CHARTERED SOCIETY OF PHYSIOTHERAPY

Simulation toolkit

for pre-registration physiotherapy education/training

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Declaration of conflict of interest
Guillaume Alinier is an ASPiH Executive Committee member.

Executive Summary
This simulation toolkit for pre-registration physiotherapy education evolved from a project funded by the Chartered Society of Physiotherapy (CSP) in the United Kingdom (UK), KNOWBEST: The KNOWledge, BEhaviours and Skills required of the modern physioTherapy graduate including the future role of practice- based learning. The mixed methods project, which ran from September 2021 to March 2022, included a scoping review of contemporary approaches to practice based learning, with a specific focus on simulation-based learning. The review identified a modest, but highly relevant body of literature examining stakeholder acceptability and the appropriateness of simulation within pre-registration education. Combining the favourable findings from this review

with an acknowledged chronic shortfall in clinical placements, a recommendation from the KNOWBEST project was for the CSP to 'Commission a simulation toolkit to expedite the adoption of models of practice involving simulation and related activities through rapid dissemination'. With a commitment to ensuring student preparedness for post qualifying clinical autonomy through high quality training, it was evident that simulation-based learning offers considerable potential as an evidence based adjunct or substitute for existing clinical practice-based learning (the current UK requirement is for 1000 hours of practice based learning). Whilst some education providers of physiotherapy education have for some time engaged with SBL, others have less experience and a simulation toolkit was needed as a profession specific resource to expedite greater engagement in and use of SBL.

The toolkit is designed and constructed by SBL experts, from within and outside the physiotherapy profession. A working group with wider membership and the KNOWBEST Steering group were consulted throughout to inform structure and content validation, with ASPiH Executive Committee members providing feedback on the derived version as part of the process of content validation and quality assurance.

The toolkit draws on educational theory, profession-specific empirical evidence, best practice guidelines, standards as well as clinical and academic expertise, thus providing a wealth of resources to help physiotherapy education providers design and deliver SBL within their programmes. The aim was to provide a structured (11-part) profession-specific resource, which meets the need of CSP members, associates and support workers, being appropriate to those coming to SBL for the first time, or others wishing to extend their use of SBL or optimise the quality of their existing provision in light of national standards of SBL in healthcare.

Contents

Overview of Simulation-based learning

What is simulation?

Simulation is an educational technique, that allows interactive, and at times immersive activity by recreating all or part of clinical experience without exposing patients to the associated risks.[1] Simulation- based education, presents training that has many financial and safety advantages in healthcare. A range of different simulation modalities can be used such as: actor role players, standardised patients, human computerized manikins, part-task trainers, and virtual reality to replicate clinical scenarios that are suitably realistic and believable so that specific learning outcomes can be achieved.

Below are a few well-known quotes defining the term simulation in the context of healthcare education:

'Simulation is a technique – not a technology – to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner.' (Gaba, 2004)[2]

"an educational technique that allows interactive, and at times immersive, activity by recreating all or part of clinical experience without exposing patients to the associated risks." (Maran and Glavin, 2003)[1]

Fidelity and Realism

Fidelity is multidimensional, referring to the degree to which the simulation-based activity or the technology used help replicate reality as perceived by the learners. Several models of fidelity exist, describing different dimensions, 1) physical fidelity (e.g., environment, patient, equipment); 2) psychological fidelity (e.g., the semantical and phenomenal aspects). Collectively these capture the extent to which the simulation can duplicate or capture the real task to make the student feel as if it is real and how they are made to immerse into the activity); and 3) the conceptual fidelity ensure the scenario makes sense.[3 4]

Realism represents things or situations that are accurate or true to life. Depending on the learning objectives, it is sometimes important to make the simulation experience as real as possible; accomplished by having the student perform the task and requires the specific equipment used in that area of practice

All aspects of fidelity significantly hinge on the learners' perceived realism of the context of the learning episode as opposed to any one particular element such as the technology used (Figure 1).

Importantly **low-fidelity activities** lack significantly in one or more fidelity dimension as

required for the specific learning objectives and depending on the level of experience of the learners. **High-fidelity in person** simulation replicates as realistically as possible all relevant aspects in the physical, psychological and conceptual dimensions.

