Scenario-Based Digital Education for Intercultural Competence in Physiotherapy: Lessons Learnt from a Multi-Country Pilot Evaluation of the MOV-E Project

Abstract

Introduction

Physiotherapy practice increasingly requires intercultural communication and cultural sensitivity, given the diversity of patient populations and the influence of cultural norms on treatment adherence and outcomes. While the pedagogical effectiveness of online and blended education in physiotherapy has been well documented—with evidence showing equal or superior outcomes in knowledge, skills, and learner satisfaction compared to traditional methods—few studies have focused on the development of intercultural competence through digital platforms. The MOV-E project was designed to address this gap by creating an e-learning course on intercultural communication in physiotherapy, delivered through case-based videos, interactive modules, and a final exam. This study analyses the outcomes of the post-piloting evaluation carried out in five European countries and contextualises the results against evidence from other online and hybrid physiotherapy programmes.

Methods

The course was piloted in Poland, Türkiye, Spain, Finland, and Hungary. Participants included undergraduate and postgraduate students, physiotherapy educators, and practicing clinicians. Delivery modes varied: compulsory course integration (Poland), voluntary enrolment (Türkiye, Finland, Hungary), and practicum-embedded implementation (Spain). After completing the course and final exam, participants completed post-pilot questionnaires combining Likert-scale items and open-ended questions. Data were analysed descriptively, with cross-country comparisons highlighting patterns in satisfaction, perceived learning gains, and challenges. Findings were triangulated with recent evidence on online physiotherapy education from systematic reviews and implementation studies.

Results

In all countries, video-based and scenario-driven materials were reported as the most engaging and effective resources. Students consistently noted improvements in empathy, respectful and gender-sensitive language, non-verbal communication, and the ability to respect cultural boundaries during therapy. Clinicians emphasised the direct clinical applicability of the content in domains such as sports physiotherapy, geriatrics, spine rehabilitation, and pregnancy-related care. Teachers and academics reported observable improvements in students' cultural awareness but called for more diverse case libraries, interactive exercises, and forums for exchange.

Cross-country differences were pronounced. Spain and Türkiye achieved the highest satisfaction scores, with learners emphasising the realism and clinical relevance of scenarios. Poland and Hungary reported more moderate evaluations,

citing content density, theoretical overload, and time-management challenges. Finland participants valued the intercultural emphasis but were hindered by translation inconsistencies and technical difficulties on the platform. These findings mirror broader research on digital physiotherapy education, where blended models generally outperform pure online approaches in terms of satisfaction, and where technical reliability and linguistic accessibility are critical success factors.

Discussion

The MOV-E pilot confirms that e-learning courses can successfully foster intercultural communication skills in physiotherapy, a domain underrepresented in prior research. Its reliance on videos, scenarios, microlearning modules, and quizzes aligns with best practices from the literature. At the same time, the evaluation highlights key implementation challenges: the need for localisation of language and cultural content, simplification of theoretical modules, and the integration of synchronous role-play and reflection to complement asynchronous study. Comparisons with other online physiotherapy courses suggest that MOV-E adds unique value by explicitly targeting intercultural competence and by incorporating a summative exam.

Conclusion

MOV-E demonstrates strong potential to enhance intercultural communication in physiotherapy education across diverse European contexts. For future implementation, guidelines include: adopting a hybrid model that combines asynchronous case-based learning with synchronous debriefs; strengthening translation, accessibility, and plain-language supports; diversifying cultural and clinical case scenarios; and developing validated, scenario-based exams that measure both knowledge and applied communication skills. These measures will not only improve learner outcomes but also contribute to international best practices in embedding intercultural competence into physiotherapy curricula.

Introduction

Physiotherapy is a profession increasingly shaped by globalisation, migration, and the diversification of patient populations. Effective practice requires not only biomechanical and clinical reasoning skills but also the ability to communicate across cultural, linguistic, and social boundaries. Intercultural competence and sensitivity are vital to fostering trust, ensuring adherence to treatment, and optimising rehabilitation outcomes. Despite this, physiotherapy curricula have historically emphasised biomedical content, with limited structured training in cultural awareness or communication skills. The emergence of digital education presents an opportunity to address this

gap, as e-learning and blended models enable scalable, flexible, and contextually adaptable training in both technical and interpersonal skills (Cervera-Gasch et al., 2021; Vitoria et al., 2018).

