessment frameworks could map onto the authors' previously developed synthesized assessment framework and to note where frameworks had levels that did not easily fit into our categories. We converted each study to a spreadsheet that mapped framework author(s), year, country of publication, article type, purpose, design, levels of the framework, definitions of each level, and results, all of which, were intended to answer research questions 1 and 2.

Figure 1

PRISM Flow diagram of the search process



On the second spreadsheet, data about how diverse ways of knowing and the centering of learners through social justice and equity lenses were captured to answer the third research question. We looked both at the scoping review articles identified earlier in the process, which had a focus on equity, and at the additional culturally-specific, non-western, or non-traditional frameworks that focused more on diverse ways of knowing as it relates to learning and assessment. This data collection and interpretation in the spreadsheet was intended to shed light on Research Question 3.

To both amplify these perspectives and incorporate them into this discussion, we chose to use the Equity-Minded and Equity-Centered Assessment Framework (Henning et al., 2022; Lundquist & Henning, 2021) as an organizer for analyzing the findings of our third research question. Frameworks were identified as being equity-minded (engaged in assessment with an understanding of the historical and social context that has perpetuated exclusionary practices) and/or equity-centered (engaged in assessment with an eye on systematic conditions rather than individual factors). Finally, on the second spreadsheet, memos were written to capture authors' reflections on the analysis (i.e., what it was like to try to fit some of the fluid Global South frameworks into the rigid formatting of spreadsheet columns).

Results

General description of the studies

A total of 43 articles met the inclusion criteria and were selected for review, spanning publications from 2000 to 2023 (Figure 1). The authors of these articles represented a diverse array of 17 countries: Australia (n = 7), Canada (n = 5), Colombia (n = 1), Cuba (n = 1), Ghana (n = 1), India (n = 2), Lebanon (n = 1), New Zealand (n = 2), Panama (n = 1), Saudi Arabia (n = 1), Singapore (n = 1), Slovenia (n = 1), Spain (n = 1), Sweden (n = 2), UAE (n = 1), UK (n = 6), and USA (n = 17) (Table 3).

Table 3

Frameworks, International Scope, and Disciplines

Assessment Frameworks	References	Country of Study or Institutional Affiliation	Disciplines
Assessment Ecology*	Inoue (2015)	USA	English/Writing
Assessment of Higher Education Framework	Thomas et al. (2020)	Australia	Education, Law, English
Blooms (Original)	Higgins et al. (2017)	UK	Radiography
	Kadry and Ghazal (2019)	Lebanon	Technology
	Chimalakonda and Nori (2012)	India	Technology
	Ch and Goteti (2013)	India	Technology

Blooms (Revised)	Bresciani et al. (2010)	USA	Student Affairs
	Moseley et al. (2004)	UK and Australia	Education
	Law and Pang (2014)	Singapore	Engineering
	Elhussein and Düştegör (2017)	Saudi Arabia	Computer Science
	Schoepp (2017)	UAE	Education
	Johansson (2020)	Sweden	English
Equity-Minded and Equity-Centered Assessment*	Henning et al. (2021)	USA	Higher Education
	Lundquist & Henning (2021)	USA	Higher Education
Fink	Fink (2021)	USA	Higher Education
	Fink (2003)	USA	Higher Education
	Uribe Cantalejo and Pardo (2020)	Colombia	Dental Education
Ghanaian Assessment *	Martin et al. (2021)	Ghana and USA	Higher Education
Global Health Learning Progression (GHELP)*	Schellhase et al. (2020)	USA	Pharmacy
Indigenous Assessment Model*	Wall et al. (2023)	USA	Higher Education
Kirkpatrick	Alzaghoul and Tovar (2018)	Spain	Engineering
	Jadallah et al. (2021)	USA	Construction
Kolb	Miller et al. (2005)	USA	Social Work
	McMullan et al. (2003)	UK	Nursing
Learning Dimensions	Lane et al. (2019)	Australia	Higher Education
Marzano Taxonomy	Marzano and Kendall (2007)	USA	Higher Education
	Marzano et al. (2008)	USA	Higher Education
	Moseley et al. (2004)	UK and Australia	Higher Education
Medicine Wheel*	LaFever (2016)	Canada	Higher Education
Miller “Whole Person” Model*	Miller (2000)	Canada	Spiritual/Nursing Education
Moore	Moore et al. (2009)	USA	Medical Education
	Moore et al. (2018)	USA	Medical Education
	Harris et al. (2022)	Canada, UK, and USA	Medical Education
	Lucero & Chen (2020)	USA	Medical Education

Reflective Learning*	Whalen and Paez, (2019)	Canada	Higher Education
	Whalen and Paez (2021)	Canada	Higher Education
Relational Power of Education*	Moore (2005)	Cuba	Higher Education
Six Facets of Understanding	Wiggins and McTighe (2005)	USA	Higher Education
Specify, Explain, Embed, Nudge (SEEN) Framework	Kensington-Miller et al. (2018)	New Zealand	Higher Education
	Longley and Kensington-Miller (2020)	New Zealand	Dance Education
Structure of Observed Learning Outcomes (SOLO)	Miller et al. (2017)	Australia	Higher Education
	Gentile et al. (2020)	Sweden	Engineering
	Cvetek (2013)	Slovenia	Higher Education
	Moseley et al. (2004)	UK and Australia	Higher Education
Student Knowing in Workplace Practice *	Burford et al. (2020)	Australia	Higher Education

* Frameworks that incorporate diverse ways of knowing

Research Questions 1 and 2: What assessment or evaluation frameworks are used in assessment? What are these assessment and evaluation frameworks' purposes, levels, and usefulness in the assessment of student learning?

Because some frameworks showed up in multiple articles, from the 43 identified articles, our scoping review identified twenty-two distinct learning assessment frameworks. Table 3 outlines the frameworks that address Research Question 1. Table 4 provides a summary of each of the frameworks in the scoping review, noting the model's purpose, outlining distinct levels, and highlighting areas the authors find useful in the assessment of student learning addressing Research Question 2.

Table 4

Summaries of Assessment Frameworks that Inform Educators' Assessment of Learners

Assessment Frameworks	Summary
Assessment Ecology	The "assessment ecology" framework, developed by Asao B. Inoue, is a conceptual framework that emphasizes a holistic approach to assessment in education (Inoue, 2015). This framework is a response to traditional assessment practices that often prioritize standardized tests and grades, which can be limited in their ability to accurately measure student learning and achievement. Key components of the assessment ecology framework include multiple measures, transparency, equity and inclusion, feedback and revision, and community engagement.

