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Integrating transformative learning in healthcare education: a sequential explanatory mixed-methods study of educator preparedness, practice and institutional conditions

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Abstract

Background: Transformative learning is increasingly recognised as important for preparing health professionals to address complex challenges related to sustainability, equity, ethics and global health. However, limited empirical evidence exists on how healthcare educators integrate transformative learning principles into teaching, how prepared they feel to do so and which conditions shape their practice. This study examined these dimensions at Karolinska Institutet.

Methods: A sequential explanatory mixed-methods design combined a quantitative survey of healthcare educators (n = 62) with a qualitative focus-group workshop (n = 12). Survey respondents rated their current practice and perceived preparedness across eight transformative learning principles. Internal consistency was assessed using Cronbach's alpha. Paired-samples t-tests compared current practice with perceived preparedness at the principle level, followed by exploratory dimension-level analyses for principles showing statistically significant differences. Descriptive statistics were calculated, and qualitative data were analysed using content analysis. Findings were integrated during interpretation.

Results: Educators reported moderate to high levels of current practice across all eight principles. Current-practice means ranged from 3.20 to 3.91 on a five-point scale, while perceived-preparedness means ranged from 3.19 to 3.73. Statistically significant gaps between current practice and perceived preparedness were found for promoting inclusive behaviours in teaching and learning and for engaging in critical self-reflection and continuous learning. Dimension-level analyses indicated that these gaps were concentrated in inclusive communication, inclusion of diverse voices, modelling vulnerability and respect, reflection on practice and continuous professional development. Qualitative findings identified professional development opportunities, organisational conditions and classroom-level factors as interconnected influences on integration.

Conclusions: Transformative learning was integrated to varying degrees, but educators did not always feel fully prepared to enact practices they reported using. The findings support a competency-system perspective in which educator capabilities, pedagogical practices and institutional conditions interact. Health professions education institutions should align faculty development, protected time, peer learning and organisational support to strengthen educators' capacity to integrate transformative learning.

Keywords

transformative learning; health professions education; faculty development; educator preparedness; education for sustainable development; sustainable health; mixed methods

1. Background

The pursuit of sustainable and resilient societies is increasingly challenged by complex and interconnected global issues, particularly in relation to health and well-being. Ecological degradation, persistent social inequalities and evolving public health crises are intensified by globalisation and technological change, creating conditions that require new forms of knowledge, collaboration and decision-making [1, 2]. Despite international commitment through the United Nations Agenda 2030, progress towards the Sustainable Development Goals (SDGs) remains uneven, underscoring the need for transformative approaches that extend beyond traditional disciplinary and professional boundaries.

Within this context, the concept of *sustainable health* emphasises the interdependence between human health, societal systems and environmental sustainability, calling for systemic and equity-oriented approaches to healthcare practice and education [3]. Higher education institutions (HEIs), particularly those responsible for healthcare education, are therefore central to this transformation. Preparing future professionals requires a strong disciplinary knowledge base alongside competencies such as critical reflection, systems thinking and ethical responsibility, enabling graduates to apply their knowledge, navigate complexity and contribute to sustainable development.

Education for Sustainable Development (ESD) has been widely recognised as a key strategy to support these aims, promoting holistic and learner-centred approaches that engage with uncertainty, diversity and real-world challenges [4]. Transformative learning – rooted in Mezirow's theory of perspective transformation [5] – has been identified as critical to fostering the kind of deep, reflective and action-oriented competencies required for sustainable development [6, 7]. Transformative learning encourages learners to interrogate underlying assumptions and engage with diverse perspectives, enabling shifts in values, attitudes and practices that are essential for addressing health challenges.

However, while the theoretical importance of transformative learning and ESD in higher education is well established, existing research has predominantly focused on conceptual frameworks, curricular development or student outcomes, with comparatively limited attention to how transformative learning is integrated by educators in practice [8]. The concept of sustainable health makes this particularly relevant to healthcare and health professions education. This represents a significant gap, as there is still limited empirical evidence on how educators operationalise transformative learning principles in real teaching environments and how prepared they feel to do so [9]. There is a lack of research examining how health professions educators themselves understand, integrate and experience transformative learning approaches aligned with sustainable health [6, 7]. Furthermore, the structural and institutional conditions that shape educators' capacity to engage with transformative education, such as organisational culture, incentives and access to professional development – remain insufficiently explored. As a result, there is limited

understanding of the extent to which transformative learning is embedded in everyday education practices and of the barriers and enablers that influence its integration.

To address this gap, the paper makes three key contributions. First, it provides empirical evidence on educator-level integration of transformative learning in healthcare education, addressing a significant gap in the literature. Second, it advances understanding of how individual agency and institutional structures interact to shape the integration of transformative education. Third, it offers practical insights for higher education institutions seeking to strengthen professional development, organisational support and curriculum design to advance sustainable health through education.

2. Literature review and theoretical framework

2.1 Transformative learning and Education for Sustainable Development (ESD)

Transformative learning, first conceptualised by Mezirow in the late 1970s, refers to the process by which individuals critically examine their assumptions and undergo a shift in perspective through reflection and dialogue [5]. Central to this theory is the idea that learning is not merely the acquisition of knowledge but involves a transformation in meaning-making, enabling individuals to reinterpret experiences and engage more critically with complex realities [10]. This process is widely regarded as essential in contexts characterised by uncertainty, ethical dilemmas and competing values. These conditions are prominent in health professions education, even more so in the field of sustainable health. Subsequent scholars have emphasised that transformation is often accompanied by uncertainty, discomfort and resistance, particularly when individuals confront deeply held assumptions [11].

In parallel, ESD has emerged as a global framework aimed at equipping learners with the competencies required to address interconnected environmental, social and economic challenges. International bodies such as UNESCO have positioned ESD as a transformative approach to education, emphasising competencies such as systems thinking, critical reflection, collaboration and ethical responsibility [6]. This perspective is reflected in SDG 4.7, which calls for all learners to acquire the knowledge, skills, values and attitudes needed to promote sustainable development, including through Education for Sustainable Development, global citizenship, human rights, gender equality and appreciation of cultural diversity [12]. Transformative learning is widely regarded as a key pedagogical approach for achieving these ambitions, as it supports the critical reflection and perspective transformation necessary for meaningful engagement with sustainability challenges [7].

Within HEIs, there is growing recognition that achieving the goals of ESD requires moving beyond traditional, discipline-specific teaching towards more integrative and learner-centred approaches. These approaches prioritise experiential learning, dialogue and

reflexivity, aligning closely with the principles of transformative learning [13]. However, while the conceptual alignment between transformative learning and ESD is well established, empirical studies have highlighted persistent challenges in translating these principles into educational practice [14]. Tensions remain between institutional structures, disciplinary traditions and the pedagogical shifts required for transformative education.

2.2 Transformative learning in higher and healthcare education

The application of transformative learning within higher education has been widely explored, with studies demonstrating its potential to enhance critical thinking, foster personal development and support engagement with complex societal issues [15, 16]. In the context of healthcare education, transformative learning is particularly relevant, as healthcare professionals must navigate uncertainty, ethical tensions and diverse social contexts in their practice.

Research in medical and health professions education has increasingly emphasised the need for curricula that support not only clinical competency but also the development of reflective, socially responsible practices [17]. Transformative learning has been identified as a key mechanism for achieving these aims, particularly through pedagogical approaches that encourage dialogue, reflexivity and engagement with real-world challenges [18, 19]. Such approaches enable students to integrate knowledge across domains, understand trade-offs and develop the capacity to act as agents of change in complex health systems.