A growing body of research demonstrates that online and hybrid learning approaches are highly effective in physiotherapy education. Systematic reviews and controlled studies show that blended learning can outperform traditional teaching methods in knowledge acquisition, practical skills, and ethical competence, while maintaining or improving learner satisfaction (Aguado-Gutiérrez et al., 2020; Soro et al., 2022). Online courses have also been linked to increased motivation, flexibility, and perceived clinical relevance, particularly when scenario-based design, multimedia resources, and interactive assessments are employed (De Andrés-Gaspar et al., 2022; Rodríguez-Almagro et al., 2018). These findings collectively highlight the suitability of digital approaches for advancing health sciences education.

Despite this evidence, intercultural communication remains underexplored, with few interventions embedding it explicitly into physiotherapy curricula. While many studies measure student motivation, satisfaction, and skill acquisition, relatively few evaluate the development of competencies that enable physiotherapists to work effectively with patients from diverse cultural backgrounds (Cervera-Gasch et al., 2021). Most existing research continues to focus on biomedical and technical domains, with limited attention to relational aspects such as empathy, respectful communication, and cultural sensitivity.

The MOV-E project was designed to address this gap by integrating intercultural communication training into a structured e-learning course on movement analysis and therapy. This study is one of the first to evaluate intercultural communication training in physiotherapy via e-learning across multiple countries. Through its combination of case-based scenarios, video demonstrations, reflective activities, and a summative exam, MOV-E contributes new evidence on how intercultural competence can be embedded into physiotherapy curricula using blended and online approaches. The purpose of this paper is to present findings from the post-pilot evaluation of the MOV-E course, carried out in Poland, Türkiye, Spain, Finland, and Hungary, and to provide guidelines for its wider implementation.

2. Methods

Study Design

This study employed a descriptive, mixed-methods design to evaluate the implementation and outcomes of the MOV-E e-learning course: *Development of Intercultural Communication Skills in Physiotherapy Practice through an E-learning Course on Movement Analysis and Therapy*. The choice of a mixed-methods approach was motivated by the dual need to capture measurable patterns in satisfaction and learning outcomes while also exploring participants' experiences in depth. Mixed-methods designs provide a more comprehensive and nuanced account of complex educational interventions than either quantitative or qualitative approaches alone (Creswell & Plano Clark, 2018). In health sciences education, such designs are particularly valuable for evaluating digital innovations, as they allow for an assessment of both outcomes and the contextual factors that influence them (Johnson & Onwuegbuzie, 2004).

By combining survey-based measures with qualitative reflections, the study aimed to triangulate findings, enhance validity, and generate actionable insights. Quantitative ratings offered a systematic overview of satisfaction and perceived learning gains, while qualitative responses captured the richness of learners' and educators' perspectives. This integration of methods responds to calls in educational research to move beyond simple outcome measurement toward holistic understandings of learner engagement in blended and online contexts (Fetters & Freshwater, 2015).

Setting and Participants

The course was piloted in five European countries—Poland, Türkiye, Spain, Finland, and Hungary—between 2023 and 2024. Each site implemented the programme within its local curricular framework, ranging from compulsory master's-level modules to elective or practicum-integrated formats. Across sites, three stakeholder groups participated: physiotherapy students, teachers and academics, and clinicians. A summary of participant numbers and delivery contexts is presented in Table 1.

Table 1

MOV-E Pilot Participants by Country and Stakeholder Group

Country	Students (n)	Teachers/Academics (n)	Clinicians (n)	Delivery Context
Poland	63	5	6	Compulsory, Master's level
Türkiye	23	7	10	Voluntary, Undergraduate level
Spain	6	5	Several*	Integrated in practicum
Finland	10	0	0	Elective, Bachelor's level
Hungary	28	5	5	Voluntary, Undergraduate level

Note. In Spain, clinicians' participation was linked to practicum supervision and was not recorded as a fixed number.

As shown in Table 1, participation varied considerably across sites. Poland and Hungary contributed the largest student cohorts, while Spain and Finland involved smaller groups. Teachers and clinicians were represented in most contexts, except in Finland where only students participated. Spain was distinctive in embedding the course within clinical practice placements, giving learners direct opportunities to apply intercultural skills with patients.

Course Design and Delivery

The MOV-E course was designed as a blended e-learning programme with a consistent pedagogical framework across countries. Core components included a theoretical manual on intercultural communication in physiotherapy, scenario-based video materials depicting both effective and ineffective communication strategies, reflective exercises, and formative quizzes with feedback. A final summative exam assessed both theoretical knowledge and the application of intercultural communication principles in movement analysis and therapy. Delivery modes varied: in Poland, the

course was embedded as a compulsory module, while in Spain it was linked to practicum training; in other sites, it was offered on a voluntary or elective basis. This variability enabled comparative insights into learner engagement under different curricular conditions.