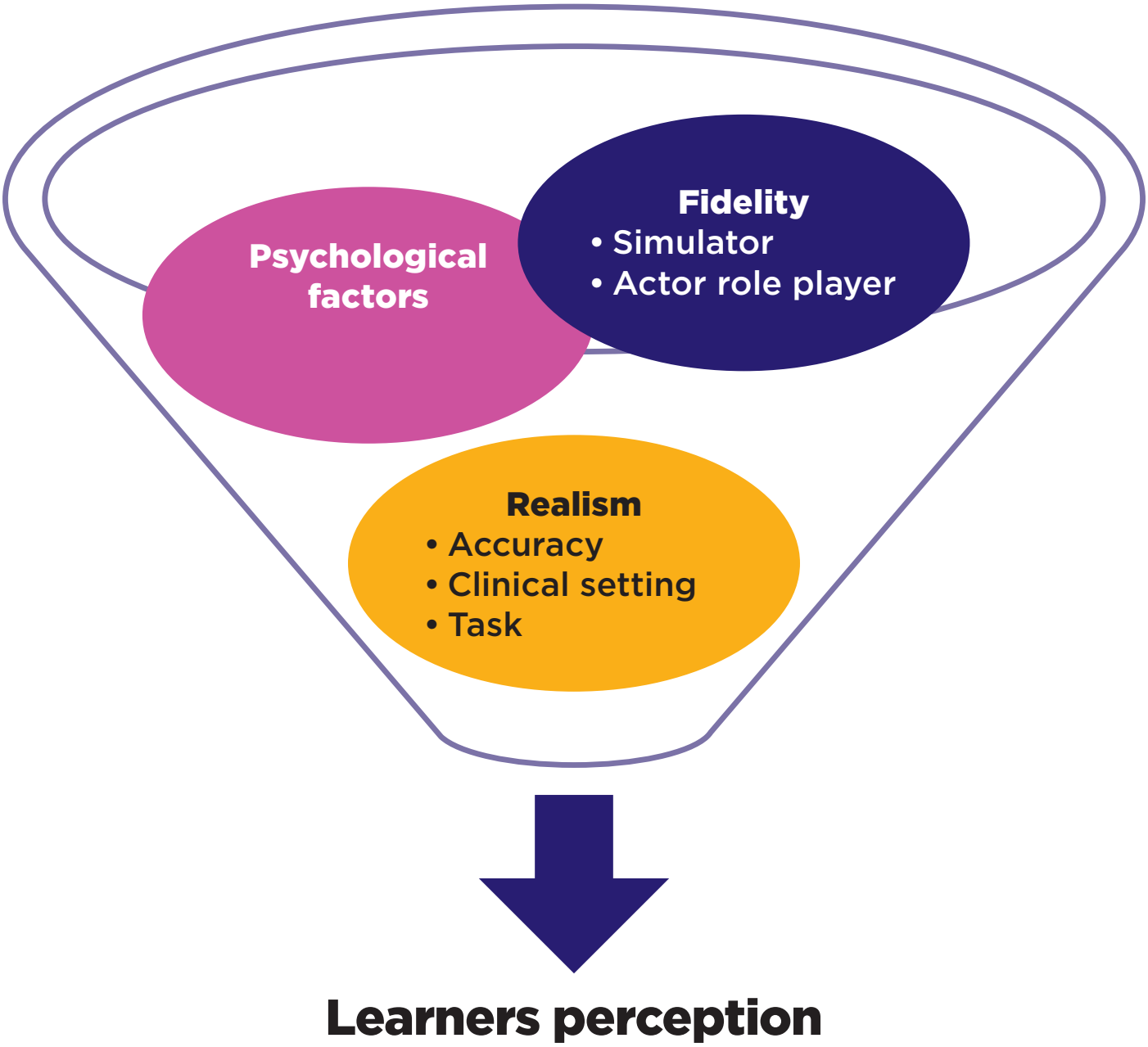

Figure 1. Learners' perception of realism

Pedagogical approach to simulation

Simulation is founded on a learner-centred philosophy, and on a blended approach to learning that comprises elements of ***behaviourism, cognitivism, constructivism***, (Figure 2), and ***experiential learning theory***. See Section 1 for further information.

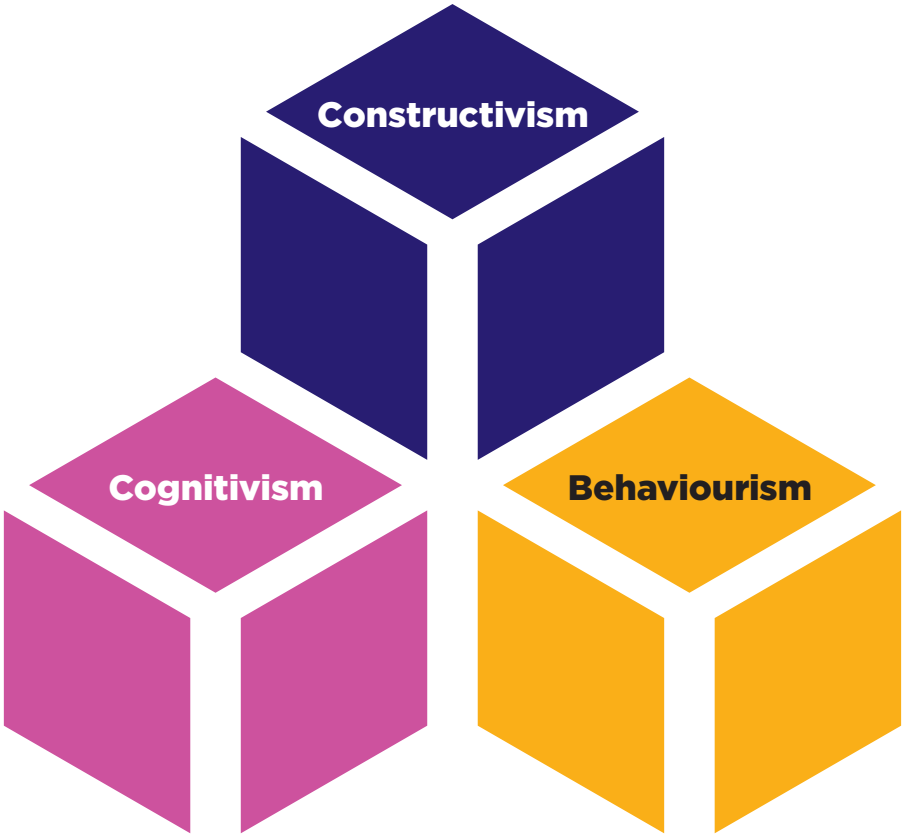

Figure 2. Pedagogical approach to simulation

Why use simulation in physiotherapy student education?

As well as a recommendation from the WHO[5], SBL offers considerable potential, as an approach to support pre-registration physiotherapy students in their development of knowledge, skills, attributes, and behaviours. This may assist them to achieve competence across different patient presentations and settings, and in preparedness for professional practice.