Despite this growing body of work, much of the existing literature focuses on curriculum design or student learning outcomes, with comparatively less attention paid to the role of educators in facilitating transformative learning processes. This represents a critical limitation, as educators are central to creating the conditions under which transformative learning can occur. Their beliefs, competencies and practices shape how pedagogical principles are interpreted and integrated in the classroom. While student learning outcomes are often used as the primary indicator of transformative learning, they reflect the outcome rather than the process and do not reveal whether, how or to what extent meaningful transformation has occurred. Without closer examination of educators' practices, it remains unclear how – or indeed whether – transformative learning is being realised in practice.

2.3 Educator competencies and the role of institutional context

A growing strand of literature highlights that the successful integration of transformative learning and ESD depends not only on curriculum design, but also on educator competencies and institutional conditions [20]. Educators are required to adopt new roles as facilitators of learning, guiding students through processes of critical reflection, dialogue and meaning making. This requires competencies that extend beyond subject expertise,

including the ability to manage uncertainty, facilitate difficult conversations and engage with diverse perspectives.

At the same time, institutional factors – such as organisational culture, incentives, leadership and access to professional development – play a decisive role in enabling or constraining transformative teaching practices [21]. Research has shown that without adequate institutional support, educators may struggle to integrate innovative pedagogies, even when they recognise their value [22]. This creates a gap between the ambitions of transformative education and its realisation in practice.

In response to these challenges, several frameworks have been developed to articulate the competencies required for transformative learning. At KI, for example, key competencies that have been identified include systems thinking, critical and ethical reflection, self-awareness, collaboration and empowerment [23]. These competencies are operationalised through eight principles for quality teaching and learning, which aim to support educators in integrating transformative approaches into their teaching [24], as shown in Figure 1. These principles reflect broader trends in higher education towards fostering inclusive, dialogic and student-centred learning environments, aligned with sustainable development goals.

Figure 1. Eight principles for transformative learning in healthcare education.
The eight principles for quality teaching and learning used as the conceptual basis for the study. Adapted from Karolinska Institutet [24].

[*Insert Figure 1 here*]

2.4 Research gap and conceptual framing of the study

Although transformative learning is increasingly recognised as important for ESD and healthcare education, limited empirical research has examined how educators integrate its principles into everyday teaching, how prepared they feel to do so and how their practice is shaped by institutional and disciplinary conditions. Addressing this gap requires attention to the interaction between educators' capabilities, pedagogical practices and the organisational structures that enable or constrain educational innovation.

This is particularly relevant at Karolinska Institutet (KI), where transformative learning and sustainable development have been prioritised within the university's strategic agenda [25]. KI's emphasis on ethical reflection, global perspectives and educational quality aligns with broader calls for higher education to prepare globally competent and socially responsible health professionals [26]. However, there is limited empirical evidence of how these ambitions are reflected in educators' current practice and perceived preparedness.

The present study therefore conceptualises the integration of transformative learning as emerging from interactions among three elements: pedagogical principles derived from

transformative learning theory, educator competencies associated with ESD and the institutional conditions shaping educational practice. Using a mixed-methods approach, the study investigates the extent to which healthcare educators at KI report integrating transformative learning principles, how prepared they feel to do so and which structural and pedagogical conditions facilitate or hinder their integration. It addresses the following research questions:

- To what extent do healthcare educators report integrating transformative learning principles into their teaching practice?
- To what extent do healthcare educators feel prepared to integrate transformative learning principles into their teaching practice and are there differences between reported current practice and perceived preparedness?
- What structural and pedagogical conditions do healthcare educators identify as facilitating or hindering the integration of transformative learning principles?

3. Methods

3.1 Study design

This study employed a sequential explanatory mixed-methods design, combining a quantitative survey with a qualitative focus-group workshop to examine healthcare educators' integration of transformative learning [28, 29]. A mixed-methods approach was appropriate because the research questions required both the identification of patterns in educators' reported current practice and perceived preparedness and a deeper understanding of the conditions shaping these patterns. The survey addressed the former, while the subsequent workshop explored relevant pedagogical, contextual and institutional factors. Bringing these strands together enables a more comprehensive understanding of transformative learning integration than either method could provide independently.

This design aligns with calls in transformative learning and ESD research for methodological approaches that capture both individual perceptions and the institutional conditions shaping educational practice [30].

3.2 Study setting and sampling

The study was conducted at Karolinska Institutet (KI), a medical university in Stockholm, Sweden, offering healthcare education at undergraduate, postgraduate and doctoral levels. KI provides a relevant institutional setting because its educational strategy explicitly prioritises sustainable development, ethical reflection, global engagement and educational quality [25, 27].

The sampling strategy was purposive, targeting educators with formal responsibility for the design, delivery and evaluation of education. This included course leaders, programme directors and departmental directors of education across undergraduate and postgraduate programmes. These roles were selected to ensure that participants had both pedagogical

responsibility and influence over curriculum integration, making them well positioned to reflect on transformative learning practices.

To enhance coverage and representativeness, contact lists were compiled across departments and programmes using institutional directories and administrative contacts. While the sampling strategy aimed to capture a broad cross-section of educators across disciplines, participation was voluntary and therefore subject to self-selection bias. As a result, respondents are likely to represent educators who are more engaged or interested in pedagogical development than the wider academic population.

The survey was conducted between 2 October and 30 November 2024, with regular reminder emails sent to encourage participation. The estimated completion time was 30 minutes. Participants for the qualitative component were recruited through multiple channels, including the survey, institutional communication platforms and alumni networks of relevant teacher training programmes. This multi-channel recruitment strategy aimed to broaden the diversity of perspectives included in the qualitative dataset.

3.3 Quantitative data collection

The quantitative strand was designed for educators to self-assess their current practice and perceived preparedness in relation to transformative learning approaches. The survey was structured around the eight principles for transformative teaching developed at KI [24], which operationalise key competencies for sustainable education [23].

Each principle was decomposed into five observable dimensions to facilitate interpretation and reduce ambiguity [see Additional file 1]. For each dimension, respondents were asked to rate:

- the extent to which they are "*currently doing*" the practice; and
- the extent to which they "*feel equipped*" to implement it.

Responses were recorded on a five-point Likert scale ranging from "to a very small extent" (1) to "to a very large extent" (5), with an additional "I don't know" option [see Additional file 2]. This dual-question structure enabled comparison between current practice and perceived preparedness, a dimension relevant to understanding integration gaps [31].

The survey also included open-ended questions inviting respondents to provide examples of teaching practices. These free-text responses were used to enrich the interpretation of the quantitative findings and complement the workshop data. Background variables (e.g. gender identity, role, years of experience, discipline) were collected to contextualise and stratify findings.

To support content validity, the survey instrument was collaboratively developed by the research team, piloted with colleagues engaged in higher education at KI and revised based on feedback. Data collection was conducted through the secure KI Survey platform and responses were anonymised prior to analysis. Participation incentives (raffle entry) were used to support response rates.

3.4 Qualitative data collection

The qualitative component consisted of a focus-group workshop conducted using an interactive mosaic format [32]. Similar to a world café approach, participants worked in small groups and rotated between discussion stations, allowing ideas to be progressively developed through multiple rounds of discussion. The format was selected to maximise engagement and depth of reflection within a limited time frame and to enable iterative exploration of barriers, enablers and support measures associated with each transformative learning principle.

During the workshop, participants rotated across discussion stations corresponding to the different transformative learning principles, ensuring that all participants engaged with each topic. This process encouraged the sharing and refinement of perspectives as participants built on the reflections of previous groups.

Data were collected at multiple points, including participants' written reflections on post-it notes, facilitator field notes and audio recordings of the group discussions. Combining these sources enhanced the richness of the dataset and supported triangulation by capturing both individual perspectives and collective sense-making processes.

3.5 Data analysis and integration

3.5.1 Quantitative data analysis

Quantitative data included assessment of internal consistency, principle-level comparisons and dimension-level exploratory analyses in addition to descriptive statistics. Analyses were conducted using Stata/SE 17.0, with Microsoft Excel used for visualisation.