Data Collection Instrument

Evaluation data were collected using a structured post-pilot questionnaire distributed online after participants had completed the course and final exam. The instrument combined Likert-scale items and open-ended questions. Quantitative items measured clarity, usefulness, relevance, satisfaction, and applicability on a five-point scale. Qualitative items invited participants to elaborate on their learning experiences, highlight perceived strengths and weaknesses, and propose recommendations for improvement. This mixed design captured both breadth and depth of participant responses, consistent with best practices in evaluating complex educational innovations (Johnson & Onwuegbuzie, 2004).

Data Analysis

Data analysis proceeded in two stages. Quantitative data were summarised using descriptive statistics, including means, standard deviations, and frequency distributions. Cross-country comparisons highlighted similarities and divergences in learner satisfaction and perceived outcomes. Qualitative data were analysed thematically. Two independent reviewers coded open-ended responses iteratively, identifying recurrent categories such as “learning gains,” “barriers to implementation,” and “recommendations for improvement.” Coding discrepancies were resolved through discussion until consensus was achieved. Integrating these findings enabled a richer interpretation, situating overall patterns within the local and cultural contexts that shaped learning experiences.

Ethical Considerations

Ethical approval for the pilot implementation and subsequent evaluation was secured according to institutional requirements in each participating country. All participants were informed about the study’s aims and assured that their responses would remain anonymous and confidential.

Participation was voluntary, and completion of the questionnaire was taken as informed consent. Data were anonymised at source, securely stored, and analysed only in aggregated form. These measures ensured compliance with international ethical standards for educational and health sciences research (World Medical Association, 2013).

3. Results

The MOV-E course was piloted in five countries with participation from 130 students, 22 teachers/academics, and 26 clinicians. Across all groups, participants valued the scenario-based design, reflective activities, and clinical applicability of the course. However, ratings and comments varied across national contexts, shaped by differences in delivery format, curricular integration, and technical implementation.

Students

Students rated the scenario-based videos as the most valuable feature, emphasising their realism, re-watchability, and direct clinical relevance. They reported learning gains in empathy, gender-sensitive communication, non-verbal awareness, and boundary-setting. Quantitative satisfaction was highest in Spain and Türkiye, where mean scores ranged from 4.5 to 5.0. In Poland, students scored the course more moderately (3.8–4.3), noting concerns about theoretical overload and workload. Hungarian students rated clarity and usefulness highly (up to 4.5) but reported lower motivation (mean 3.8). Finland's students recorded positive overall satisfaction (4.0–4.2), though open comments highlighted frustrations with translation accuracy and technical usability.

Teachers and Academics

Teachers consistently endorsed the video-rich, case-based pedagogy, observing that it stimulated reflection on intercultural issues and improved student engagement. Their ratings ranged from 4.3 to 4.8 across most sites, with Spain and Türkiye reporting the strongest evaluations (4.5–4.9). Teachers identified the reflective elements as particularly effective but suggested a greater diversity of case

examples, opportunities for synchronous interaction, and stronger curricular embedding to maximise impact.

Clinicians

Clinicians emphasised the practical applicability of MOV-E to physiotherapy subfields such as geriatrics, sports, spinal rehabilitation, and pregnancy care. They confirmed that course skills—particularly empathy, culturally sensitive phrasing, and non-verbal communication—were directly transferable to practice. Quantitative ratings were consistently high across sites, with mean scores between 4.3 and 4.8. Clinicians recommended expanding localised case scenarios and adding training on interpreter-mediated communication, health literacy, and support for patients with sensory impairments.

Cross-Country Comparison

As shown in Table 2, Spain and Türkiye achieved the highest overall satisfaction, with near-ceiling scores among all stakeholder groups. Spain's integration of the course into practicum training and Türkiye's motivated voluntary participation were noted as key facilitators of positive outcomes. Poland and Hungary demonstrated more moderate evaluations: students recognised the value of MOV-E but pointed to workload and motivation as barriers. Finland showed positive scores overall but qualitative comments revealed that technical and translation issues limited learner engagement.

Overall, the MOV-E pilot demonstrated its potential as a valuable and transferable educational intervention for enhancing intercultural communication skills in physiotherapy. Across all sites, the strongest aspects of the course were the scenario-based design, reflective exercises, and clinical relevance. The main barriers identified were cognitive load, motivational challenges, and issues of technical and linguistic accessibility. Teachers and clinicians strongly endorsed the continuation and expansion of the programme, provided that improvements are made in localisation, case diversity, and accessibility.