SBL offers considerable potential to further support student preparedness for PBL and professional practice, at a time where training places have increased considerably and demand for PBL opportunities has grown. The COVID-19 pandemic has further highlighted the importance of high quality and equitable learning opportunities so that students can demonstrate fulfilment of HCPC Standards of proficiency for physiotherapists. Specifically, SBL (adjunctive or substitutional) in physiotherapy education could help:

- standardise learning to ensure all **students are offered similar educational opportunities and exposure to ensure their preparedness for professional practice** (e.g. ICU) (Adjunctive SBL)
- support learner **preparation for clinical practice-based learning (PBL)** using adjunctive SBL (pre-PBL hours to develop skills and confidence) (Adjunctive SBL)
- **enhance safety** in less common but important clinical scenarios (e.g. assessment of red flags) (Substitutional SBL)
- professional preparation where clinical **capability and capacity is limited** (e.g. paediatrics) (Substitutional SBL)

What are the benefits of simulation-based learning?

The educational benefits of simulation in healthcare education include the following:

- Deliberate practice with immediate debriefing and/or feedback from educators, peers, and, or standardised patients (actors) allowing for reflection, change, and improved performance.
- Exposure to uncommon events or potentially challenging clinical areas where it is difficult to secure PBL for all students (e.g. ICU, paediatrics, mental health, front door admission avoidance).
- Reproducibility (across a large cohort, consistent quality of learning experience, compared to PBL which can be so varied).
- Opportunity for assessment of learners allows standardisation to ensure required competencies are achieved.
- The absence of risks to patients.

The features of simulation which best facilitate learning are illustrated in Figure 3.

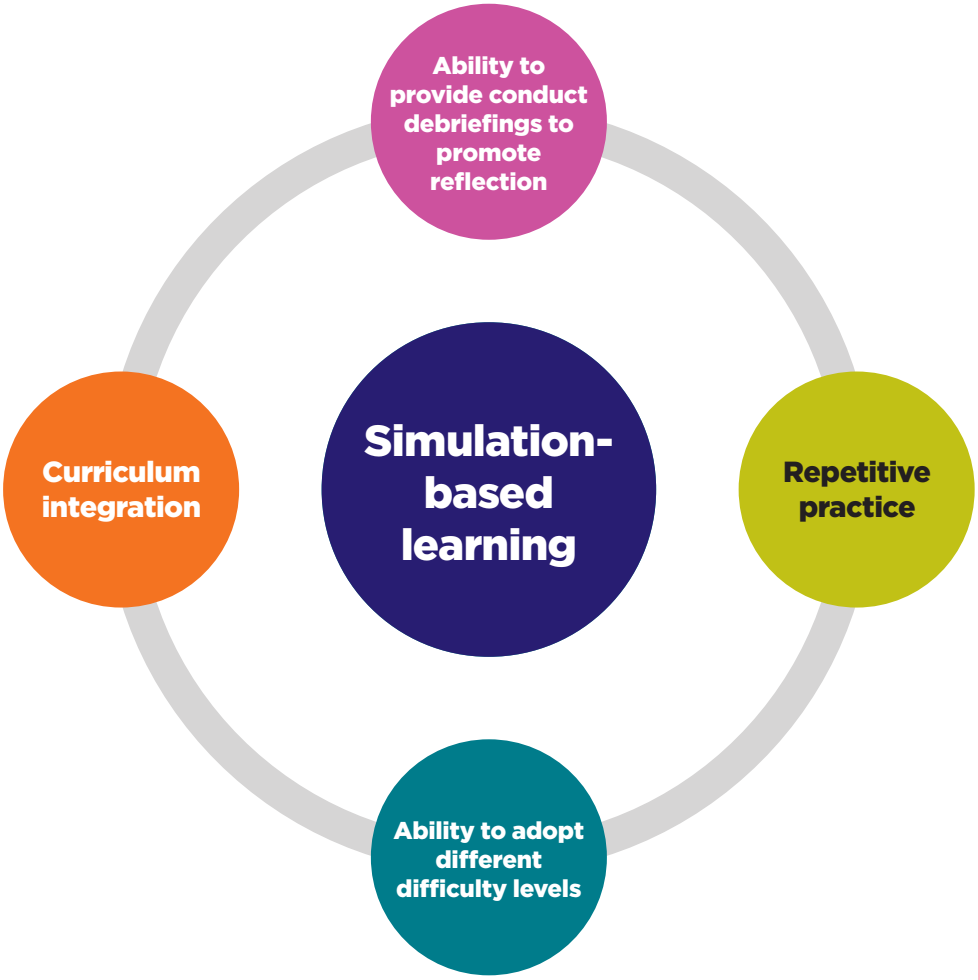

Figure 3. Features of simulation (adapted from Lateef 6)

For all of the above reasons SBL has become integral to some healthcare professions' educational curriculum.[7] In the UK the Nursing and Midwifery Council (2020) endorses that education providers can substitute clinical hours with SBL (300/2300 hours required). In Australia, Occupational Therapy (OT) accreditation standards endorse up to 200 of the mandated 1000 PBL hours to include SBL. A clinical trial by Imms et al. (2018)[8] concluded that students can achieve equivalent learning outcomes from a 40 hr simulated placement to those of a 40 hr traditional placement.

What is the evidence supporting the use of simulation in physiotherapy education?

The recent scoping review of evidence of simulation in physiotherapy pre-registration education in KNOWBEST (in preparation for publication)[9] identified 60 studies supporting the use of simulation in physiotherapy education. This includes 30 abstracts from conference proceedings which is indicative of an emerging body of profession specific pre-registration education evidence. Collectively, findings support the use of simulation; where pre-clinical placement SBL was positively received by key stakeholders, with physiotherapy students exhibiting heightened levels of confidence and self-efficacy through engagement with university-delivered simulation-based activities. See Section 8 for further details with Figure 4 illustrating themes and findings from the scoping review.