Scale construction and internal consistency

Each principle was operationalised as a multi-dimensional construct comprising five items (dimensions), with responses recorded on a five-point Likert scale ranging from 1 (“very small extent”) to 5 (“very large extent”), with an additional “I don’t know” option treated as missing. For each principle, two composite scores were calculated: current practice, corresponding to the “currently doing” items, and perceived preparedness, corresponding to the “feeling equipped” items. These were computed as the mean of the five corresponding dimension-level items for each respondent.

Internal consistency was assessed using Cronbach’s alpha, calculated separately for the current-practice and perceived-preparedness items within each principle. Alpha coefficients were interpreted following conventional thresholds for acceptable (≥ 0.70) and good (≥ 0.80) reliability.

Comparison of current practice and perceived preparedness at the principle level

To examine differences between educators' current practice and perceived preparedness, paired-samples t-tests were conducted for each of the eight transformative learning principles. This approach was appropriate because the same respondents provided both measures, allowing mean differences to be assessed within individuals.

The paired-samples t-tests evaluated whether the mean difference between current-practice and perceived-preparedness scores differed significantly from zero. Statistical significance was assessed at the $p < .05$ level and 95% confidence intervals were calculated for all mean differences. Analyses were conducted using complete cases, resulting in minor variation in sample size across principles due to item-level missing data.

Dimension-level analyses

To examine which dimensions contributed to the statistically significant principle-level differences, exploratory paired-samples t-tests were conducted for the dimensions within Principles 1 and 8. For each dimension, current-practice and perceived-preparedness scores were compared Because these follow-up analyses involved multiple comparisons, the findings were interpreted cautiously and regarded as indicative rather than definitive.

Descriptive analyses

Descriptive statistics, including means and standard deviations, were calculated for all dimension-level items and principle-level composite scores. These descriptive results were used to support interpretation of inferential findings and to generate graphical representations of selected principles.

3.5.2 Qualitative data analysis

Qualitative data were analysed using qualitative content analysis combining deductive and inductive approaches [33, 34]. The initial coding structure was informed by the study's analytical focus on barriers, enablers and support measures. Inductive coding was then used to identify and develop additional categories and patterns grounded in the data.

To enhance trustworthiness, the analysis followed a collaborative coding process involving multiple researchers, with iterative discussions and refinement of categories [35]. This process enabled different researcher perspectives to inform the analysis and supported a more nuanced interpretation of the data. Data management and coding were conducted using Microsoft Excel, selected based on project scope and data volume [36].

Following the workshop analysis, relevant survey free-text responses were reviewed to identify additional examples that illustrated or complemented the qualitative categories. Each quotation is labelled according to its data source, using "workshop participant" or "survey respondent ID", followed by the relevant identifier. Quotations translated from Swedish are indicated accordingly.

3.5.3 Integration of data analysis

The quantitative and qualitative strands were not merged statistically but were integrated at the interpretation stage. The qualitative findings, including illustrative survey free-text responses, were used to contextualise and explain patterns identified in the quantitative data. This integration enabled a more comprehensive understanding of the relationship between reported practices and the structural and contextual conditions shaping them [28].

3.6 Ethical considerations

All participants received detailed information about the study's aims, procedures and data handling before participation. Participation was voluntary. Survey participants indicated informed consent before completing the survey, while workshop participants provided informed consent before participation. All data were anonymised and stored securely in accordance with institutional guidelines.

An application for ethical review was submitted to the Swedish Ethical Review Authority; however, the study was not formally reviewed, as it was deemed not to involve interventions that could cause physical or psychological harm, in accordance with the Swedish Act concerning the Ethical Review of Research Involving Humans (2003:460; Dnr 2024-04690-01).

3.7 Use of generative AI and AI-assisted technologies

During manuscript preparation, the authors used Microsoft 365 Copilot to support language editing, text refinement, manuscript structuring, drafting support for selected passages and the formatting and technical preparation of visualisations based exclusively on author-verified results. The authors reviewed, revised and verified all outputs and take full responsibility for the manuscript. Generative AI tools were not used to collect, generate, statistically analyse or interpret the research data.

4. Results

4.1 Participant characteristics

A total of 62 educators completed the survey (response rate 18.6%), representing a broad cross-section of programmes and disciplines at KI. Most respondents held course leadership responsibilities and had more than ten years of teaching experience, indicating substantial experience with curriculum design and educational delivery (Table 1).

Table 1. Characteristics of survey respondents

Characteristic	*n*	%
Gender		
Woman	46	74.2
Man	16	25.8
Role		
Programme director	4	6.5
Course leader	48	77.4
Other[a]	10	16.1
Teaching experience		
0–3 years	4	6.5
4–6 years	7	11.3
7–10 years	4	6.5

More than 10 years	43	69.4
Missing	4	6.5
Study programmes		
Medicine and biomedicine	15	24.2
Allied health sciences[b]	16	25.8
Dentistry	4	6.5
Master's programmes[c]	15	24.2
Two or more programme domains[d]	10	16.1
Single courses	2	3.2

Note: Total sample, *n* = 62. Percentages were calculated using the full sample as the denominator and may not sum to 100 because of rounding.

[a] Departmental director of education, head of division, lecturer, course examiner, educating librarian or combined course leader and programme director.

[b] Psychology, nursing, audiology, speech and language pathology, occupational therapy and physiotherapy.

[c] Global Health, Public Health, Toxicology, Work and Health, Bioentrepreneurship, Health Economics, Policy and Management, Nutrition and Clinical Research.

[d] For example, all undergraduate programmes or the Master's Programme in Public Health and the Medical Programme.

The qualitative component comprised 12 educators who had also completed the survey. Participants represented a range of teaching roles and disciplinary backgrounds, providing complementary insights into the factors influencing transformative learning practices (Table 2).

Table 2. Characteristics of workshop participants

Characteristic	***n***	**%**
Gender		
Woman	9	75.0
Man	3	25.0
Educator role		
Course leader	9	75.0
Teacher without course leadership	2	16.7
Research assistant	1	8.3
Subject area		
Biomedicine	2	16.7
Statistics	1	8.3
Global public health	4	33.3
Bioentrepreneurship	2	16.7
Education	2	16.7
Not specified	1	8.3

Note: Total workshop sample, *n* = 12. Percentages may not sum to 100 because of rounding.

4.2 Extent of integration of transformative learning

Across all eight principles, educators reported moderate to high levels of integration, suggesting that transformative learning practices are already embedded to some extent within teaching at KI. Mean scores for current practice ranged from 3.20 to 3.91 on the five-point scale. The highest levels of integration were reported for Principle 8 *(Engaging in critical self-reflection and continuous learning)* and Principle 1 *(Promoting inclusive behaviours in teaching and learning)*, whereas Principles 5 *(Integrating social and ethical responsibility into education)* and 7 *(Integrating creative thinking, knowledge creation and knowledge exchange)* showed the lowest levels of integration.

Similarly, perceived preparedness scores were generally moderate to high across all principles, ranging from 3.19 to 3.73. The overall pattern suggests that educators perceived themselves as both engaging in and being reasonably prepared to use transformative learning approaches.

Figure 2. Current practice and perceived preparedness across the eight principles
Bars show mean composite scores for current practice and perceived preparedness. Points in the right-hand panel show paired mean differences, with horizontal lines indicating 95% confidence intervals. Positive values indicate higher reported current practice than perceived preparedness. Exact *p*-values are shown. Statistically significant comparisons are indicated by brackets and highlighted in plum. Sample sizes vary because of item-level missing responses.

[*Insert Figure 2 here*]

As shown in Figure 2, current-practice scores were slightly higher than perceived-preparedness scores for most principles. However, the magnitude of these differences was generally small, indicating broad alignment between what educators report doing and how equipped they feel to do it.