Table 2
Comparative Quantitative Results of MOV-E Pilot by Country and Stakeholder Group

Country	Students Mean Score (Range)	Teachers Mean Score (Range)	Clinicians Mean Score (Range)	Key Observations
Poland	3.8–4.3	4.3–4.6	4.3–4.6	Moderate satisfaction; concerns about theoretical overload and time management.
Türkiye	4.5–4.8	4.5–4.8	4.5–4.8	High satisfaction; strong motivation and applicability.
Spain	5.0	4.7–4.9	4.6–4.8	Ceiling scores; integration with practicum enhanced engagement.
Finland	4.0–4.2	—	—	Positive satisfaction; translation and technical issues noted.
Hungary	3.8–4.5	4.4–4.7	4.4–4.6	Good clarity/usefulness scores; lower motivation.

Note. Mean score ranges are based on 5-point Likert-scale evaluations. A dash (—) indicates no data were available for that group in the respective country.

4. Discussion

This study is among the first to demonstrate that intercultural communication skills in physiotherapy can be developed through blended e-learning across multiple countries. By evaluating the MOV-E course in five diverse contexts, we provide novel evidence that scenario-based, reflective, and video-rich learning activities are not only feasible but also valued by students, teachers, and clinicians. The study contributes to closing a long-standing gap in physiotherapy education, where biomedical and biomechanical competencies have been prioritised while cultural and relational skills remain underrepresented (Forsyth et al., 2020).

Cross-country findings highlight the influence of curricular integration, technical accessibility, and content design on learner experiences. Spain and Türkiye achieved the highest satisfaction, pointing to the importance of contextual embedding: integration into practicum settings in Spain enhanced

authenticity and relevance, while voluntary, self-selected participation in Türkiye increased motivation and engagement. By contrast, Poland and Hungary yielded more moderate evaluations, reflecting challenges with theoretical density, workload, and student motivation. Finland's results underscored that translation fidelity and technical usability can undermine otherwise well-designed content, demonstrating the necessity of robust localisation processes for cross-national adoption, as noted by Wojniusz et al., 2022.

The findings of the current study are consistent with broader evidence in physiotherapy and health sciences education. Reviews and trials have shown that blended and online approaches perform as well as or better than traditional teaching in terms of knowledge acquisition, clinical skills, and learner satisfaction (Aguado-Gutiérrez et al., 2020; Rodríguez-Almagro et al., 2018; Butcher & Lewis, 2022). Hybrid models also support ethical competence and professional development (Soro et al., 2022; Durham et al., 2024). What sets MOV-E apart is its explicit focus on intercultural communication, a dimension rarely addressed in physiotherapy curricula. As noted in recent studies, cultural sensitivity has been largely overlooked in digital interventions (Cervera-Gasch et al., 2021; Pagels et al., 2025). By embedding intercultural case scenarios, reflective exercises, and a summative exam, MOV-E extends the reach of blended learning beyond technical knowledge into relational and communicative domains.

One explanatory factor that shaped outcomes was the degree of curricular integration. Research demonstrates that blended and online interventions are most effective when embedded within existing learning pathways and linked to authentic practice contexts (Aguado-Gutiérrez et al., 2020; Campbell et al., 2023). Spain's practicum-based integration created strong links between online learning and patient interaction, reinforcing clinical relevance. By contrast, compulsory modules without clinical application, as seen in Poland, were associated with perceptions of overload and limited autonomy, echoing evidence that learner-centred, contextually embedded activities foster greater motivation and knowledge transfer (De Andrés-Gaspar et al., 2022; Majerus, 2023).

Language accessibility and localisation represented another critical explanatory factor. Finland's results showed that even high-quality pedagogical design can be undermined by translation

inconsistencies or platform usability issues. Prior research during the COVID-19 pandemic similarly found that poorly adapted digital content disrupted engagement and reduced perceived learning value (Cervera-Gasch et al., 2021; Luedtke et al., 2023). The MOV-E pilot reinforces the need for rigorous localisation, including subtitling, culturally adapted case repertoires, and robust technical infrastructure, to ensure equitable learning across multilingual cohorts, all of which have also been advocated by Wojniusz et al., (2022).