'There is evidence that simulated learning environments can replace a portion of a full-time 4-week clinical rotation without impairing learning'. (Mori et al., 2015) [10]

Figure 4. Word cloud illustrating themes and findings from the scoping review findings

Why a pre-registration education physiotherapy toolkit?

Whilst there are numerous guidance documents, policies, and resources on SBL, none are specific to physiotherapy or designed for pre-registration education. Drawing on empirical evidence, profession specific expertise, and examples of best practice, it is hoped that this 'shared' learning will further promote the use of and integration of SBL in pre-registration physiotherapy education.

A central resource repository within a professional specific toolkit may expedite and support implementation of SBL in pre-registration education; thus enhancing physiotherapy student preparedness and easing pressures on placement coordinators and providers of core placements.

Part 1

Educational theory underpinning simulation based learning

Simulation is founded on a learner-centred philosophy, and as a blended approach to learning that comprises elements of ***behaviourism, cognitivism, constructivism*** (Figure 5) and ***experiential learning theory***. SBL is a unique teaching strategy, which enables the development towards becoming a physiotherapist.

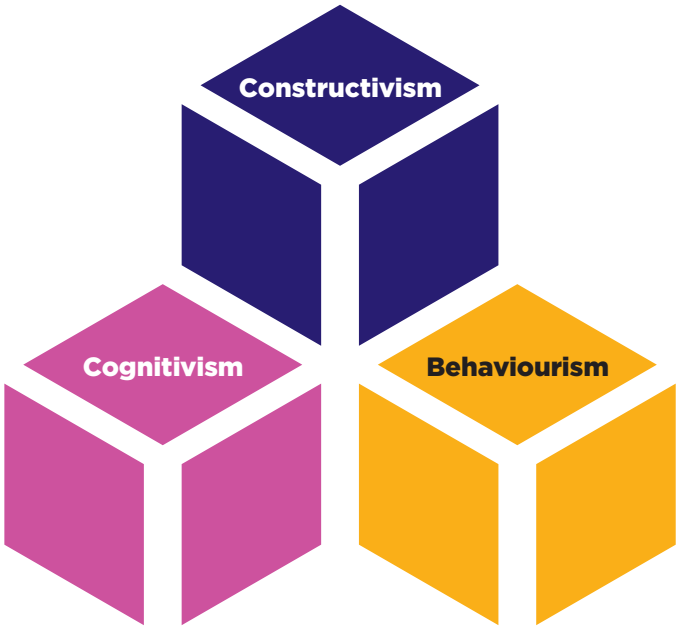

Figure 5. Pedagogical approach to simulation

Constructivist – SBL activities can be mapped to the physiotherapy curriculum to ensure certain learning outcomes are achieved. SBL Activities can be 'scaffolded' to suit the level of the learner using principles of Bloom's taxonomy i.e. a classification system used to define and distinguish different levels of human cognition (such as thinking, learning, and understanding). The scaffolding is progressively removed according to the level of the learner.[1]

Bloom's Taxonomy[11] (See Figure 6 – with permission) may be used to illustrate higher levels of thinking although it could also be applied to facilitate 'problem-based learning' of more complex clinical presentations at a higher level. For example, at level 6 managing a patient with knee osteoarthritis (OA) presenting with co-, multi-morbidities, such as COPD and depression, or dealing with a difficult relative.