Assessment of Higher Education Framework	Thomas et al.'s (2020) article proposes an analytical framework for the interpretation and creation of assessments across disciplines. Their framework suggests that categorization can and should occur by rhetorical purposes, formats, modes, and group arrangements. This approach highlights the importance of idenitfying both discipline- specific qualities and those shared across disciplines and fields.
Blooms Taxonomy (original and revised)	Bloom's cognitive taxonomy is a hierarchical system that categorizes the thinking skills of learners from recalling information to creating, which encourages educators to move up the taxonomy to create a curriculum that aligns assessment activities and curricular development including course and experiential learning objectives (Ryan, 2015). Its most recent adaption spans six cognitive domains, from basic to complex: remember, understand, apply, analyze, evaluation, and create. While commonly used for learning objective development in practice, often only Bloom's cognitive domain is referenced, rather than its lesser-known affective and psychomotor domains frame (Anderson et al., 2001; Zaidi et al., 2018).
Equity-Minded and Equity-Centered Assessment	Equity-Minded and Equity-Centered Assessment underscores and advocates a two-fold approach: "Equity-Mindedness" involves recognizing and addressing disparities in educational outcomes and ensuring fair opportunities for all students (Henning et al., 2022). Simultaneously, "Equity-Centeredness" demands a proactive commitment to challenging and rectifying systemic inequalities embedded in assessment practices. The framework emphasizes a holistic perspective, acknowledging the intersectionality of student identities.
Fink Model of Integrated Course Design and Taxonomy	Fink's taxonomy provides an alternative to Bloom's taxonomy, highlighting Bloom's lack of emphasis on concepts critical to successful learning, such as metacognition, interpersonal relationships, and communication (Branzetti et al., 2019; Uribe Cantalejo & Pardo, 2020). Fink's replaces Bloom's approach with six fundamental domains: foundational knowledge, application, integration, caring, human dimension, and learning how to learn. While rarely referenced in assessment literature, Fink's Taxonomy emphasizes the importance of holistic learning experiences that go beyond acquiring knowledge and highlights the human and affective dimensions of learning.
Ghanaian Assessment	Developed by Martin et al., (2021), this framework aims to address the challenges and limitations of traditional assessment methods in Ghana by integrating local cultural

	values, practices, and languages into the assessment process. Key features of Ghanaian Assessment include recognizing the importance of cultural relevance, contextual appropriateness, authentic assessment, community involvement, and holistic evaluation.
Global Health Learning Progression (GHELP)	The GHELP model outlines the developmental progression of knowledge and skills to guide the learning journey from basic understanding to advanced proficiency in global health and addresses how they might be assessed (Schellhase et al., 2020). This model highlights developmental approaches, relevance to specific fields, and focus on global perspectives. This model uses previously published cultural and experiential learning models to move learners from cultural awareness to cultural sensitivity.
Indigenous Assessment Model	The Indigenous assessment model seeks to honor Indigenous knowledge systems and promote educational equity and inclusion within Indigenous communities (Wall et al, 2023). Key features of the Indigenous Assessment Model include assessment aligned with Indigenous ways of knowing; spiritual, emotional, and community aspects of learning; interconnectedness; strengths-based approaches; and recognizing the importance of sustainability and stewardship of the land and resources.
Kirkpatrick	Kirkpatrick's model is often used to evaluate the effectiveness of training programs. It consists of four levels: Reaction, Learning, Behavior, and Results. These levels assess participants' reactions, learning outcomes, behavior changes, and impact on organizational goals (DeSilets, 2018; Yardley & Dornan, 2012). Kirkpatrick's model provides a comprehensive framework for assessing training effectiveness at different levels. It emphasizes the importance of aligning training goals with organizational objectives.
Kolb’s Learning Styles	Kolb's theory identifies four stages of learning—concrete experience, reflective observation, abstract conceptualization, and active experimentation. Kolb’s recognition of diverse learning styles, emphasis on experiential learning, and practical applicability allow for its use in assessment practices.
Learning Dimensions Framework	Learning dimensions describes five student-centered typologies, including connectedness, mindset, self-management, professional identity, and academic capabilities. The framework offers a holistic view of students, allows for individualized assessment and intervention strategies, and

	emphasizes not only academic but also personal and professional development.
Marzano Taxonomy	The Marzano Framework, often used in education, focuses on instructional strategies and provides a research-based approach to effective teaching. It emphasizes identifying and using strategies that have a high probability of success in improving student learning. Clear emphasis on evidence-based practices and a systematic approach to instructional design.
Medicine Wheel	Indigenous educators are advocating for the use of frameworks such as the Medicine Wheel to recruit, retain, and support indigenous students in their learning goals (Brodt et al., 2020; LaFever, 2016). Frameworks like the Medicine Wheel bring to light the bias most frameworks have toward measuring knowledge, competence, and performance at the risk of minimizing evidence of other ways of knowing such as the affective and spiritual domains (Montenegro January, 2020; Walsh-Buhi 2017).
Miller Whole Person Model	Miller's "Parish Nursing" Whole Person Model developed by Granger E. Westberg and elaborated on by Ann F. Miller, emphasizes caring for individuals' physical, emotional, social, and spiritual needs. The key components highlight the interconnectedness of health and well-being and emphasize the importance of a collaborative and culturally sensitive approach to care delivery within faith communities. Four major components are Person/Parishioner, Health/Shalom-Wholeness, Nurse/Parish Nurse, and Community/Parish, with the integrating component The Triune God (Miller, 2000).
Moore Expanded Outcomes Framework	Moore's Expanded Outcome Framework is a synthesis model for planning and assessing continuous learning for clinicians, developed and adapted from previous frameworks such as Kirkpatrick, Millers, Abrahamson, and Dixon (Abrahamson, 1984; Dixon, 1978; Miller, 1990; Moore et al., 2009). Moore's seven levels include participation, satisfaction, declarative knowledge, procedural knowledge, competence, performance, patient health, and community health.
Reflective Learning Framework	Reflective learning involves a cyclical process of self-awareness, recounting, and discussion. It is often applied in educational settings to encourage students and professionals to reflect on their experiences and enhance their learning (Whalen & Paez, 2019). It encourages metacognition and self-directed learning skills.