Finally, the density of content and resulting cognitive load appeared to limit satisfaction in Poland and Hungary. Students reported theoretical overload and difficulties in balancing modules with other academic responsibilities. Studies on e-learning in health sciences highlight that excessive information density reduces retention and undermines motivation, whereas microlearning strategies—such as modular units, concise summaries, and just-in-time resources—improve outcomes (Rodríguez-Almagro et al., 2018; De Andrés-Gaspar et al., 2022; Varma et al., 2024). Addressing this issue in future iterations of MOV-E will be essential to sustaining motivation and supporting diverse learning needs.

The practical implications of these findings are twofold. For curriculum design, the results confirm that e-learning in physiotherapy is most effective when contextualised—whether through practicum integration, synchronous debriefings, or links to authentic patient interactions. Attention must also be given to managing cognitive load through microlearning strategies, modularised content, and concise resources, particularly in contexts where students reported overload. For clinical practice, the course demonstrated transferability of communication skills into diverse areas such as geriatrics, sports, and rehabilitation. Teachers and clinicians consistently endorsed its clinical value, reinforcing the idea that intercultural competence is not an ancillary skill but a core component of patient-centred care in diverse healthcare systems. It confirms the findings of Hlebš (2025) and Kothe et al., (2023) who underscore the role of context in the learners' perception of the efficiency of the learning and teaching enviroment.

Taken together, these findings provide compelling evidence that MOV-E can serve as a scalable and adaptable model for embedding intercultural communication into physiotherapy education. However,

the results also underscore that successful implementation requires thoughtful curricular integration, rigorous localisation, and attention to learner workload. The next section outlines the directions for future research, limitations of the study and provides recommendations for future iterations of MOV-E and similar initiatives.

Directions for Future Research

Future research should address these limitations by adopting more robust and standardised evaluation designs. Larger, balanced samples across multiple institutions would allow for stronger statistical comparisons and more generalisable conclusions. The development and application of validated instruments for measuring intercultural competence in physiotherapy education should be prioritised, as current evidence remains sparse in this area. Mixed-methods studies combining self-report, performance-based assessments, and direct observation during clinical placements could provide a more comprehensive understanding of skill acquisition and transfer.

Further, experimental or quasi-experimental designs could test the effectiveness of MOV-E in comparison with traditional or hybrid communication training, building on evidence that blended models can yield superior knowledge and ethical outcomes (Aguado-Gutiérrez et al., 2020; Soro et al., 2022). The integration of innovative learning technologies, such as virtual reality simulations or gamification, also warrants investigation, particularly in relation to their potential for immersive intercultural encounters. Finally, longitudinal studies following students into professional practice would provide insights into the retention and real-world application of intercultural communication skills acquired through digital learning.

Overall, the MOV-E pilot demonstrates that intercultural communication training can be effectively delivered through e-learning in physiotherapy education. The cross-country findings highlight both the promise and the challenges of scaling such interventions across diverse contexts. By refining localisation strategies, integrating the course into authentic clinical experiences, and developing stronger evaluation frameworks, MOV-E and similar initiatives have the potential to set new benchmarks for embedding intercultural competence in health sciences curricula.

5. Limitations

This study has several limitations that should be taken into account when interpreting the findings. First, the sample sizes varied considerably across countries, with larger cohorts in Poland and Hungary and smaller ones in Spain and Finland. This uneven distribution limits the generalisability of results and may have amplified the influence of local contexts on participant evaluations. Second, the study relied on self-reported data, which, while useful for capturing learner perceptions and attitudes, are subject to social desirability and recall bias. Objective measures of intercultural communication skills, such as direct observation or validated competence scales, were not included.

Third, differences in course delivery across sites created variability that complicates direct comparison. Spain integrated the course into a practicum, Poland delivered it as a compulsory module without strong clinical linkage, and Finland offered it as an elective. Such heterogeneity reflects the adaptability of the MOV-E model but also underscores the challenge of attributing differences in outcomes to course design alone. Fourth, translation and localisation issues may have affected both the learning experience and the interpretation of qualitative responses, despite efforts to standardise coding procedures. Finally, the short timeframe of evaluation did not allow assessment of long-term knowledge retention or transfer of intercultural skills into clinical practice.

Despite these limitations, the study also has notable strengths. It represents a multi-country implementation across diverse curricular and clinical contexts, which is rare in physiotherapy education research. The inclusion of multiple stakeholder groups—students, teachers, and clinicians—provides a more comprehensive picture of the course's impact and applicability. Furthermore, the use of a mixed-methods design allowed the integration of quantitative data with rich qualitative insights, strengthening the validity and depth of the findings. Most importantly, the study addresses a critical gap in the literature by explicitly evaluating intercultural communication training in physiotherapy through an e-learning format, contributing novel evidence to both the physiotherapy and health sciences education fields.