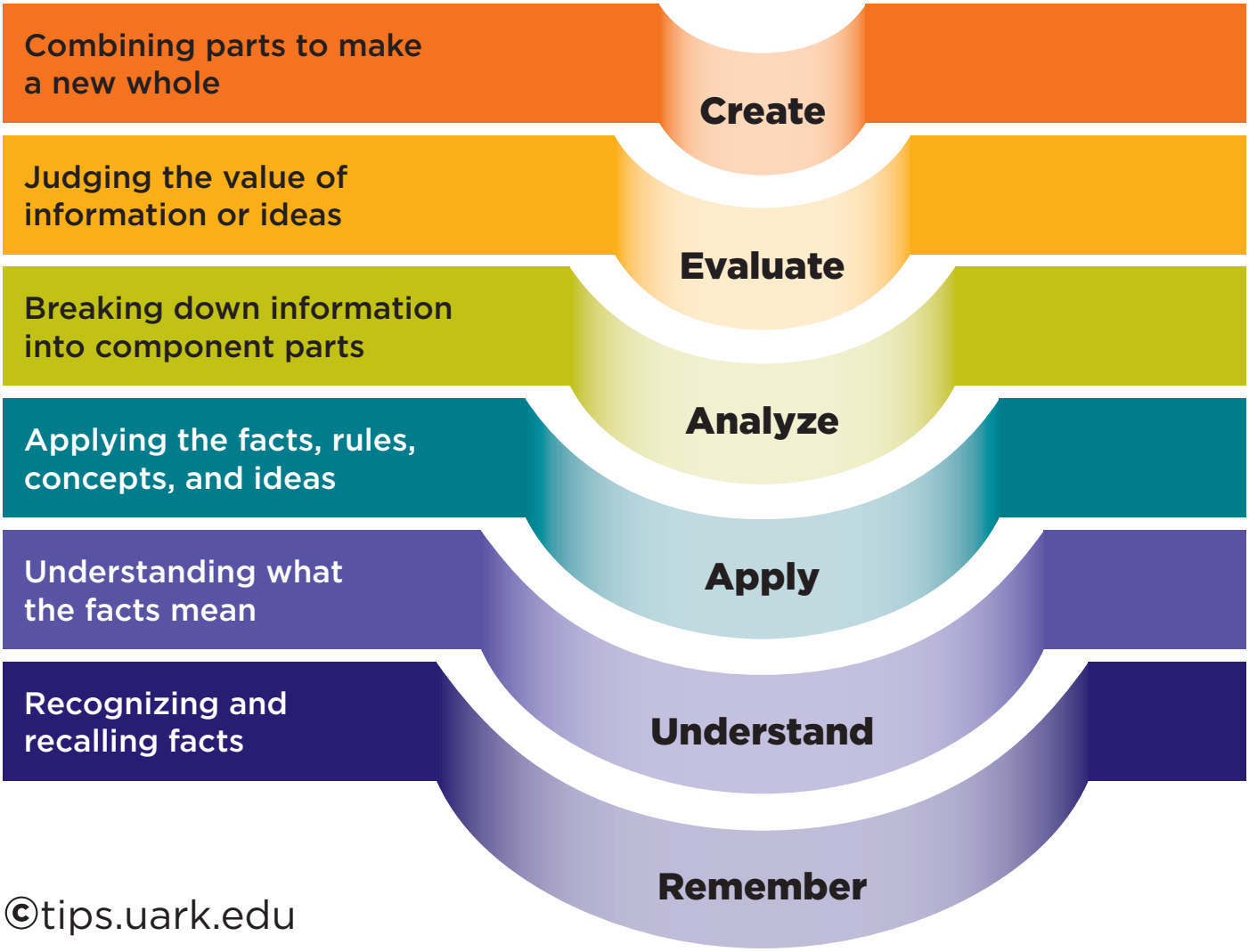

Figure 6. Bloom's Taxonomy (2001)[11] (Jessica Shabatura from https://tips.uark.edu/using-blooms-taxonomy/)

In a BSc Hons Physiotherapy programme we often stage learning using Blooms taxonomy such that level 4 (year 1) is about remembering and understanding, level 5 (year 2) is about application and analysis and level 6 (year 3) is about evaluating and creating new concepts.
Example of scaffolding SBL activities: example OA knee (See Figures 8a and b):
Knows: Learner has some knowledge of the knee anatomy, and identifies key anatomical features on a peer (low fidelity) and they have some knowledge of OA
Knows how: Learner rehearses how to apply that knowledge in a subjective assessment to ask the appropriate questions through role pay (low fidelity SBL) or by using an actor role player (high fidelity SBL)
Shows: Learner rehearses shows how to apply their knowledge by undertaking an objective assessment this can be role play or by using an actor role player
Does: Learner actually applies the knowledge achieved in SBL in practice

Cognitive – Clinical reasoning is central to physiotherapy practice and evidence-based shared decision-making for patient care and management. Comprising knowledge (procedural and propositional), reflective practice and metacognition, clinical reasoning

is 'the sum of the thinking and decision-making process associated with clinical practice'.[12] SBL activities facilitate the development of all types of knowledge prior to practice-based learning or as a supplement to practice-based learning.

The cognitive aspect of clinical reasoning can be facilitated in SBL by asking the learner to "think aloud" to share their thought process. This can be expanded upon during the debriefing where they can reflect on their performance which further develops their knowledge of the specific situation and the task they were involved in.

Behavioural – SBL enables students to rehearse and practise different skills, these can range from practising patient-centred communication skills, procedural skills, and professional specific psychomotor skills. The affective aspect of clinical reasoning can be developed, along with professionalism.

Experiential learning – Kolb's experiential learning theory (1984)[13] provides support for SBL where knowledge is built by transforming an experience in a cyclical manner from a concrete experience (SBL participation), through reflective observation (debriefing and reflection), abstract conceptualisation (consider relevance of activity), and active experimentation (test what was learned) (See Figure 7). Using this enhanced knowledge in a new concrete experience, followed by another reflection to further expand their knowledge (See Figure 8a and b) facilitates development towards professional clinical competence; whilst Miller's original Pyramid of Clinical Competence[14] indicates attainment of 'expertise', this conceptual model can be applied to illustrate fulfilment of clinical confidence and competence.