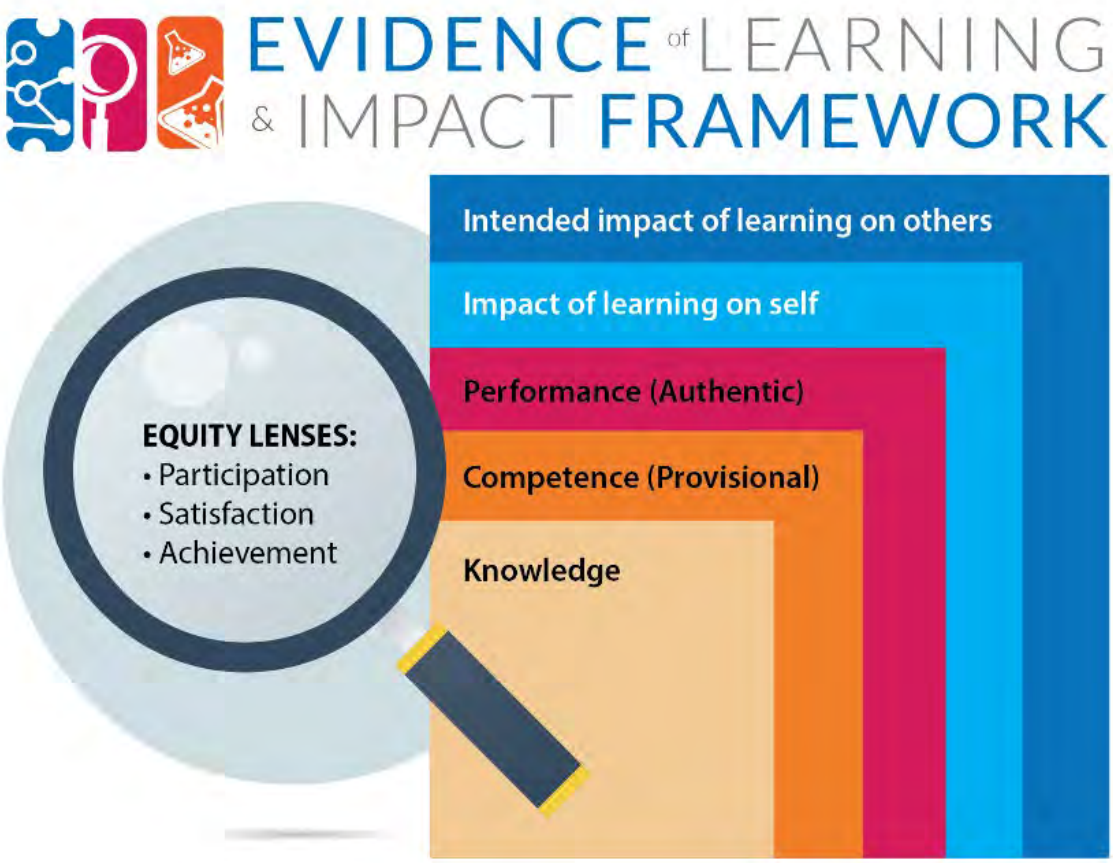
Relational Power of Education	Moore's concept of the relational power of education emphasizes the interconnectedness of individuals within educational contexts and the potential for education to foster meaningful relationships, empower individuals, and contribute to positive social change (Moore, 2005). Key aspects include interpersonal relationship, empowerment and agency, social justice and equity, dialogue and collaboration, transformational learning, and ethical responsibility.
Specify, Explain, Embed, Nudge (SEEN) Framework	Specify, Explain, Embed, Nudge (SEEN) is a framework for designing assessment tasks that promote deeper understanding (Kensington-Miller et al., 2016). It is designed for higher education settings and focuses on moving learners towards critical thinking. SEEN provides increased clarity in assessment design principles for the 'invisible' attributes, emphasis on critical thinking, and applicability to higher education (Kensington-Miller et al., 2018; Kensington-Miller et al., 2016).
Structure of Observed Learning Outcomes (SOLO)	The Structure of Observed Learning Outcomes (SOLO) taxonomy classifies the complexity of students' understanding (Cvetek, 2013; Gentile et al., 2020) SOLO utilizes five classifications: prestructural, unistructural, multistructural, relational, and extended abstract. It is used to design assessments that measure depth of understanding and offers a systematic way to assess the depth of understanding in students' learning outcomes.
Student Knowing in Workplace Practice	This framework focuses on understanding how students apply their knowledge in real-world workplace settings, emphasizing the practical application of learning (Burford et al., 2020). It emphasizes the importance of real-world application and transferable skills.
Six Facets of Understanding	Developed by Wiggins and McTighe, this framework defines understanding in six dimensions: Explanation, Interpretation, Application, Perspective, Empathy, and Self-Knowledge (Wiggins & McTighe, 2005). This framework attempts to ensure that understanding goes beyond rote memorization to encompass deeper cognitive processes and a more holistic appreciation of knowledge.

To dive deeper into Research Questions 1 and 2, we went through each scoping review article's framework, identified their thematic categories, and carefully blended them with our own previously developed institutional assessment framework categories. These cross walked categories have

become the foundation for our proposed *Evidence of Learning and Impact Framework* shown in Figure 2.

Figure 2

Initial Version of Evidence of Learning and Impact Framework



Note: Artist credit to Kathie Forney

Of note, there were four frameworks identified in our scoping review which did not map well to this crosswalk because they were about assessment generally rather than a description of levels we could map: Assessment Ecology (Inoue, 2015), Equity-Minded and Equity-Centered Assessment (Henning et al., 2022), Indigenous Assessment Model (Wall et al., 2021), and the Miller "Whole Person" model (Miller, 2000). Though the categories of assessment described in these articles did not align well with our categories, authors did learn valuable lessons from each, as described in the summary column of Table 4. See Table 5 for our final crosswalk.

Table 5

Crosswalk to Evidence of Learning and Impact Framework

FRAMEWORK TITLE	Knowledge***	Competence/application	Performance	Impact on self	Impact on others
Assessment of higher education framework	Descriptive (Rhetorical Purpose) Analytical	Persuasive * Creative Responsive * Design-Based	Persuasive * Creative Design-Based	Reflective	
Bloom's (revised)	Remember * Understand Apply	Apply * Analyze Evaluate	Create Psychomotor Domain	Affective Domain	
Fink	Foundational Knowledge Learning How to Learn	Application	Integration	Integration Human Dimension Caring Learning How to Learn	Human Dimension
Ghanian assessment	Sankofa	Funtunfunefu denkyemfunefu	Funtunfunefu denkyemfunefu	Sankofa Funtunfunefu denkyemfunefu Nea onnim no sua a, ohu	Funtunfunefu denkyemfunefu Nea onnim no sua a, ohu
Global health learning progression (ghelp)	Experiencing (Cultural Awareness)		Thinking (External Environment) Acting (Cultural Sensitivity)	Reflecting (Cultural Appreciation) Thinking (Internal Self)	

				Acting (Cultural Sensitivity)	
Kirkpatrick	Learning	Learning	Learning Behavioral Change/Behavior	Behavioral Change/Behavior	Organizational Performance/Results
Kolb	Concrete Experience Formulation of Abstract Concepts	Concrete Experience Formulation of Abstract Concepts	Testing	Observe and Reflect	
Learning dimensions				Connectedness Mindset Self-Management Academic Capabilities Professional Identity	Connectedness
Marzano taxonomy	Retrieval (Cognitive System) Comprehension (Cognitive System) Analysis (Cognitive System)	Comprehension (Cognitive System) Analysis (Cognitive System)	Knowledge Utilization (Cognitive System)	Metacognitive System Self System	
Medicine wheel	Intellectual	Intellectual	Physical Emotional	Emotional Spiritual	Spiritual
Moore	Declarative Knowledge Procedural Knowledge	Competence	Performance		Patient Health Community Health

Reflective learning	Temporal Progression (Recount) Cause-and-Effect Relationship (Discussion)	Important Aspects of the Experience (Recount) Connection to Academic Theory (Recount) Relating to Other Contexts (Discussion) Cause-and-Effect Relationship (Discussion) Other Possible Responses (Discussion) Planning and Future Practices	Connection to Academic Theory (Recount) Relating to Other Contexts (Discussion) Planning and Future Practices	Personal Thoughts and Feelings (Discussion)	
Relational power of education			Relationships with Difference Relationships with Social Structures	Relationships with Self Relationships with Culture and Community Relationships with the Earth Relationships with Social Structures	Relationships with Culture and Community Relationships with Difference Relationships with the Earth Relationships with Social Structures
Six facets of understanding	Explanation	Explanation Interpretation	Explanation Interpretation Application Perspective Empathy	Interpretation Perspective Empathy Self-Knowledge	Interpretation

Specify, explain, embed, nudge (seen) framework	Explain	Specify Embed	Nudge		Nudge
Structure of observed learning outcomes (solo)	Prestructural** Unistructural	Unistructural Multistructural Relational Extended Abstract			
Student knowing in the workplace	Working		Learning Communicating Embracing Multidisciplinarity	Working Understanding Self	Understanding Self

*Note that the following frameworks had additional levels which did not fit our framework levels, but which may be useful when considering equity: Assessment of Higher Education Framework (Engagement-Based); Kirkpatrick (Reaction); Moore (Participation and Satisfaction).