6. Guidelines & Recommendations

The MOV-E pilot represents one of the first systematic attempts to develop structured guidelines for embedding intercultural communication skills into physiotherapy education through blended and online delivery. While blended learning has been widely studied in health sciences education, few initiatives have explicitly targeted the relational and cultural dimensions of physiotherapy practice or provided practical frameworks for designing, assessing, and scaling such courses across multiple national contexts. The recommendations presented here therefore contribute novel guidance, not only for refining the MOV-E course itself but also for informing future efforts to integrate intercultural competence into physiotherapy curricula worldwide.

6.1 Course Design & Delivery

The evaluation of the MOV-E pilot, together with evidence from other online and blended physiotherapy education initiatives, highlights several principles for optimising course design and delivery.

First, the course should adopt a blended delivery model that combines asynchronous micro-modules with synchronous activities. Asynchronous components—such as short videos, scenario-based exercises, and quizzes with feedback—enable flexible, self-paced learning, while synchronous elements, including debriefs and role-plays, provide opportunities to consolidate knowledge, practise applied skills, and enhance satisfaction. Evidence from randomised controlled trials supports the effectiveness of this hybrid approach in improving both knowledge outcomes and ethical reasoning in physiotherapy education (Aguado-Gutiérrez et al., 2020; Soro et al., 2022).

Second, the course should employ a scenario-first pedagogy. The use of case studies and video scenarios should remain central to the learning process, with repertoires covering diverse cultural contexts, age groups, and clinical conditions. Where feasible, “country-switchable” variants of the same case should be included to illustrate how cultural framing shapes communication. This was a

request made explicitly by Spanish participants and reflects the broader need for adaptable, context-sensitive training.

Third, microlearning principles should be used to manage cognitive load. This includes providing clear learning goals at the outset of each module and incorporating end-of-module summaries, checklists, and quick-reference materials. Such tools are particularly relevant for topics related to privacy, consent, touch and attire, and family involvement. Reports from Poland and Hungary indicated that theoretical overload was a barrier to learning, and concise aids can help mitigate this challenge.

Fourth, the course must be designed with language accessibility at its core. Subtitles and translations should be provided for all video materials, supplemented by plain-language glossaries and sentence banks to support learners working in second languages. In addition, robust quality assurance processes should be applied to translations to prevent context drift, as issues of linguistic fidelity were noted in both Finland and Türkiye.

Fifth, the programme should include guided practice in communication strategies. Learners recommended the addition of exercises on interpreter use, rewriting technical explanations into plain language for patients with low health literacy, and basic sign-language instruction. These components would expand the applicability of the course and directly support physiotherapists in meeting the needs of diverse patient groups.

Finally, the incorporation of immersive technologies should be piloted. Virtual reality (VR) or 3D simulations could allow students to experience cross-cultural encounters in a controlled, interactive environment, while gamified feedback systems may enhance motivation and engagement. Systematic reviews and scoping studies have identified these approaches as promising innovations in digital health sciences education, particularly for developing communication and interpersonal skills (De Andrés-Gaspar et al., 2022).

Together, these recommendations provide a framework for refining the MOV-E course into a scalable, high-quality learning intervention that combines pedagogical effectiveness with cultural adaptability.

6.2 Final Exam in Movement Analysis & Therapy

A summative final exam is an essential component of the MOV-E course, serving both to measure the acquisition of intercultural communication skills and to reinforce their transfer into clinical practice. In line with best practices in health sciences education, the exam should be carefully blueprinted to ensure alignment between learning objectives, assessment items, and competencies being tested. A scenario-based Objective Structured Clinical Examination (OSCE) or viva format is recommended, incorporating video clips of movement analysis alongside communication tasks. For example, students may be asked to explain a sensitive diagnosis in plain language, adapt their approach to gender-sensitive norms, or plan an intervention in consultation with an interpreter. Evidence from the literature supports the effectiveness of oral and practical examinations in online and blended settings, where they have been shown to improve not only knowledge but also professional reasoning and communication skills (Soro et al., 2022).

To capture the multidimensional nature of intercultural communication, the exam should use mixed item formats. Case-linked multiple-choice questions (MCQs) or single-best-answer (SBA) items can assess knowledge recall and application, while script concordance tests and short-answer rationales can evaluate clinical reasoning. OSCE or viva stations should employ structured checklists to record behaviours such as empathy, non-verbal communication, and boundary setting, thereby addressing the broader gap in the assessment of intercultural competence in physiotherapy education (Cervera-Gasch et al., 2021).