4.3 Gaps between current practice and perceived preparedness

4.3.1 Comparison of current practice and perceived preparedness across principles

To examine differences between educators' current practice and perceived preparedness, paired-samples t-tests were conducted for each of the eight principles (Figure 2).

Overall, the results suggest a high degree of alignment between reported current practice and perceived preparedness across most principles. Where differences were observed, they were generally small and non-significant. Only Principles 1 and 8 showed statistically significant gaps, with respondents reporting higher levels of current practice than perceived preparedness.

Taken together, these findings indicate that educators generally reported alignment between current practice and perceived preparedness across the eight principles, with statistically significant gaps observed only for Principles 1 and 8.

4.3.2 Internal consistency of the scales

Cronbach's alpha coefficients indicated acceptable to good internal consistency across all eight principles. For the current-practice scales, coefficients ranged from .77 to .89, while those for the perceived-preparedness scales ranged from .79 to .90 [see Additional file 3]. These findings supported the aggregation of the five dimension-level items within each principle into principle-level composite scores.

4.3.3 Dimension-level analyses

The dimension-level results are presented in Figures 3 and 4. The figures display mean scores for current practice and perceived preparedness, together with paired mean differences, 95% confidence intervals and exact p-values. Overall, the findings indicate that the significant differences observed at the principle level were driven by specific dimensions rather than by consistent differences across all components of the principles.

Principle 1. Promoting inclusive behaviours in teaching and learning

As shown in Figure 3, the significant difference observed for Principle 1 was not present across all dimensions. No statistically significant differences were found for creating safe and inclusive learning environments ($p = .643$) or adopting a facilitator role ($p = .180$). In contrast, significant differences were observed for modelling inclusive communication ($p = .047$), including diverse voices and perspectives ($p = .018$) and modelling vulnerability, sensitivity and respect ($p = .004$).

Figure 3. Current practice and perceived preparedness across the dimensions of Principle 1
Comparison of educators' reported current practice and perceived preparedness across the five dimensions of Principle 1, Promoting inclusive behaviours in teaching and learning ($n = 57–60$). Bars show mean scores. Points in the right-hand panel show paired mean differences, with horizontal lines indicating 95% confidence intervals. Positive values indicate higher reported current practice than perceived preparedness. Exact *p*-values are shown. Statistically significant comparisons are indicated by brackets and highlighted in plum. Sample sizes vary because of item-level missing responses.

[*Insert Figure 3 here*]

Principle 8. Engaging in critical self-reflection and continuous learning

A similar pattern was observed for Principle 8 (Figure 4). Statistically significant differences emerged for reflection on own practice ($p = .010$) and continuous professional development ($p < .001$), with respondents reporting higher current practice than perceived preparedness.

Figure 4. Current practice and perceived preparedness across the dimensions of Principle 8
Comparison of educators' reported current practice and perceived preparedness across the five dimensions of Principle 8, Engaging in critical self-reflection and continuous learning ($n = 55–58$). Bars show mean scores. Points in the right-hand panel show paired mean differences, with horizontal lines indicating 95% confidence intervals. Positive values indicate higher reported current practice than perceived preparedness. Exact *p*-values are shown. Statistically significant comparisons are indicated by brackets and highlighted in plum. Sample sizes vary because of item-level missing responses.

[*Insert Figure 4 here*]

No statistically significant differences were found for challenging personal biases and assumptions (p = .626), developing self-awareness (p = .451) or seeking and using learner and peer feedback (p = .389).

Overall, the dimension-level analyses indicate that the significant differences observed at the principle level were driven by specific dimensions rather than by consistent differences across all components of the principles.

4.4 Structural and pedagogical conditions shaping practice

The qualitative findings provide insight into the conditions that educators perceived as influencing their integration of transformative learning. Three interconnected areas were identified: (1) professional development and educator support; (2) institutional structures and organisational conditions; and (3) pedagogical opportunities and challenges.

4.4.1 Professional development and educator support

Educators expressed strong interest in developing their capacity to engage with transformative learning approaches and emphasised the value of dialogue, reflection and peer learning. Collaborative spaces for discussing teaching practices were frequently described as important sources of learning and inspiration.

For example:

"These kinds of reflections together with peers are transformative for us, we need more." (Workshop participant 2)

Educators also described professional development opportunities as unevenly available across departments and programmes. Several highlighted a need for additional support related to inclusive teaching, difficult conversations, sustainability and social justice topics.

For example:

"Having someone valuing course development … would make it easier to prioritise …" (Workshop participant 4)

“Above all, collegial discussions, continuing professional development and collegial support are valuable.” (Survey respondent 40, translated from Swedish)

“I always learn by watching others. I only teach things I have learnt by doing or by watching others do them; I have no research experience in this.” (Survey respondent 23)

4.4.2 Institutional structures and organisational conditions

Educators frequently identified structural and organisational factors as influencing their ability to integrate transformative learning approaches. Recurring themes included limited time for educational development, insufficient incentives for teaching innovation and the prioritisation of research activities over teaching.

For example:

"Teaching is underpaid … we are using research money to do all of these things, developing our teaching because there's so little time set for example for the peer review, the peer feedback for the teachers and all of these things around teaching that could improve the teaching are not really in the budget." (Workshop participant 4)

"All the statements above depend on opportunities to interact with students. Because of financial constraints, time for dialogue is not prioritised and teaching quickly reverts to the simple transmission of information." (Survey respondent 45, translated from Swedish)

Educators also discussed challenges associated with integrating transformative learning principles into programme structures and curricula.

For example:

"Teaching might never be as valued as research …" (Workshop participant 5)

"I want to be transformative, it's a question of changing the system before the system changes us." (Workshop participant 10)

"It is clear from the political context that I, as a teacher, am expected to teach nursing students in large groups and examine as many as possible, as quickly as possible, to produce as many nurses as possible for society. This conflicts with the goals above." (Survey respondent 105)

4.4.3 Pedagogical opportunities and challenges

Educators reported using a range of teaching approaches aligned with transformative learning, including student-centred learning activities, co-creation with students, intercultural learning experiences and engagement with real-world sustainability challenges.

For example:

"The classroom has students from different countries from within and outside the EU. I try to take advantage of this diversity by discussing case problems and how these would be solved in different countries. This is much appreciated by the students. We all learn together how guidelines are guides and not norms of treatment." (Survey respondent 70)

"I always co-create with students, so they have an impact on what I include as course content. However, I feel that if I had time, I would involve them more in curriculum and Canvas design, in the things that happen between courses." (Survey respondent 23)

At the same time, educators identified several practical and pedagogical challenges to integration. These included limited time and teaching resources, difficulty identifying diverse educational materials, curriculum constraints, uncertainty about facilitating sensitive discussions and students' expectations of more traditional forms of teaching.

For example:

"It is very difficult to get away from the Eurocentric lens since the learning material is European or American. I do not know where to find these other materials." (Workshop participant 3)

"One student ... defended her beliefs, while the class appeared to disagree with her. The discussion became quite emotional in relation to environmental sustainability and I felt that I lacked the skills to mediate the discussion and turn it into a learning experience." (Survey respondent 70)

"I feel that it is not always unproblematic to draw on examples from learners with different backgrounds, especially in the medical programme, where there is a great diversity of backgrounds. I worry about singling out students who may not want to foreground that they have another background." (Survey respondent 95)

Finally, educators noted tensions between transformative pedagogical ambitions and existing course structures, intended learning outcomes and student expectations. One respondent described the difficulty of maintaining a facilitator role when students expected more direct knowledge transmission:

"As a TBL [Task-Based Learning] facilitator, [I aim] to help students reflect and discuss rather than being an information provider. This is, however, difficult, as students prefer the latter." (Survey respondent 121)

5. Discussion

This study examined the extent to which healthcare educators integrate transformative learning principles, how prepared they feel to integrate them and the structural and pedagogical conditions shaping their practice. Three key findings emerged. First, transformative learning practices appear to be moderately well embedded within teaching at KI, although integration varies across principles. Second, educators generally reported alignment between current practice and perceived preparedness, but notable gaps were observed for principles related to inclusive teaching and critical self-reflection. Third, the integration of transformative learning is shaped not only by educators' competencies and practices but also by organisational conditions that can either support or constrain pedagogical innovation. Together, these findings suggest that the challenge is not whether educators value transformative learning, but how institutions can better support its sustained integration.