**Prestructural seems to be outside of the typical scope of these frameworks, but it is placed under Knowledge to ensure all of SOLO is represented.

***These frameworks all have somewhat different purposes. For visualizing this crosswalk, our categorizations are simplified and cannot easily represent the entirety of each category but provide a rough sense of the contributions and alignment.

The *Evidence of Learning and Impact Framework*'s five organizing levels as seen in the column headers of the crosswalk are Knowledge, Competence/Application, Performance, Impact on Self, and Impact on Others. More details about the *Evidence of Learning and Impact Framework* itself, its framing questions, and refinement will be detailed elsewhere (Moreno et al., Under Review), but a description of what we learned from the scoping review article about each of these categories follows. Note that we are not saying these categories fit perfectly into our conceptualization of an assessment framework as there are places of overlap throughout, but this is an attempt to summarize what we see in the literature to understand collectively what could be meant by Knowledge, Competence/Application, Performance, Impact on Self, and Impact on Others.

What we, the creators of the *Evidence of Learning and Impact Framework,* classify as *Knowledge* is thought of in varied ways in the scoping review articles, including relatively straightforward concepts like Retrieval, Foundational Knowledge, Procedural knowledge, and Comprehension; specific aspects of knowledge such as understanding Cause-and-Effect, and Temporal Progression; and emphasizing other things which impact knowledge acquisition such as Learning How to Learn, the importance of having Experiences as a basis for some knowledge acquisition, and the importance of learning from the past and tradition (seen in *Sankofa*, a Ghanian concept) (Anderson et al., 2001; Bloom et al., 2001; Fink, 2021).

Our category of *Competence/Application* is focused on applying the knowledge and learning or taking basic understanding one step further by seeing connections, including what the scoping review articles refer to as Analyze, Evaluate, Interpretation, Discussion, Connection to Academic Theory, and Relating to Other Concepts (Anderson et al., 2001; Biggs & Tang, 2011; Bloom et al., 2001; Fink, 2021). Some of the more interesting categories include Creative and Design-based, which addresses the sometimes generative nature of *Competence/Application*, identifying important aspects of an experience which requires Judgment, and Planning and Future Practices.

The categories we identified in the scoping review articles that shed light on *Performance* have a fair amount of overlap with *Competence/Application*. *Performance* categories go beyond *Competence/Application* in emphasizing the group/community aspects of learning from and with others (*Funtunfunefu denkyemfunefu*, from Ghana) which we see happening in experiential learning environments, for example, along with Behavioral Change and Integration of Learning from various courses and Embracing Multidisciplinarity. It is also in *Performance* that learners often are confronted with real-life Relationships with Difference and Relationships with Social Structures which they need to practice navigating in real-time. We put Communicating into *Performance* primarily as well, as effective communication requires adjusting to a real audience. Performance also encompasses broader awareness of others and their circumstances, captured by concepts such as Acting (Cultural Sensitivity, GHELP framework) and Emotional Empathy.

Impact on Self switches gears to the portion of the crosswalk focused on the impact of the learning done by a learner, starting with how it impacts the learner themselves or aspects of self that can shift due to learning. These include a change in Caring or in understanding the Human Dimension of what they are studying in a way that is personally impactful. Reflection and Thinking (Internal Self, GHELP

framework) plays a big role in the Impact on Self category, which are essential to other concepts in this category such as Mindset, Self-management, Emotional, Spiritual, Relationship with Self, and Self-Knowledge (Duckworth, 2013; LaFever, 2016; Seligman, 2002). Shifts in Professional Identity and Assessment of Academic Capabilities fit nicely into Impact on Self as well. The Ghanian concept of *Nea onnim no sua a, ohu* has to do with becoming a lifelong learner, highlighting that learning can inspire the desire to continue to learn as a habit of mind.

Finally, the *Impact on Others* category is focused on how the learners learning can result in broader impact. Categories in the scoping review article frameworks that we aligned with *Impact on Others* include Organizational Performance/Results, Patient Health, Community Health, and Relationships with Culture and Community, with Difference, with Earth, and with Social Structures (Bastien, 2000; Moore et al., 2018; Selby & Kagawa, 2018; Wall et al., 2021). Overall, we found that our broadly-labeled categories in the crosswalk indeed did allow for many of the other frameworks' levels to be mapped in a way that felt fairly inclusive despite the discipline or learning environment they were based in.

Research Question 3: What elements of assessment frameworks make space for diverse ways of knowing, and the centering of learners, especially through social justice and equity lenses?

We found 10 frameworks that they believe can and should be used to or continue to be used to reconceptualize culturally specific orientations of teaching, learning, and assessment. These include frameworks such as the Indigenous Assessment Model (Wall et al., 2023), the spiritually based "Whole Person" Model (Miller, 2000), and Relational Power (Moore, 2005). Each framework provides a context to increase diverse ways of knowing or intentional centering of diverse learners in the U.S. higher education context (Capan Melser et al., 2020; Harden & Laidlaw, 2016; Pangaro & ten Cate, 2013).

To organize and summarize learnings from the 10 frameworks identified by Research Question 3, we graphically organized them into two non-exclusive categories: Equity-minded Assessment and Equity-Centered Assessment (Table 6). For the purposes of this article, authors echo Lundquist and Henning's (2021) definitions of these two terms: Equity-minded assessment practices are about creating and generating personal awareness for practitioners in order to design culturally responsive, bias-free, and socially just assessment practices, while Equity-Centered Assessment engages in works at the system level to deconstruct and decolonize assessment, create anti-racist assessment practices, to move to assessment for social justice (Lundquist & Henning, 2021; Miller, 2000; Moore, 2005; Wall et al., 2023) The assessment frameworks that make room for these diverse ways of knowing or that have a strong equity focus are summarized in Table 6, which also outlines the categories of each of the individual frameworks, the research approach, and whether the article describes equity-minded assessment or equity-centered assessment, or both (Capan Melser et al., 2020; Harden & Laidlaw, 2016; Pangaro & ten Cate, 2013).