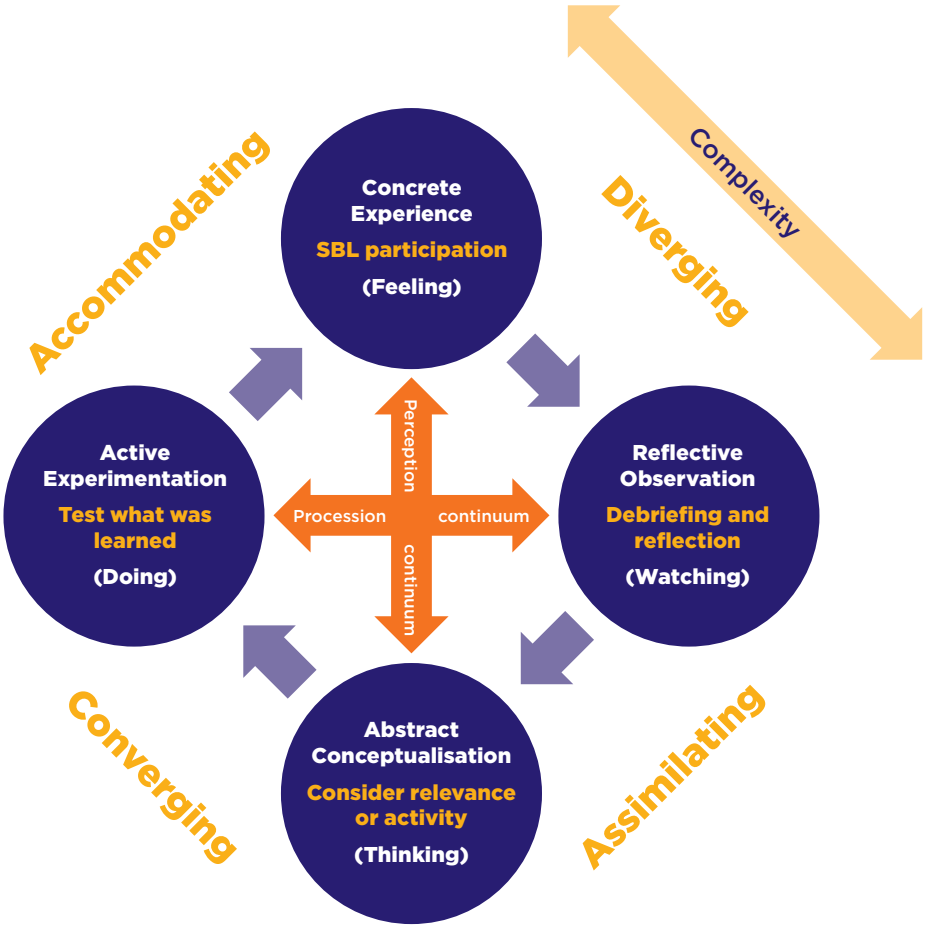

Figure 7. Kolb's experiential learning theory model 13

Miller's model (Pyramid of Clinical Competence)[14] may be used to conceptually frame the acquisition and assessment of knowledge, skills, and attitudes across a range of competencies needed for professional practice in physiotherapy.[15] These competencies may be specific to clinical condition (e.g. OA, stroke, COPD etc.), populations (e.g. frail elders, paediatrics etc.), or professional practice skills (e.g. communication, rehabilitation etc.).

Historically the model has been used to match assessment methods to the competency being tested and shape learning objectives. Assessment in the 'behavioural zone' being suited to assess application of physiotherapy specific knowledge, skills, attributes, and behaviours required for future professional practice.

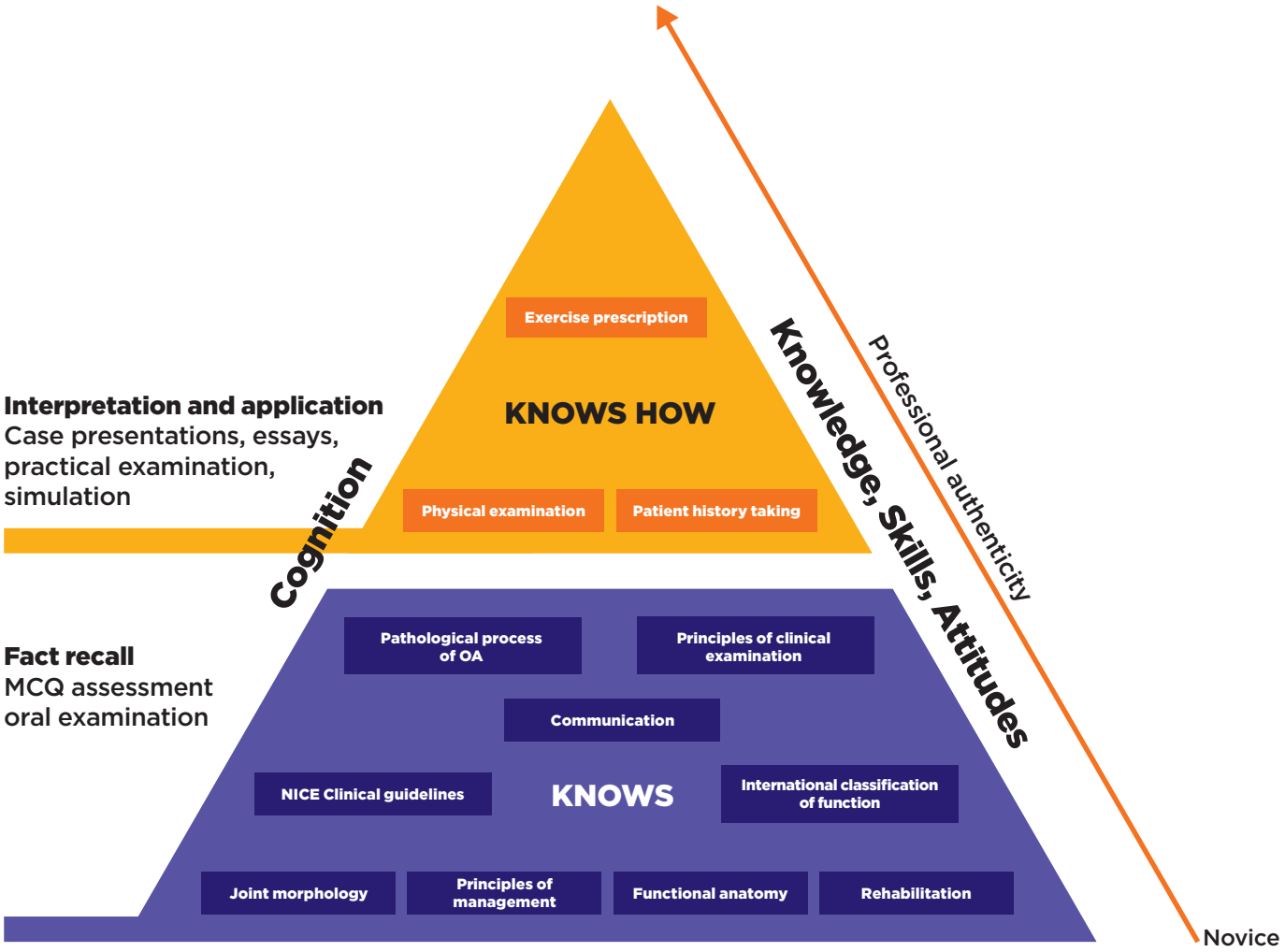

Figure 8a. Development of knowledge, skills and attitudes

The lower two levels relate to **cognition** (comprising types of knowledge; procedural, propositional, tacit), this being relevant to physiotherapy students' learning. They 'know' something which is relevant to physiotherapy (e.g. management of lower limb osteoarthritis (OA)) or they 'know how' to examine or manage a lower limb OA knee complaint for example. See Figure 8a for example.