5.1 Extent of integration of transformative learning

The findings indicate that transformative learning is already present within healthcare education at KI. Across all eight principles, educators reported moderate to high levels of integration, suggesting that many practices associated with transformative learning have become integrated into everyday teaching. This aligns with previous research highlighting increasing adoption of learner-centred, dialogic and reflective pedagogies within higher education [15, 16].

At the same time, integration was not evenly distributed across principles. The highest levels of reported practice were found for Principle 1 *(Promoting inclusive behaviours in teaching and learning)* and Principle 8 *(Engaging in critical self-reflection and continuous learning),* while lower levels were reported for Principle 5 *(Integrating social and ethical responsibility into education)* and Principle 7 *(Integrating creative thinking, knowledge creation and knowledge exchange)*. This variation suggests that some dimensions of transformative learning may be easier to translate into practice than others.

One possible interpretation is that educators are more familiar with pedagogical approaches associated with student-centred learning, which focus on participation, reflection and facilitation and have become increasingly prominent in contemporary higher education [37]. In contrast, principles that require engagement with questions of power, ethics, social responsibility or competing knowledge systems may involve greater conceptual complexity and may be less explicitly embedded within disciplinary traditions and curricular structures. This interpretation is consistent with research on ESD, which suggests that sustainability-related competencies, particularly those involving ethics, equity and global justice, are often the most challenging to integrate into educational practice [6, 7].

5.2 The integration gap: acting without feeling fully prepared

A central finding of this study is the presence of a gap between reported current practice and perceived preparedness for certain transformative learning principles. While differences between current practice and perceived preparedness were generally small, statistically significant gaps were observed for Principle 1 and Principle 8, with educators reporting higher levels of current practice than perceived preparedness.

The dimension-level analyses provide important insight into this pattern. For Principle 1, significant gaps were concentrated in dimensions related to inclusive communication, encouraging diverse voices and modelling relational humility. For Principle 8, the gaps were concentrated in professional development and reflection on practice. These findings suggest that educators may be engaging in transformative teaching practices without necessarily feeling fully equipped to do so.

This finding extends existing scholarship on transformative learning and professional development. Much of the literature has focused on the adoption of innovative teaching practices, often assuming that practice reflects competency development [22]. The present findings suggest a more complex relationship. Educators may adopt transformative approaches because they recognise their importance, because institutional priorities encourage them or because they encounter these challenges in practice, even when they feel they have not received sufficient preparation.

Notably, the largest gaps were found in dimensions involving relational, ethical and reflective aspects of teaching. Unlike technical teaching skills, these competencies require educators to navigate uncertainty, facilitate difficult conversations, engage with diverse perspectives and critically examine their own assumptions. Such practices are central to

transformative learning theory [5] but are also among the most demanding aspects of educational practice. From an SDG 4.7 perspective, these findings suggest that achieving sustainability-related learning outcomes requires attention not only to student competencies but also to educators' preparedness to facilitate transformative learning processes.

The qualitative findings reinforce this interpretation. Participants described uncertainty about addressing sensitive topics, managing disagreement and engaging with issues related to equity and diversity. Together, these findings suggest that transformative teaching requires professional competencies that extend beyond traditional pedagogical expertise. The challenge may therefore be less about understanding transformative learning conceptually and more about developing the confidence and support required to integrate it effectively.

5.3 Structural and pedagogical conditions shaping integration

The third research question focused on the conditions shaping educators' integration of transformative learning. The qualitative findings indicate that integration is strongly influenced by institutional and organisational contexts.

Participants consistently identified structural barriers including time constraints, limited resources, insufficient recognition of teaching development and the continued prioritisation of research activities. These findings are consistent with broader higher education literature demonstrating that educational innovation depends not only on individual educator motivation but also on supportive institutional environments [20, 21].

Importantly, the findings reveal a distinction between willingness and capacity. Educators generally expressed strong motivation to engage with transformative learning and described numerous examples of innovative teaching practices. However, many also reported that such work occurred in spite of, rather than because of, institutional systems and incentives. Although individual educators may initiate transformative practices, sustaining and embedding them across programmes requires institutional structures that provide time, resources, recognition and opportunities for continued pedagogical development.

The findings also highlight the importance of professional learning communities and peer dialogue. Participants repeatedly emphasised the value of collaborative reflection, exchange of experiences and opportunities to learn from colleagues. Such findings resonate with research on communities of practice, which identifies collaborative learning environments as important mechanisms for educational development and pedagogical change [38].

At the classroom level, educators reported tensions between aspirations and practical realities. Although many sought to integrate intercultural perspectives, sustainability challenges and co-creative learning approaches, they also described difficulties related to available learning materials, curriculum constraints and student expectations. These findings illustrate how transformative learning is shaped by multiple interacting levels of

influence, ranging from individual educators to institutional systems and broader disciplinary norms.

5.4 Towards a competency-system perspective on transformative learning

Taken together, the findings support a competency-system perspective in which the integration of transformative learning emerges through interactions among educator competencies, pedagogical practices and institutional conditions. This perspective shifts attention from individual preparedness alone towards the alignment among personal capabilities, classroom practices and organisational support structures.

Existing literature has often focused on transformative learning either as a pedagogical approach or as an individual learning process [5, 8]. The findings of this study suggest that such perspectives may be incomplete when considering integration in higher education settings. Educators do not operate in isolation; their ability to integrate transformative learning depends on both personal capabilities and organisational conditions.

This perspective helps explain why educators may report integrating transformative practices while simultaneously feeling underprepared and why motivation alone does not necessarily translate into sustained change. It also reinforces growing calls within ESD scholarship for systemic approaches that recognise the interconnected roles of educators, curricula and institutions in achieving educational transformation [21, 39].

5.5 Implications for practice

The findings have several implications for healthcare education and professional development. First, professional development initiatives should move beyond technical teaching skills to include competencies associated with inclusive teaching, relational competencies, ethical engagement and facilitation of difficult conversations. These areas were among those where educators reported the largest gaps between current practice and perceived preparedness.

Second, institutions should create structures that support ongoing pedagogical development. Participants emphasised the importance of protected time, the value assigned to teaching, peer learning opportunities and communities of practice. Without such structures, transformative learning risks remaining dependent on individual commitment rather than becoming a shared institutional endeavour.

Third, curriculum development efforts should explicitly integrate principles related to sustainability, social responsibility and diverse ways of knowing. The lower integration of some principles suggests that these dimensions may require greater visibility and support within programme design and educational leadership.

These findings are also relevant in relation to SDG 4.7, which calls for learners to acquire the knowledge, skills, values and attitudes needed to promote sustainable development, including through Education for Sustainable Development and global citizenship education [12]. Achieving these ambitions requires educators who are both capable of and supported

in facilitating critical reflection, ethical engagement and consideration of diverse perspectives. The integration gaps and structural challenges identified in this study therefore highlight important considerations for institutions seeking to operationalise SDG 4.7 within healthcare education.

At KI, these findings provide an empirical basis for translating the educational ambitions of Strategy 2030 into targeted institutional action. Strengthening educators' preparedness for inclusive, reflective and ethically engaged teaching can support KI's commitments to educational quality, equal opportunities, international and interprofessional education, lifelong learning and education for sustainable development. The findings also indicate where integration may require more systematic support: professional development that addresses relational and reflective competencies; protected time and recognition for pedagogical development; opportunities for peer learning; and curriculum processes that make sustainability, social responsibility and diverse perspectives more explicit. In this way, this study can help KI move from broad strategic commitments towards identifiable priorities for educator development, curriculum enhancement and organisational support.