Table 6

Frameworks Making Space for Diverse Ways of Knowing in Assessment

Assessment Frameworks	Participants/Audience	Research Approach (if applicable)	Equity-Minded	Equity-Centered
Equity-Minded and Equity-Centered Assessment	*Higher Education Assessment Professionals*	*Equity-Centered Assessment Landscape Survey*	*Bias Free Culturally Responsive Socially Just*	*Deconstructed Anti-Racist Decolonizing Assessment for Social Justice*
Assessment Ecology Inoue (2015)	Graduate Students and Writing Teachers/Administrators	NA		X
Ghanaian Assessment Martin et al. (2021)	University Study Abroad: US and Ghana	Black feminist case study		X
Global Health Learning Progression (GHELP) Schellhase et al. (2020)	Pharmacy Students in Global Health	Mixed Methods	X	
Indigenous Assessment Model Wall et al. (2021)	Tribal college students	Case Study	X	X
Medicine Wheel (LaFever, 2016)	Indigenous and non-indigenous college students	NA	X	
Miller "Whole Person" Model* (Miller, 2000)	Parish Nurses	Case Study	X	
Reflective Learning Whalen and Paez (2019); Whalen and Paez (2021)	University sustainability course	Semi-Structured Interviews	X	
Relational Power of Education (Moore, 2005)	Educational philosophy students in Cuba and US	Case Study		X
Student Knowing in Workplace Practice (Burford et al., 2020)	Undergraduate and postgraduate students with workplace internships	Focus Groups	X	

Although these 10 articles did not always align neatly with the working framework being used at the authors' institution, they did inform how authors thought about reflective learning and professional

identity formation for learners (Burford et al., 2020; LaFever, 2016; Martin et al., 2021; Moore, 2005; Schellhase et al., 2020; Whalen & Paez, 2019), impact of learning on the community and world (LaFever, 2016; Lundquist & Henning, 2021; Martin et al., 2021; Wall et al., 2023), methods of assessment (Inoue, 2015; Wall et al., 2023; Whalen & Paez, 2019) and approaches to faculty development and equity work (Inoue, 2015; Wall et al., 2023).

Discussion

Through the use of a scoping review, we, the authors addressed three aims: the first to identify what assessment frameworks are used to inform educators' assessment of learners, second, to map how these frameworks categorize learning, and the third to identify the elements of assessment frameworks that make space for diverse ways of knowing and the centering of learners, especially through social justice and equity lenses.

The scoping review illuminated several significant tensions and considerations present in the discourse surrounding assessment frameworks. Among these is the tension between the simplifying tendency to categorize frameworks using shared terminology and the discomfort associated with categorizing frameworks from a predominantly Western perspective. Only a small number of recent frameworks described or considered diverse perspectives, inclusion, and assessment for social justice (e.g., Medicine Wheel) (Henning et al., 2016; MacLeod et al., 2020). Additionally, as recent trends shift the assessment community's focus to equity-centered and equity-minded assessment, we acknowledge that the predominance of authors, like ourselves, reporting institutional affiliations in the Global North may perpetuate the erasure and minimization of perspectives that center global cultures, languages, and norms. Consequently, we aimed to develop a framework that loosely aligns, or allows for alignment, with culturally and contextually specific frameworks that have global relevance.

The tensions persisted throughout the analysis of the scoping review, leading the authors to navigate moments of discomfort as they attempted to integrate non-linear and "fringe" assessment frameworks into categories that typically favor linear and hierarchical structures. Throughout the analysis, we found concepts and perspectives that did not align and did not feel comfortable pushing into our emerging framework, so we used Lundquist and Henning's equity-minded vs. equity-centered approach to organize these forward-thinking assessment frameworks (Table 6) as a companion to the more rigid crosswalk we created. We recognize this tension and hope that the levels used in the framework are helpful and broadly applicable but caution against assuming that our Evidence of Learning and Impact levels are fully comprehensive of what we saw in the literature and should be used as is. We encourage the reader to explore both the *Evidence of Learning and Impact Framework,* and the articles highlighted in this article to more fully understand the literature and current practice in learning outcomes frameworks, including those that do not fit our standard Global North way of thinking and categorization, and come to their own context-specific decisions and practice ideas. The lack of shared definitions and terms highlighted in this scoping review among the articles we reviewed should not be framed as a problem of accountability nor alignment within the discipline of assessment

overall, but as a demonstration of the richness that exists, which illuminates the complexity of human learning and assessment. We have much to learn from ways of thinking about assessment from synthesizing what is done in other countries, cultures, disciplines, and institutions.

A third set of tensions is the potential skew in the evaluation of learning often focused on performance as the 'highest' level of learning (e.g., Bloom's, Kirkpatrick, and Kolb), whereas we believe value is to be found at all levels of learning, and indeed, do not intend to use our own framework hierarchically. We caution against using this, or any, framework hierarchically, and encourage the use of frameworks in context, and in collaboration with their community partners and affected parties.

The final tension is the emergence of assessment and evaluation frameworks that are frequently centered around student learning but were never intended to be used for assessment purposes, such as Bloom's and Kirkpatrick's frameworks. Despite their original purposes, these frameworks were found to be meaningfully applied to develop multifaceted and rich assessment practices, rather than as a single small part of assessment practice (e.g., writing learning objectives). This suggests their value in the continued development of inclusive assessment frameworks relevant to the integration of assessment, teaching, and learning.

In addition to tensions, the study also had two notable limitations. First, we did not provide detailed definitions for each level of the *Evidence of Learning and Impact Framework*, which may affect its clarity and application, but we have future publications planned dedicated to elaborating and explaining each level. Additionally, the scoping review included only English-language articles, potentially limiting the diversity and comprehensiveness of the findings, especially in relation to answering Question 3. To address this limitation, we spent extra time reading, understanding, and discussing the articles that were from cultures we were less familiar with to reflect the diversity of thought within English language articles in the scoping review.

Despite these limitations, we posit that assessment frameworks can make space for multidisciplinary approaches and diverse ways of knowing through inclusive language and criteria, flexibility in assessment formats, integration of multiple perspectives, cultural humility, project-based and real-world assessments, interdisciplinary collaboration, and recognizing non-traditional forms of knowledge and lived experiences. As noted in Table 6, there is existing literature to inform our assessment practices in ways that support both equity-minded and equity-centered assessment. While not within the extent of the scoping review, the synthesis of equity-centered and equity-minded assessment frameworks provides an opportunity for practitioners to practice awareness (i.e., what is being said that we have not heard?), inclusion (i.e., who are we not hearing from?), and process & practice (i.e., should and how can we change our current procedures to be more equity-centered or minded?) (Lundquist & Henning, 2021). While no one assessment framework can incorporate all-inclusive practices for diverse contexts and audiences, a synthesis of this information creates an opportunity to think differently about the work. How can a holistic assessment framework create a more inclusive

and accommodating environment that recognizes and values the richness of multidisciplinary approaches and diverse ways of knowing?

Conclusions

To intentionally disrupt thinking so that we do not repeat or compound our current limited understanding, we present an example of re-aligning our conceptual, theoretical, and practical frameworks as shown through this scoping review (Pound & Campbell, 2015; Sibeon, 2004; Tucker, 2021). A combination of multiple theories or concepts to produce new perspectives and new research agendas can bring great potential value to our understanding. (Cairney, 2013; Murray & Evers 1989).