Ensuring validity and reliability is critical for summative assessment. Publishing an exam blueprint that clearly links objectives to items and stations will promote transparency and accountability. Standardising station timing, calibrating raters, and reporting psychometric indicators of internal consistency—such as KR-20 or Cronbach’s alpha for MCQs, and generalisability studies (G-studies)

for OSCEs—will strengthen the robustness of the exam. Such practices are widely recognised in health sciences assessment as essential for producing defensible outcomes (Johnson & Onwuegbuzie, 2004).

The exam experience must also be accessible and user-friendly. Stimuli should be available in all relevant languages, supported by subtitles and glossary tooltips to ensure parity of understanding across multilingual cohorts. Video introductions should be kept concise to reduce cognitive load, and technical reliability should be prioritised to prevent issues such as timeouts or auto-logout, which were noted in the pilots. These measures will ensure that the assessment evaluates communication competence rather than technological proficiency.

Finally, the exam should incorporate a feedback loop to enhance learning beyond the summative event. Providing students with analytic feedback by domain and scenario will enable self-regulated learning and reflection on strengths and areas for improvement. This approach builds on the positive impact of quizzes-with-feedback observed in the pilot study and aligns with the broader evidence that formative feedback promotes deeper learning and skill retention (De Andrés-Gaspar et al., 2022).

In sum, the final exam for MOV-E should combine rigorous psychometric design with authentic, scenario-based tasks that mirror the complexities of clinical practice. Such an approach not only validates the effectiveness of the course but also establishes a model for assessing intercultural competence in physiotherapy education.

6.3 Implementation in Other Physiotherapy Areas

The positive outcomes of the MOV-E pilot suggest that the course framework is adaptable to a wide range of physiotherapy specialisations. Expanding the scope of implementation will ensure that intercultural communication skills are embedded across the full spectrum of clinical contexts where physiotherapists engage with diverse patient populations.

In sports physiotherapy, intercultural competence is essential for working with athletes from different cultural backgrounds, often in high-stress and competitive environments. The course can be adapted

to include scenarios that focus on motivational interviewing, communication during return-to-play decisions, and the management of culturally influenced attitudes toward injury and rehabilitation. Clinicians in the pilot specifically highlighted the need for content relevant to sports contexts, underscoring its practical importance.

In geriatrics, physiotherapists frequently engage with older adults whose communication may be affected by cognitive decline, sensory impairments, or reliance on family caregivers. Modules should therefore incorporate scenarios addressing family mediation, dementia-sensitive communication strategies, and respect for cultural beliefs about ageing, dependence, and caregiving. This would extend the relevance of MOV-E to one of the fastest-growing patient populations worldwide.

In pelvic health and pregnancy care, intercultural sensitivity is particularly critical given the intimate nature of treatments, variations in cultural norms regarding touch, privacy, and gender roles, and the involvement of reproductive health. Case examples could be designed to train physiotherapists in gender-sensitive communication, negotiating boundaries, and ensuring informed consent in culturally diverse settings.

In neurorehabilitation, communication challenges are often compounded by patients' cognitive, speech, or comprehension impairments. Training should focus on plain-language adaptations, the use of non-verbal strategies, and collaboration with interpreters or family members, especially where cultural norms shape expectations of rehabilitation. Scenarios in this area could also highlight cross-cultural understandings of disability and independence.

To ensure effectiveness, implementation in these areas should follow the same blended learning model validated in the pilot: combining asynchronous micro-modules with synchronous debriefs and scenario-based role-plays. Content localisation remains a priority, particularly in relation to case selection, terminology, and translation fidelity. Clinical educators and supervisors should be actively involved in contextual adaptation, ensuring alignment with practice environments and patient needs.

Ultimately, expanding MOV-E to other physiotherapy domains will not only strengthen students' and clinicians' intercultural competence but also enhance the patient-centredness and equity of physiotherapy services. In doing so, the course can serve as a transferable model of best practice in embedding communication and cultural sensitivity training into health sciences education.

6.4 Platform, Accessibility & Analytics

Successful implementation of MOV-E across diverse educational and clinical contexts depends not only on pedagogical design but also on the robustness and inclusivity of the digital platform. The pilot demonstrated that technical usability and accessibility are critical determinants of learner satisfaction and engagement. In Finland and Türkiye, for instance, translation inconsistencies and navigation problems undermined otherwise positive experiences, illustrating the importance of platform design as a foundation for effective learning.