The implications extend beyond KI. Although institutional strategies differ, HEIs commonly seek to promote educational quality, inclusion, sustainability, global engagement, social responsibility and graduate preparedness for complex societal challenges. The competency-system perspective developed in this study offers HEIs a transferable approach for examining whether their institutional ambitions are supported by alignment among educators' preparedness, pedagogical practice and organisational conditions. Used as a diagnostic and developmental framework, the principles and associated dimensions could help institutions identify areas of strength, locate integration gaps, prioritise professional development and structural support and monitor progress towards their own strategic educational goals. Adaptation to institutional and disciplinary contexts would nevertheless be necessary and further validation is required before the framework is used for comparative or evaluative purposes.

More broadly, the findings suggest that advancing transformative learning for sustainable health requires alignment between what institutions aspire to achieve, what educators are prepared and supported to integrate and the conditions under which teaching occurs.

5.6 Limitations and strengths

This study has several limitations. First, the relatively low survey response rate may limit statistical power and generalisability, although this is consistent with challenges commonly encountered in educational research [40]. While the sample was sufficient to detect moderate effects and conduct paired analyses, smaller differences between current practice and perceived preparedness may not have been detected.

Second, the study relies on self-reported data, which may be subject to response biases such as social desirability and variation in respondents' interpretations of the survey items. Reported levels of integration and preparedness may therefore not fully reflect actual teaching practices or competencies. Furthermore, workshop participants and survey

respondents may represent educators with a particular interest in pedagogy and educational development, potentially resulting in a more engaged sample than the wider educator population [41, 42].

Third, although composite scale scores demonstrated acceptable to excellent internal consistency, the dimensions within each principle represent conceptually distinct aspects of teaching practice. Aggregating these dimensions may therefore obscure important within-principle variation. The dimension-level analyses illustrate this complexity, showing that significant differences at the principle level were often driven by specific dimensions rather than by consistent patterns across all items.

Fourth, the analysis treats Likert-scale responses as approximately continuous when calculating means and conducting paired-samples t-tests. While this approach is widely accepted in educational and social science research, it involves assumptions that should be acknowledged.

Fifth, the dimension-level analyses were exploratory and involved multiple comparisons, increasing the risk of Type I error. These findings should therefore be interpreted cautiously and regarded as indicative rather than definitive.

Finally, variation in responses across some principles suggests opportunities to further refine the instrument and strengthen conceptual clarity, for example through cognitive interviewing and additional validation work in different educational contexts.

Despite these limitations, the study has several important strengths. First, it addresses a significant gap in the literature by focusing on educators' integration of transformative learning principles rather than solely on curriculum design or student outcomes. Second, the study provides one of the first attempts to operationalise transformative learning principles within healthcare education through a structured, multi-dimensional measurement framework. The eight principles were translated into observable teaching dimensions, enabling systematic examination of both reported current practice and perceived preparedness.

A further strength is the mixed-methods design, which combines quantitative assessment with qualitative exploration of the contextual conditions shaping practice. The workshop design was particularly well suited to the study's focus on transformative learning, as it incorporated dialogue, reflection and collaborative knowledge construction, all of which are central elements of transformative learning theory. This approach enabled not only the identification of integration patterns but also a richer understanding of the institutional and pedagogical factors influencing them. In addition, the consistent internal reliability of the principle scales provides support for the coherence of the underlying constructs.

Finally, the survey instrument represents a promising contribution for future research and educational development. Although further validation is required, the framework offers a practical tool for examining transformative learning practices and educator preparedness

across disciplines and educational settings, providing a potential basis for future comparative studies and faculty development initiatives.

6. Conclusion

This study examined how healthcare educators at Karolinska Institutet integrate transformative learning principles, how prepared they feel to integrate them and the conditions shaping their practice.

Educators reported moderate to high levels of integration into their current practice across the eight principles, but gaps between reported current practice and perceived preparedness were evident. in specific dimensions of inclusive teaching, critical reflection and continuous professional development.

For higher education institutions seeking to advance sustainable health, Education for Sustainable Development and the ambitions of SDG 4.7, the findings suggest that supporting transformative learning requires more than encouraging pedagogical innovation. It also requires creating the institutional conditions that enable educators to develop, sustain and confidently integrate transformative teaching practices. Ultimately, transformative education depends not only on transformative educators, but also on transformative institutions.

List of abbreviations

CI: Confidence interval

ESD: Education for Sustainable Development

HEI: Higher education institution

KI: Karolinska Institutet

SDG: Sustainable Development Goal

Declarations

Ethics approval and consent to participate

An application for ethical review was submitted to the Swedish Ethical Review Authority. The study was not formally reviewed because it was deemed not to involve interventions that could cause physical or psychological harm under the Swedish Ethical Review Act (2003:460) (reference number 2024-04690-01). Participation was voluntary. Survey participants received information about the study and indicated informed consent by choosing to complete the survey. Workshop participants received study information and provided informed consent before participation.

Consent for publication

Not applicable. The manuscript does not contain identifiable individual-level data, images or videos.

Availability of data and materials

The datasets generated and analysed during the current study are not publicly available because they contain qualitative responses and contextual information that could enable deductive identification of participants. De-identified data may be made available by the corresponding author on reasonable request, subject to assessment of the proposed use and applicable ethical, legal and institutional requirements.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

JV and MN contributed equally to this work and share first authorship. TA and KB contributed equally and share senior authorship. JV, MN, TA and KB conceptualised and designed the study. JV, MN, NV and KB collected the data. JV, MN and KB conducted the formal analysis, curated the data and interpreted the findings. JV and KB prepared the visualisations and validated the analyses. SG, HMA, TA and KB supervised the work. TA and KB acquired funding, and KB coordinated the project. JV, MN and KB drafted the manuscript. All authors contributed to the interpretation of the findings and critically reviewed and substantively revised the manuscript. All authors approved the submitted version and agreed to be personally accountable for their own contributions and for ensuring that questions relating to the accuracy or integrity of any part of the work are appropriately investigated, resolved and documented.

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Authors' information

The multidisciplinary author team brings together expertise in health professions education, educational development, transformative learning, global public health, sustainable health, public mental health, medical anthropology, occupational therapy, child health, epidemiology, health policy and social anthropology. The team's educational and research experience includes internationalisation of the curriculum, education for

sustainable development, intercultural education, qualitative and mixed-methods research, complex interventions, curriculum development and international capacity-building.

Additional files

Additional file 1

File format: DOCX; title: Principles for transformative learning and associated dimensions; description: Table presenting the eight principles for transformative learning, their short descriptions and the five dimensions assessed for each principle.

Additional file 2

File format: DOCX; title: Survey instrument; description: Survey items used to assess educators' current practice and perceived preparedness across the eight transformative learning principles, including the response scale.

Additional file 3

File format: DOCX; title: Internal consistency of the principle-level composite scales; description: Number of items and Cronbach's alpha coefficients for current practice and perceived preparedness across the eight principles.