This scoping review is part synthesis, part reaction to what we found unsatisfying in existing assessment models they had been using, and part innovation, highlighting how they approached the creation of a useful learning outcomes crosswalk, which led to the *Evidence of Learning and Impact Framework*. We found that by using a crosswalk to synthesize what elements current models highlight and omit, and by pulling in missing perspectives, such as the Medicine Wheel, they have been able to reduce silos of knowledge across and within disciplines. Using this approach, we hope to inform scholarly discussion of learning outcomes assessment in ways that promote the inclusion of interprofessional and interdisciplinary approaches, diverse ways of knowing, and the centering of learners through social justice and equity lenses.

Using the findings of the scoping review to understand the evidence and impact of learners' learning is not solely a literature review but a challenge for educators to think differently. Assessment professionals can use the *Evidence of Learning and Impact Framework,* and corresponding scoping review crosswalks and tables presented in this paper to enhance curricular decision-making, measure the long-term impact of educational interventions, and identify gaps in learners' knowledge and skills. The framework's focus on social justice and equity helps address disparities in educational outcomes. Additionally, it supports the integration of multidisciplinary approaches and fosters continuous improvement in teaching and learning practices. With this work, we hope to continue a trend to move scholarship from a space in which we rely on a single scholar's monopoly of information to a space in which multiple narratives and multiple interpretations of the information are gathered. We also hope that this cognitive dissonance will stimulate innovative and disruptive conversations necessary for education to achieve our necessary and aspirational goals of equity, social justice, and competency.

Acknowledgments

The authors express their sincere appreciation to Laura Zeigen, MS, MLIS, MPH for her invaluable consultation and guidance.

Authors Positionality Statement

To situate this study, authors would like to share their educational and professional backgrounds and experiences in order for the reader to understand how those experiences shaped the study. The team

of authors is comprised of scholars from different disciplinary backgrounds and training (instructional designer, applied linguist, educational psychologist) and all work in administrative roles in higher education, and utilize both qualitative and quantitative data approaches. The subjectivist, constructivist approach to the study aligns with the researchers' philosophical approach to work collaboratively to explore how our different disciplinary backgrounds, epistemological views, and methodology shape our understanding and decisions. All authors are intimately involved in institutional assessment work, have college teaching experience, and one of us also works closely with programs and faculty to improve their programmatic and course-level assessments.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

Abrahamson, S. (1984). Evaluation of continuing education in the health professions. The state of the art. *Eval Health Prof*, *7*(1), 3-23. https://doi.org/10.1177/016327878400700101

Adams, N. E. (2015). Bloom's taxonomy of cognitive learning objectives. *Journal of the Medical Library Association : JMLA*, *103*(3), 152-153. https://doi.org/10.3163/1536-5050.103.3.010

Alzaghoul, A., & Tovar, E. (2018). Adapting LEGO® SERIOUS PLAY® methodology in higher education. IEEE Global Engineering Education Conference, EDUCON,

Anderson, L. W., Bloom, B. S., Krathwohl, D. R., Airasian, P., Cruikshank, K., Mayer, R., Pintrich, P., Raths, J., & Wittrock, M. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Longman.

Aveyard, H. (2011). Doing a literature review in health and social care a practical guide. *Nurse Res*, *18*(4), 45. https://doi.org/10.7748/nr.18.4.45.s2

Bastien, Betty (2004). Blackfoot Ways of Knowing: The Worldview of the Siksikaitsitapi. University of Calgary Press..

Biggs, J., & Tang, C. (2011). *Teaching For Quality Learning At University*. McGraw-Hill Education.

Bloom, B. S., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J., & Wittrock, M. C. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Longman.

Branzetti, J., Gisondi, M. A., Hopson, L. R., & Regan, L. (2019). Aiming Beyond Competent: The Application of the Taxonomy of Significant Learning to Medical Education. *Teaching and Learning in Medicine*, *31*(4), 466-478. https://doi.org/10.1080/10401334.2018.1561368

Bresciani, M. J., Gardner, M. M., & Hickmott, J. (2010). *Demonstrating Student Success: A Practical Guide to Outcomes-Based Assessment of Learning and Development in Student Affairs.* Sterling, VA: Stylus.. http://stylus.styluspub.com/Books/BookDetail.aspx?productID=182767

Burford, S., Cooper, L., & Miller, F. (2020). Stolen knowledge: Student knowing in workplace practice. *International Journal of Work-Integrated Learning*, *21*(2), 163-176.

Cairney, P. (2013). Standing on the Shoulders of Giants: How do we combine the insights of multiple theories in public policy studies? *Policy Studies Journal*, *41*(1), 1-21. https://doi.org/https://doi.org/10.1111/psj.12000

Capan Melser, M., Steiner-Hofbauer, V., Lilaj, B., Agis, H., Knaus, A., & Holzinger, A. (2020). Knowledge, application and how about competence? Qualitative assessment of multiple-choice questions for dental students. *Medical Education Online*, *25*(1), 1714199. https://doi.org/10.1080/10872981.2020.1714199

Ch, U., & Goteti, L. N. S. P. (2013). Imparting technical skills through outcome based curriculum and case study assessments. *Proceedings of the 2013 IEEE International Conference in MOOC, Innovation and Technology in Education*, MITE 2013,

Chimalakonda, S., & Nori, K. V. (2012). A Software Engineering Perspective for Accelerating Educational Technologies. *2012 IEEE 12th International Conference on Advanced Learning Technologies*, 754-755.

Crotty, T., & Allyn, D. (2001). *Evaluating Student Reflections*. Teaching Education. University of Wiconsin River Falls.

Cvetek, S. (2013). The theory of constructive alignment and implications for higher education curriculum. *Didactica Slovenica - Pedagoska Obzorja*, *28*(1), 130-140.

DeSilets, L. D. (2018). An Update on Kirkpatrick's Model of Evaluation: Part Two. *J Contin Educ Nurs*, *49*(7), 292-293. https://doi.org/10.3928/00220124-20180613-02

Dixon, J. (1978). Evaluation criteria in studies of continuing education in the health professions: a critical review and a suggested strategy. *Eval Health Prof*, *1*(2), 47-65. https://doi.org/10.1177/016327877800100204

Duckworth, A. E.-W., L. (2013). True Grit. *Observer*, *26*(4), 1-3. https://www.psychologicalscience.org/observer/true-grit?utm_source=socialmedia&utm_medium=sociallinks&utm_campaign=twitter

Elhussein, M., & Düştegör, D. (2017). Tracing back the chain: Cognitive pre-requisite analysis for CIS capstone project. ACM International Conference Proceeding Series,

Fink, L. D. (2003). *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses*. Wiley.

Fink, L. D. (2021). Toward learning-centered education in colleges and universities. *New Directions for Teaching and Learning*(166), 7-16. http://dx.doi.org/10.1002/tl.20447

Gentile, N., Kanters, J., & Davidsson, H. (2020). A method to introduce building performance simulation to beginners. *Energies*, *13*(8), Article 1941. https://doi.org/10.3390/en13081941

Harden, R. M., & Laidlaw, J. M. (2016). *Essential Skills for a Medical Teacher: An Introduction to Teaching and Learning in Medicine*. Elsevier Health Sciences.