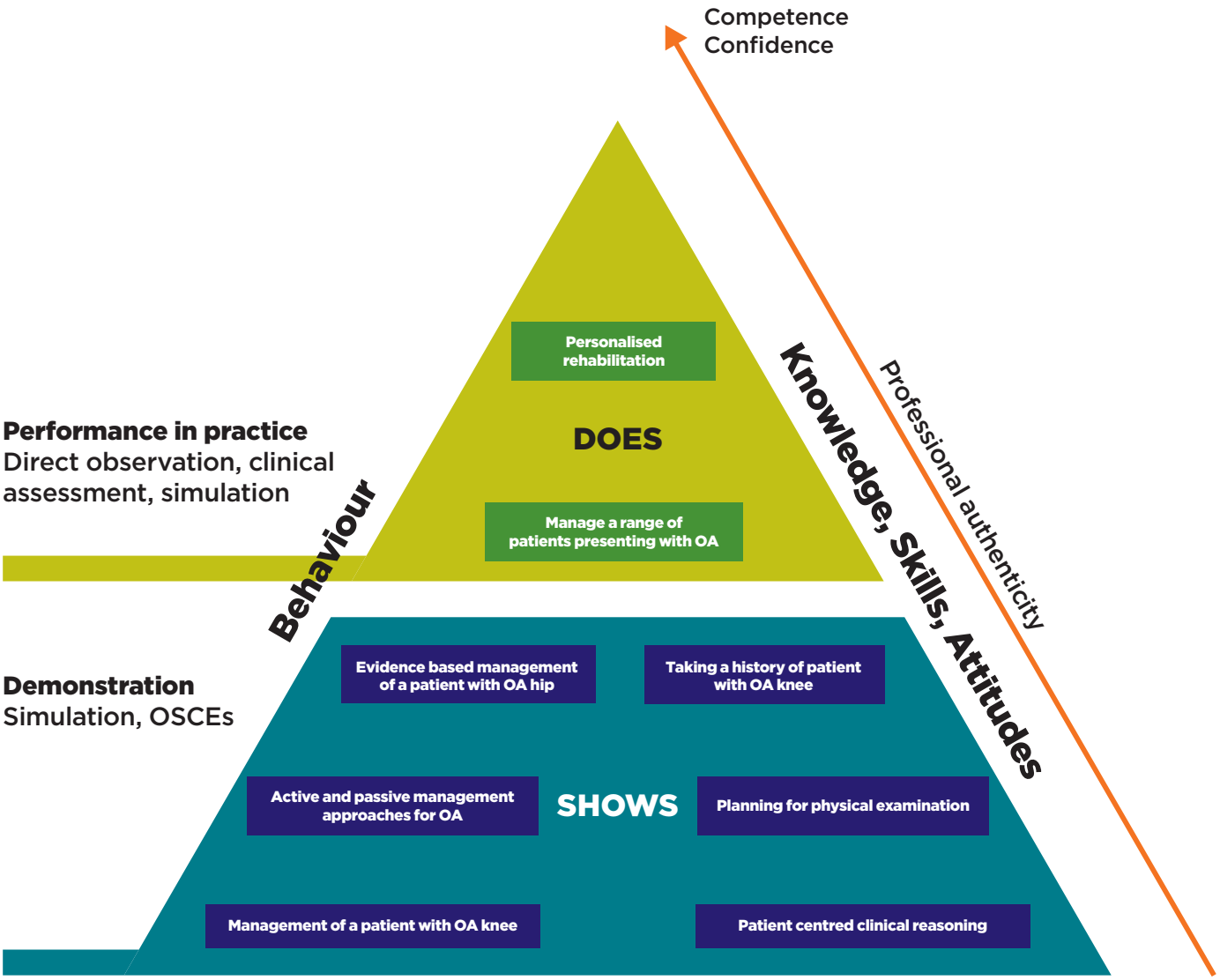

Figure 8b. Development of professional authenticity

The upper two levels relate to **behaviour:** physiotherapy students then applying what they know into practice. Using our example of OA: they can 'show' how to examine or manage patients OA hip/knee/ankle or 'do' an OA hip/knee/ankle examination in practice (clinical or simulated with a SP or actor). See Figure 8b for example.

Within the 'does' (and to a lesser extent 'show'), experiential learning from managing a range of patients (age, gender, presentations etc.) may then occur.

The uniqueness of SBL as a teaching method is that it integrates the cognitive, behavioural and affective development of the student and can be designed to suit the level of the learner. Figure 9 conceptually illustrates a pre-registration simulation framework to enable standardisation of design and delivery.[16] Specific timings may vary according to the type of SBL. Moreover, a tutor could be a practice educator involved in the simulation and undertaking their normal role depending on the level of the learner i.e. level 4 with support, level 5 less support required, level 6 without support (another example of scaffolding the learning activity to suit the level of the learner).