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Figures

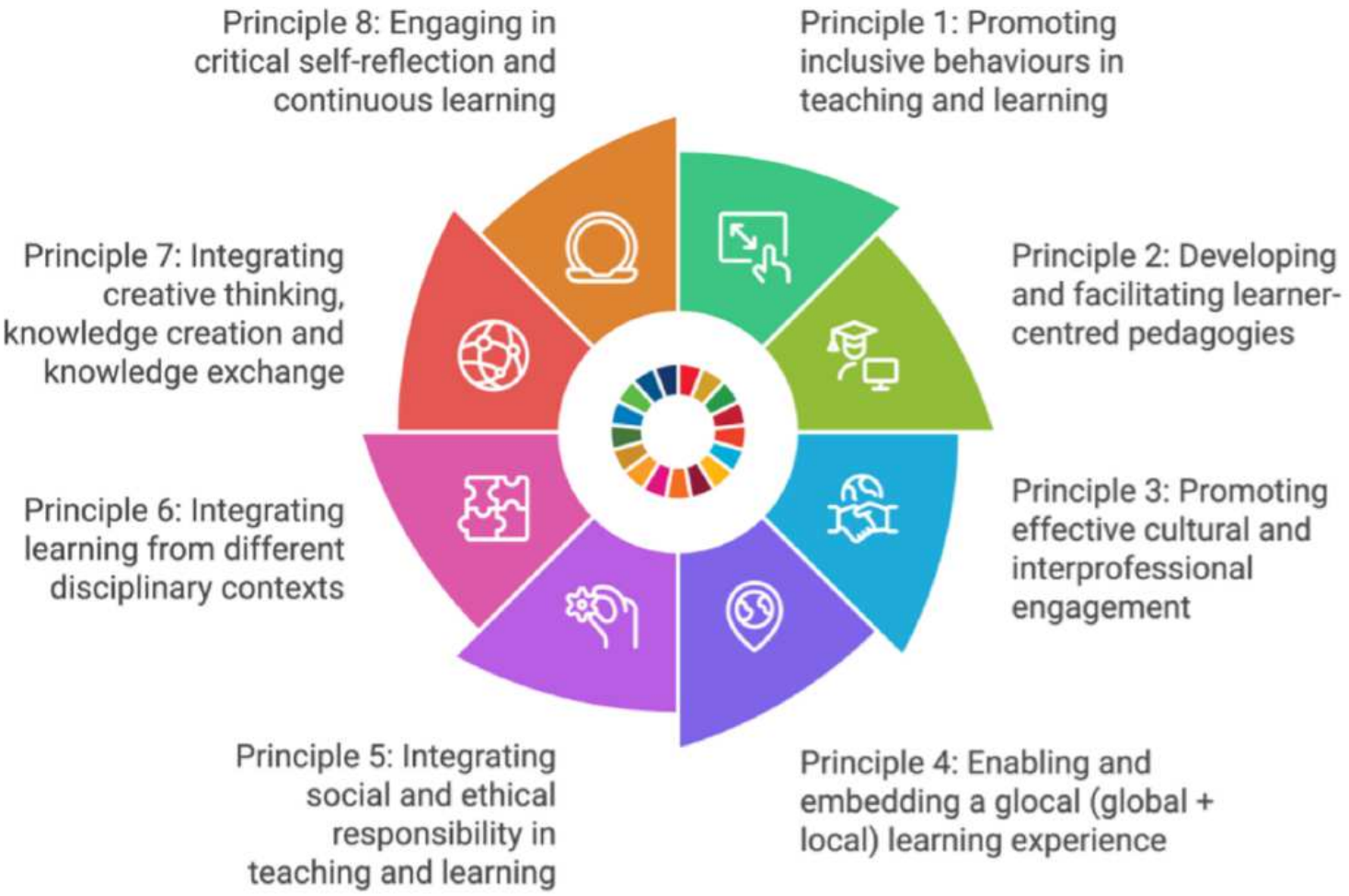


Figure 1

Eight principles for transformative learning in healthcare education.
The eight principles for quality teaching and learning used as the conceptual basis for the study. Adapted from Karolinska Institutet [24].

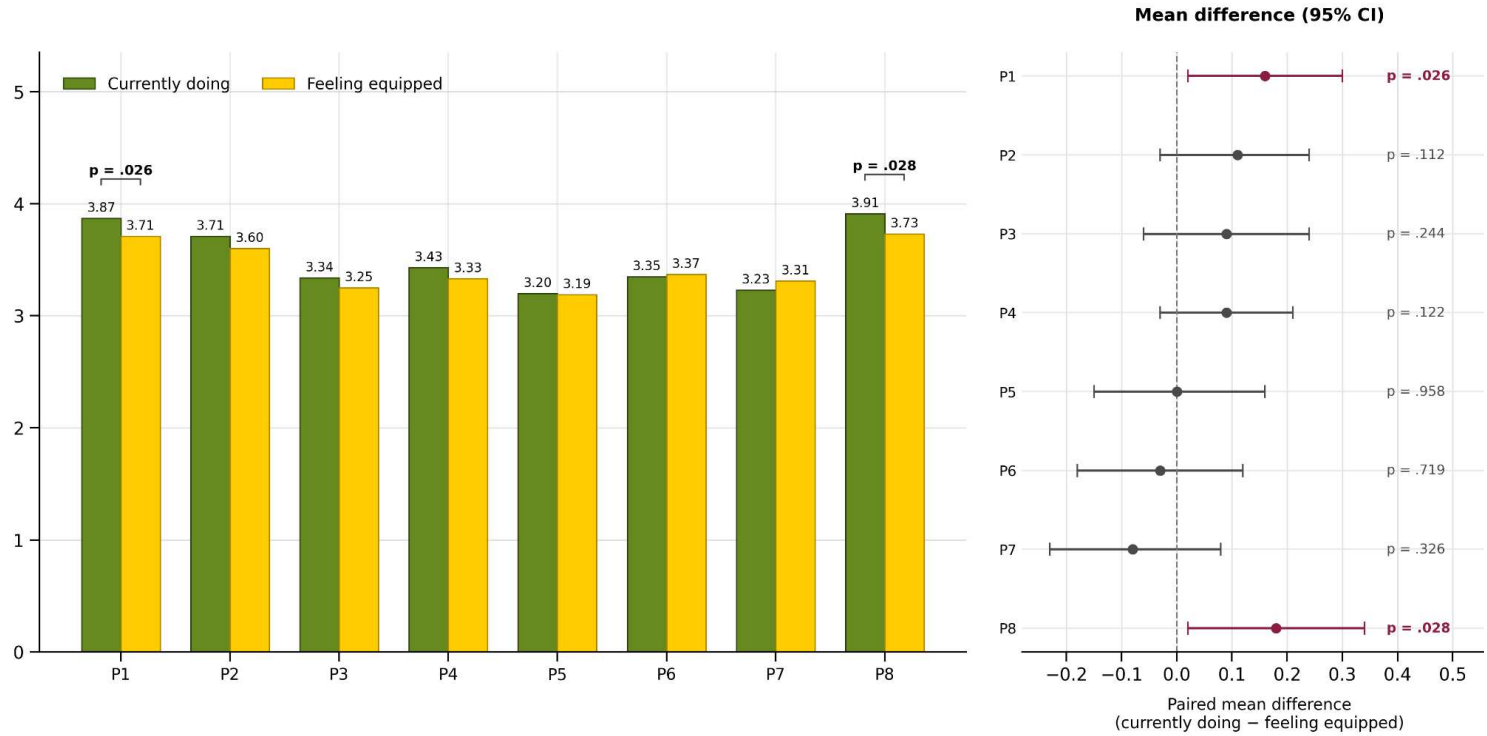


Figure 2

Current practice and perceived preparedness across the eight principles

Bars show mean composite scores for current practice and perceived preparedness. Points in the right-hand panel show paired mean differences, with horizontal lines indicating 95% confidence intervals. Positive values indicate higher reported current practice than perceived preparedness. Exact *p*-values are shown. Statistically significant comparisons are indicated by brackets and highlighted in plum. Sample sizes vary because of item-level missing responses.