Harris, S. B., Idzik, S., Boasso, A., Neunie, S. Q., Noble, A. D., Such, H. E., & Van, J. (2022). The educational impact of web-based, faculty-led continuing medical education programs in Type 2 diabetes: A survey study to analyze changes in knowledge, competence, and performance of health care professionals. *JMIR Med Educ*, *8*(4), e40520. https://doi.org/10.2196/40520

Henning, G., Heiser, C. A., Lundquist, A. E., & Rice, A. (2021). Uncovering equity in everyday assessment practice. *Assessment Update*, *33*(3), 1-16. https://doi.org/https://doi.org/10.1002/au.30252

Henning, G. W., Baker, G.R., Jankowski, N.A., Lundquist, A.E., & Montenegro, E. (Eds.). (2022). *Reframing Assessment to Center Equity: Theories, Models, and Practices (1st ed.).* Routledge. https://doi.org/https://doi.org/10.4324/9781003446729

Henning, G. W., Lundquist, A., Heiser, C., & Rice, A. (2022). An Untapped Equity Resource. *Liberal Education*. https://www.aacu.org/liberaleducation/articles/an-untapped-equity-resource

Henning, G. W., Roberts, D., & Ludvik, M. J. B. (2016). *Student Affairs Assessment: Theory to Practice*. Stylus Publishing.

Higgins, R., Hogg, P., & Robinson, L. (2017). Research informed teaching experience in diagnostic radiography: The perspectives of academic tutors and clinical placement educators. *Journal of Medical Imaging and Radiation Sciences*, *48(3)*, 226-232.

Inoue, A. (2015). *Antiracist Writing Assessment Ecologies: Teaching and Assessing Writing for a Socially Just Future*. WAC Clearinghouse.

Jadallah, H., Friedland, C. J., Nahmens, I., Pecquet, C., Berryman, C., & Zhu, Y. (2021). Construction industry training assessment framework. *Frontiers in Built Environment*, *7*. https://doi.org/10.3389/fbuil.2021.678366

Johansson, E. (2020). Higher-order thinking e-assessment in online EFL courses: Swedish instructors' perceptions and experiences. *Moderna Sprak*, *114*(2), 161-187. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85126631496&partnerID=40&md5=76c02e45af96ad45d4f2acd72de8113c

Kadry, S. N., & Ghazal, B. (2019). Design and assessment of using smartphone application in the classroom to improve students' learning. *Int. J. Eng. Pedagog.*, *9*, 17-34.

Kensington-Miller, B., Knewstubb, B., Longley, A., & Gilbert, A. (2018). "From invisible to SEEN": A conceptual framework for identifying, developing and evidencing unassessed graduate attributes. *Higher Education Research and Development*, *37*(7), 1439-1453. http://dx.doi.org/10.1080/07294360.2018.1483903

Kensington-Miller, B., Novak, J., & Evans, T. (2016). Just do it: Flipped lecture, determinants and debate. *International Journal of Mathematical Education in Science and Technology*, *47*(6), 853-862. http://dx.doi.org/10.1080/0020739X.2015.1129075

Kirkpatrick, J., & Hawk, L. (2006). Curricula and evaluation: Maximizing results. *T and D*, *60*(6), 61.

Klein, R., Julian, K. A., Snyder, E. D., Koch, J., Ufere, N. N., Volerman, A., Vandenberg, A. E., Schaeffer, S., & Palamara, K. (2019). Gender bias in resident assessment in graduate medical education: Review of the literature. *J Gen Intern Med*, *34*(5), 712-719. https://doi.org/10.1007/s11606-019-04884-0

LaFever, M. (2016). Switching from Bloom to the medicine wheel: Creating learning outcomes that support indigenous ways of knowing in post-secondary education. *Intercultural Education*, *27*(5), 409-424. http://dx.doi.org/10.1080/14675986.2016.1240496

Lane, M., Moore, A., Hooper, L., Menzies, V., Cooper, B., Shaw, N., & Rueckert, C. (2019). Dimensions of student success: A framework for defining and evaluating support for learning in higher education. *Higher Education Research and Development*, *38*(5), 954-968. http://dx.doi.org/10.1080/07294360.2019.1615418

Law, E., & Pang, S. D. (2014). Use of online assessments to monitor learning outcomes in higher level engineering courses. Proceedings of the 4th Interdisciplinary Engineering Design Education Conference, IEDEC 2014,

Longley, A., & Kensington-Miller, B. (2020). Visibilising the invisible: Three narrative accounts evoking unassessed graduate attributes in dance education. *Research in Dance Education*, *21*(1), 18-33. http://dx.doi.org/10.1080/14647893.2019.1644616

Low, D., Pollack, S. W., Liao, Z. C., Maestas, R., Kirven, L. E., Eacker, A. M., & Morales, L. S. (2019). Racial/ethnic disparities in clinical grading in medical school. *Teach Learn Med*, *31*(5), 487-496. https://doi.org/10.1080/10401334.2019.1597724

Lucero, K. S., & Chen, P. (2020). What Do Reinforcement and Confidence Have to Do with It? A Systematic Pathway Analysis of Knowledge, Competence, Confidence, and Intention to Change. *J Eur CME*, *9*(1), 1834759. https://doi.org/10.1080/21614083.2020.1834759

Lundquist, A., & Henning, G. W. (May 14, 2021). Increasing Awareness and Reducing Harm: A Framework for Equity-Minded and Equity-Centered Assessment. *Anthology.com*. https://www.anthology.com/blog/increasing-awareness-and-reducing-harm-a-framework-for-equity-minded-and-equity-centered

MacLeod, A., Ellaway, R. H., Paradis, E., Park, Y. S., Young, M., & Varpio, L. (2020). Being edgy in health professions education: Concluding the philosophy of science series. *Academic Medicine*, *95*(7). 995-998.

Martin, J., Moore, C. M., Foley, A. D., & McDermid, K. T. (2021). Culturally conscious assessment as pedagogy in study abroad: A case study of the higher education in the Ghanaian Context Program. *Frontiers: The Interdisciplinary Journal of Study Abroad*, *33*(1), 168-186. http://dx.doi.org/10.36366/frontiers.v33i1.508

Marzano, R. J., & Kendall, J. S. (2007). *The New Taxonomy of Educational Objectives*. SAGE Publications.

Marzano, R. J., Kendall, J. S, (2008). *Designing and Assessing Educational Objectives: Applying the New Taxonomy*. SAGE Publications.

McMullan, M., Endacott, R., Gray, M. A., Jasper, M., Miller, C. M., Scholes, J., & Webb, C. (2003). Portfolios and assessment of competence: a review of the literature. *J Adv Nurs*, *41*(3), 283-294. https://doi.org/10.1046/j.1365-2648.2003.02528.x

Miller, G. E. (1990). The assessment of clinical skills/competence/performance. *Acad Med*, *65*(9 Suppl), S63-67. https://doi.org/10.1097/00001888-199009000-00045

Miller, J., Kovacs, P. J., Wright, L., Corcoran, J., & Rosenblum, A. (2005). Field education: Student and eield instructor perceptions of the learning process. *Journal of Social Work Education*, *41*(1), 131-145. http://dx.doi.org/10.5175/JSWE.2005.200300330

Miller, J. L., Wilson, K., Miller, J., & Enomoto, K. (2017). Humorous materials to enhance active learning. *Higher Education Research and Development*, *36*(4), 791-806. http://dx.doi.org/10.1080/07294360.2016.1238883

Miller, L. W. (2000). Continuing professional education: A spiritually based program. *New Directions for Adult and Continuing Education*(35), 49-57.