First, usability must be prioritised. The platform should feature intuitive navigation, minimal loading times, and consistent formatting across modules. Long video introductions should be shortened, and interfaces streamlined to reduce cognitive load. Stability of session settings is also essential: technical issues such as timeouts or auto-logouts reported in the pilots can frustrate learners and compromise assessment integrity. Regular stress testing of the platform prior to deployment is recommended.

Second, accessibility must be embedded by design. All video materials should include subtitles and, where relevant, audio description to support students with hearing or visual impairments. Plain-language glossaries, glossary tooltips, and multilingual support should be integrated throughout, ensuring equitable learning opportunities across countries. Adaptive features—such as adjustable font sizes, screen reader compatibility, and colour-contrast compliance—should be standardised in line with international accessibility guidelines (e.g., WCAG 2.1).

Third, a rigorous translation and localisation process is required. Each language version should undergo a two-stage quality assurance review, ideally involving a subject matter expert and a native linguist. This dual-check system reduces the risk of context drift and enhances fidelity. Furthermore,

culturally sensitive adaptation of case scenarios is crucial to ensure authenticity and relatability for learners in different national contexts.

Finally, the use of learning analytics can add value for both students and educators. Monitoring data such as time spent on modules, quiz performance patterns, and points of learner dropout can provide actionable insights into engagement and learning difficulties. Analytics dashboards can help instructors identify where learners struggle and adjust teaching or support accordingly. At the institutional level, anonymised analytics can inform course refinement, helping to continuously improve content design, accessibility features, and assessment strategies.

By combining user-centred design, accessibility compliance, rigorous localisation, and data-driven quality enhancement, MOV-E can deliver a reliable, inclusive, and scalable digital learning experience. Ensuring platform robustness is not only a technical necessity but also a pedagogical imperative, as it safeguards learners' ability to engage meaningfully with intercultural communication training.

Taken together, these guidelines position MOV-E as a scalable and adaptable model for advancing intercultural communication in physiotherapy education. Careful attention to course design and delivery (6.1), rigorous summative assessment strategies (6.2), contextual adaptation across physiotherapy domains (6.3), and robust, accessible digital infrastructure (6.4) will ensure that the course delivers both pedagogical quality and practical relevance. By integrating these elements, MOV-E can set a benchmark for embedding cultural competence into physiotherapy training worldwide, preparing students and clinicians to deliver patient-centred care in increasingly diverse healthcare systems.

Conclusions

The MOV-E pilot demonstrated that intercultural communication skills can be successfully developed through e-learning in physiotherapy education. Across five European countries, students, teachers, and clinicians consistently valued the scenario-based design, reflective exercises, and the

clinical applicability of the course. Quantitative results confirmed high satisfaction in Spain and Türkiye, moderate satisfaction in Poland and Hungary, and positive yet technically constrained experiences in Finland. Teachers and clinicians reinforced the practical relevance of MOV-E, underlining its contribution to professional competence.

The key take-home message is that digital and blended learning can extend beyond technical skill acquisition to address relational and cultural dimensions of healthcare, which are essential for equitable, patient-centred physiotherapy practice. However, the pilot also highlighted critical conditions for success: localisation of language and case materials, thoughtful curricular integration, careful management of cognitive load, and reliable technical infrastructure.

Recommendations for Practice

1. Embed intercultural communication modules into core curricula rather than offering them solely as electives, ideally linked to clinical placements for maximal authenticity.
2. Localise content and ensure accessibility through accurate translation, subtitles, plain-language glossaries, and culturally adapted case scenarios.
3. Adopt a blended delivery model combining asynchronous e-learning with synchronous debriefs, role-plays, and peer discussions to reinforce applied skills.
4. Manage cognitive load by streamlining theoretical content and supplementing it with summaries, checklists, and modular microlearning components.
5. Expand the scope of scenarios to cover additional physiotherapy domains, including sports, geriatrics, pelvic health, and neurorehabilitation, with attention to interpreter-mediated communication and health literacy.
6. Strengthen assessment strategies by developing validated, scenario-based exams that measure both knowledge and applied intercultural competence.
7. Leverage innovative technologies such as VR or gamification to simulate intercultural encounters and enhance learner engagement.

By addressing these recommendations, the MOV-E course can be scaled and adapted across diverse physiotherapy contexts, thereby contributing to a new standard of training that combines clinical expertise with cultural responsiveness. This approach holds promise for preparing physiotherapists to meet the demands of increasingly diverse healthcare systems and to deliver equitable, patient-centred care worldwide.

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