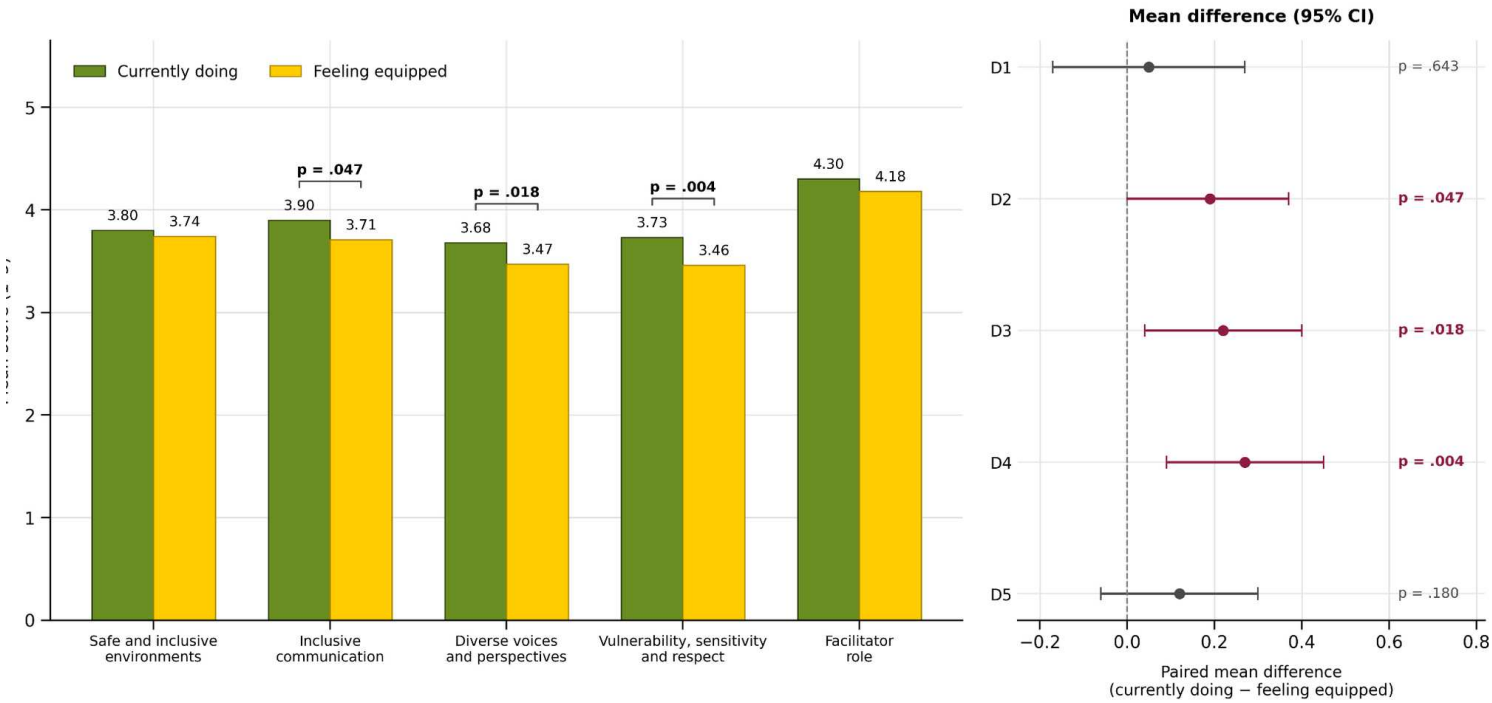


Figure 3

Current practice and perceived preparedness across the dimensions of Principle 1

Comparison of educators' reported current practice and perceived preparedness across the five dimensions of Principle 1, Promoting inclusive behaviours in teaching and learning (n = 57–60). Bars show mean scores. Points in the right-hand panel show paired mean differences, with horizontal lines indicating 95% confidence intervals. Positive values indicate higher reported current practice than perceived preparedness. Exact p-values are shown. Statistically significant comparisons are indicated by brackets and highlighted in plum. Sample sizes vary because of item-level missing responses.

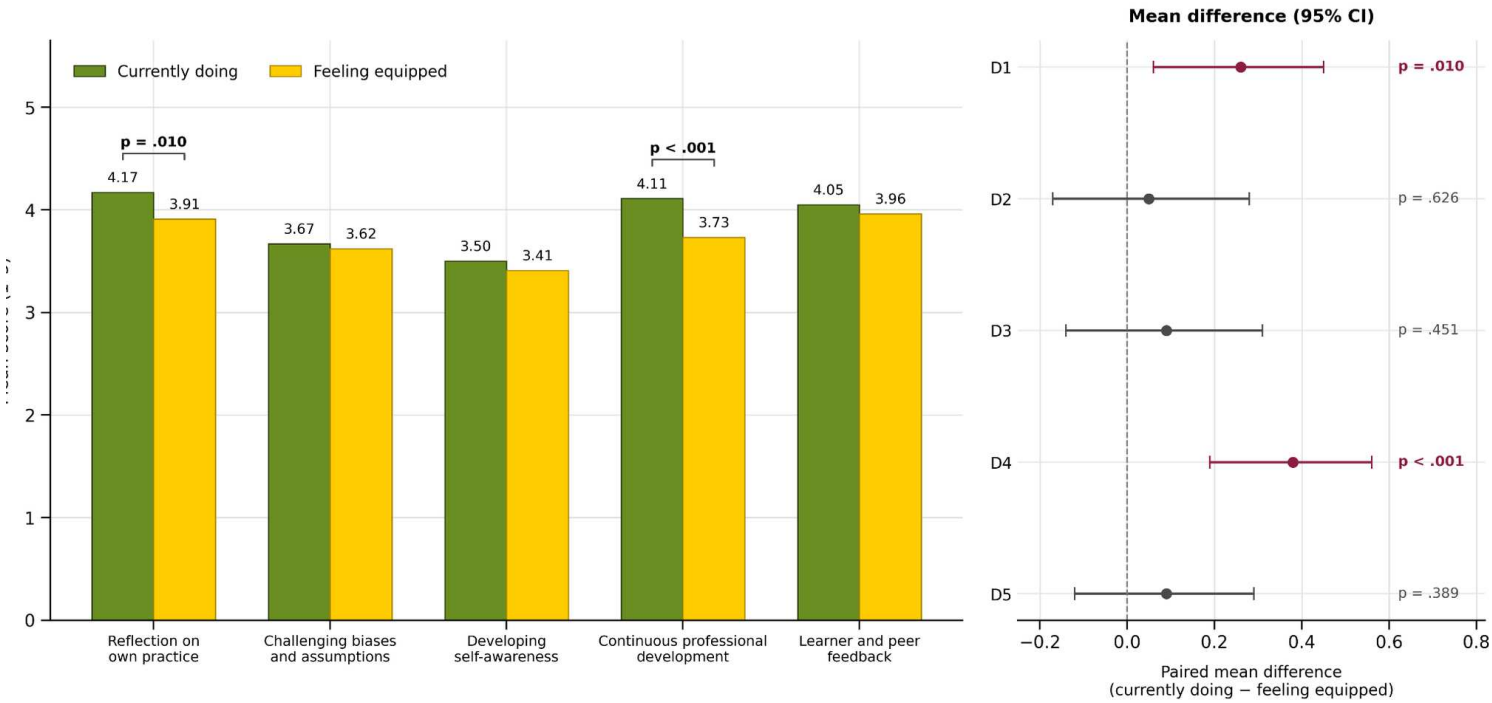


Figure 4

Current practice and perceived preparedness across the dimensions of Principle 8

Comparison of educators' reported current practice and perceived preparedness across the five dimensions of Principle 8, Engaging in critical self-reflection and continuous learning (*n* = 55–58). Bars show mean scores. Points in the right-hand panel show paired mean differences, with horizontal lines indicating 95% confidence intervals. Positive values indicate higher reported current practice than perceived preparedness. Exact *p*-values are shown. Statistically significant comparisons are indicated by brackets and highlighted in plum. Sample sizes vary because of item-level missing responses.

Supplementary Files

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