Moore, D. E., Chappell, K., Sherman, L., & Vinayaga-Pavan, M. (2018). A conceptual framework for planning and assessing learning in continuing education activities designed for clinicians in one profession and/or clinical teams. *Medical Teacher*, *40*(9), 904-913. https://doi.org/10.1080/0142159X.2018.1483578

Moore, D. E., Jr., Green, J. S., & Gallis, H. A. (2009). Achieving desired results and improved outcomes: integrating planning and assessment throughout learning activities. *J Contin Educ Health Prof*, *29*(1), 1-15. https://doi.org/10.1002/chp.20001

Moore, M. E. M. (2005). The Relational Power of Education: The immeasurability of knowledge, value, and meaning. *Interchange: A Quarterly Review of Education*, *36*(1-2), 23-48. http://dx.doi.org/10.1007/s10780-005-2340-4

Moreno, K., Jacobs, S., & Tucker, C. R. (Under Review). Evidence of Learning and Impact Framework: A Delphi Study. *Research & Practice in Assessment*.

Moseley, D., Baumfield, V., Higgins, S., Lin, M., Miller, J., Newton, D., Robson, S., Elliott, J., & Gregson, M. (2004). *Thinking Skill Frameworks for Post-16 Learners: An Evaluation. A Research Report for the Learning and Skills Research Centre* (978-1-85338-916-0).

Murray, J. B., Evers, D. J. (1989). Theory borrowing and reflectivity in interdisciplinary fields. *Advances in Consumer Research*, *16*(1), 647-652

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science*, *10*(1), 53. https://doi.org/10.1186/s13012-015-0242-0

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., McGuinness, L. A., Stewart, L. A., Thomas, J., Tricco, A. C., Welch, V. A., Whiting, P., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *PLOS Medicine*, *18*(3), e1003583. https://doi.org/10.1371/journal.pmed.1003583

Pangaro, L., & ten Cate, O. (2013). Frameworks for learner assessment in medicine: AMEE Guide No. 78. *Med Teach*, *35*(6), e1197-1210. https://doi.org/10.3109/0142159x.2013.788789

Pham M.T., Rajic. A., Greig J. D., Sargeant J. M., Papadopoulos A., McEwen S. A. (2014). A scoping review of scoping reviews: advancing the approach and enhancing the consistency. *Res Synth Methods*, *5*(4), 371-385.

Pound, P., & Campbell, R. (2015). Exploring the feasibility of theory synthesis: a worked example in the field of health related risk-taking. *Social Science & Medicine (1982)*, *124*, 57-65. https://doi.org/10.1016/j.socscimed.2014.11.029

Ryan, M. (2015). Developing Meaningful Learning Objectives for Courses and Clerkships. *MedEdPORTAL* 11: 10195. https://doi.org/doi:10.15766/mep_2374-8265.10195.

Schellhase, E. M., Miller, M. L., Malhotra, J. V., Dascanio, S. A., McLaughlin, J. E., & Steeb, D. R. (2020). Development of a Global Health Learning Progression (GHELP) Model. *Pharmacy (Basel)*, *9*(1). https://doi.org/10.3390/pharmacy9010002

Schoepp, K. (2017). The state of course learning outcomes at leading universities. *Studies in Higher Education*, *44*(4), 615-627. https://doi.org/10.1080/03075079.2017.1392500

Selby, D., & Kagawa, F. (2018). Archipelagos of learning: Environmental education on islands. *Environmental Conservation*, *45*(2), 137-146. https://doi.org/10.1017/S0376892918000097

Seligman, M. E. P. (2002). *Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfillment*. Free Press.

Sibeon, R. (2004). *Rethinking Social Theory*. Sage Publications Ltd. https://doi.org/10.4135/9781446216989

The EndNote Team. (2013). *EndNote*. In (Version EndNote 20) [64-bit]. Clarivate.

Thomas, A., Lubarsky, S., Varpio, L., Durning, S. J., & Young, M. E. (2020). Scoping reviews in health professions education: challenges, considerations and lessons learned about epistemology and

methodology. *Advances in health sciences education : theory and practice*, *25*(4), 989-1002. https://doi.org/10.1007/s10459-019-09932-2

Tucker, C., Moreno, K., & Jacobs, S. (2021, October, 27). Branches from the Same Tree: An Innovative Synthesis of Learning Outcomes Frameworks. Assessment Institute, Virtual.

Tucker, C., Stanny, C.J. (2021). Promising failure: Driving innovation by exposing imperfection. *Intersection: A Journal at the Intersection of Assessment and Learning*, *2*(3), 1-9. https://doi.org/10.61669/001c.24574

Uribe Cantalejo, J. C., & Pardo, M. I. (2020). Fink's integrated course design and taxonomy: The impact of their use in a "Basics of Dental Anatomy" course. *Journal of Dental Education*, *84*(9), 964-973. https://doi.org/https://doi.org/10.1002/jdd.12183

Wall, S., Evans, L. M., & Swentzell, P. (2021). Indigenous Assessment Cultural Relevancy in Assessment of Student Learning. In J. M. Souza & T. A. Rose (Eds.), *Exemplars of Assessment in Higher Education: Diverse Approaches to Addressing Accreditation Standards* (pp. 51-69). Taylor & Francis.

Whalen, K., & Paez, A. (2019). Development of a new framework to guide, assess, and evaluate student reflections in a university sustainability course. *Teaching and Learning Inquiry*, *7*(1), 55-77. https://doi.org/10.20343/teachlearninqu.7.1.5

Whalen, K., & Paez, A. (2021). Student perceptions of reflection and the acquisition of higher-order thinking skills in a university sustainability course. *Journal of Geography in Higher Education*, *45*(1), 108-127. https://doi.org/10.1080/03098265.2020.1804843

Wiggins, G. P., & McTighe, J. (2005). *Understanding by Design (2nd ed.)*. Pearson.

Yardley, S., & Dornan, T. (2012). Kirkpatrick's levels and education 'evidence'. *Med Educ*, *46*(1), 97-106. https://doi.org/10.1111/j.1365-2923.2011.04076.x

Zaidi, N. L. B., Grob, K. L., Monrad, S. M., Kurtz, J. B., Tai, A., Ahmed, A. Z., Gruppen, L. D., & Santen, S. A. (2018). Pushing Critical Thinking Skills With Multiple-Choice Questions: Does Bloom's Taxonomy Work?. *Academic medicine : journal of the Association of American Medical Colleges*, *93*(6), 856–859. https://doi.org/10.1097/ACM.0000000000002087

About the Authors

Constance Tucker, Office of the Provost, Oregon Health & Science University, tuckeco@ohsu.edu
Sarah Jacobs, Teaching and Learning Center, Oregon Health & Science University, meltonsa@ohsu.edu
Kirstin Moreno, Market Research and Evaluation, Northwest Energy Efficiency Alliance, kmoreno@neea.org