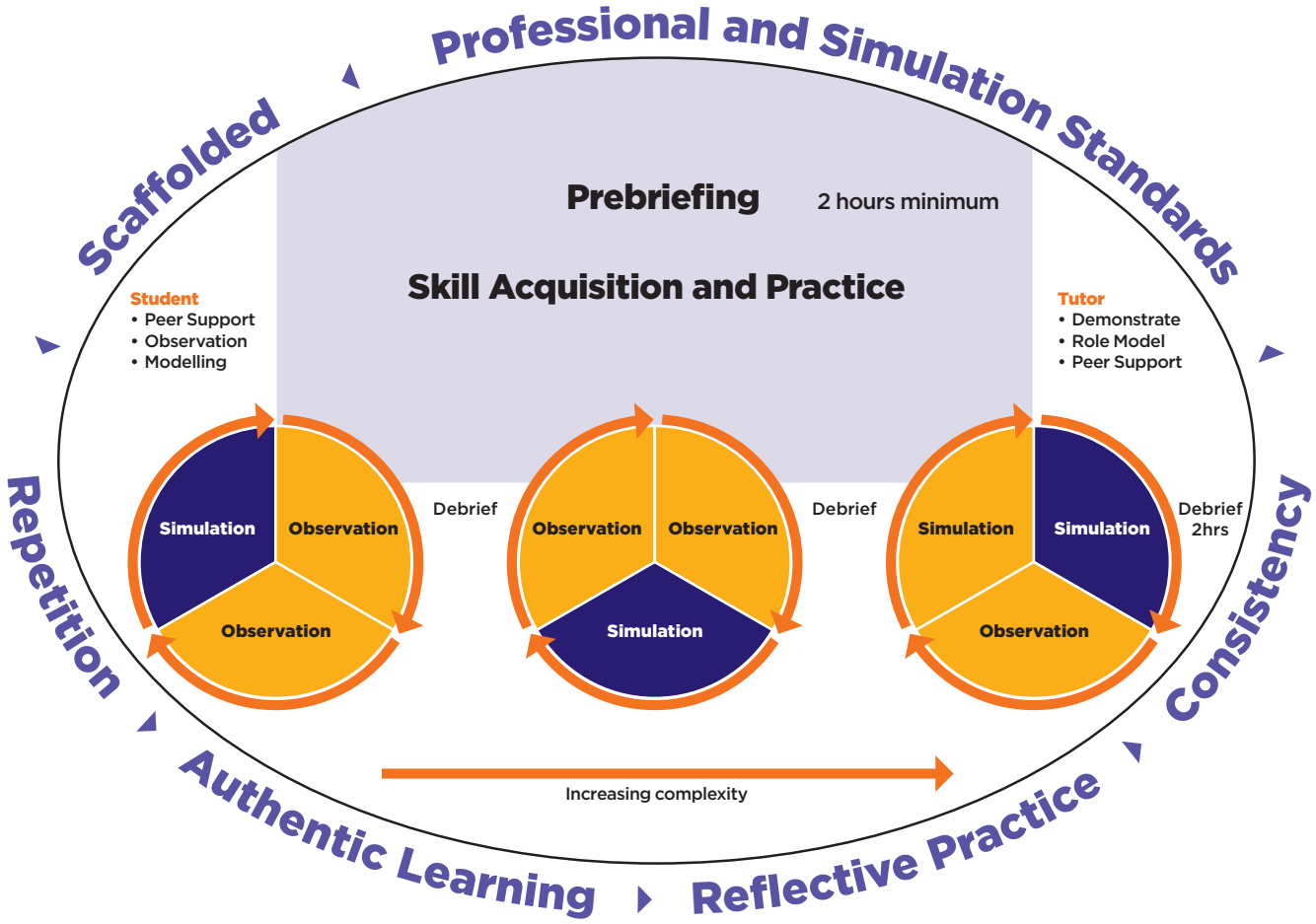

Figure 9. Pre-registration simulation framework (from Irwin et al[16]) (Permissions granted)

Part 2

Key points for integrating SBL into the physiotherapy curriculum

- As discussed in section 1, consider the level of the learner and which programme learning outcomes can be facilitated by using SBL and what level of simulation activity is required
- Consider if the SBL is adjunctive or substitutional: this decision will be based on if appropriate SBL activities need to be used to ensure equity across learners, or if SBL is being used to achieve competencies for safe and effective practice and preparedness for professional practice
- SBL should critically consider equality, diversity, and inclusivity (EDI) (age, gender, disability, ethnicity) in designing scenarios (Simulation Education Diversity Assessment Tool) https://sim-versity.eu/our- tools/the-simulation-education-diversity-assessment-tool/
- Be realistic as to what can be achieved in a single SBL event with SMART objectives[17]
- Opportunities for learners to be taught and acquire skills in role-play offers considerable potential as a means of inexpensive SBL http://www.peerpatient.com/about-peer-patient.html
- Consider the faculty and resources available – see guidance from ASPIH below

Review in conjunction with guidance available at www.aspih.org.uk[18]

Faculty
1. Faculty ensure that a safe learning environment is maintained for learners and encourage self-reflection on learning 2. Faculty engage in continuing professional development with regular evaluation of performance by both learners and fellow faculty. 3. Faculty are competent in the process of facilitating SBL at the appropriate level for the learners and of debriefing them
Technical personnel
4. Simulation technicians and technologists, whose primary responsibility is to support the delivery of SBE, have gained or are working towards professional registration with the Science Council.
Activity
Programme 5. Simulation-based education programmes are developed in alignment with formal curriculum mapping or learning/training needs analysis undertaken in clinical or educational practice.

6. The patient perspective is considered and demonstrated within educational planning.
7. A faculty member with expertise in simulation-based education oversees the simulation programme design and ensures that it is regularly peer reviewed, kept up to date and relevant to the organisation goals, clinical needs, and curriculum that it is mapped to.
8. Regular evaluation of programmes and faculty is undertaken to ensure that content and relevance is maintained.

Assessment

9. The assessment is based on the intended learning outcomes of the exercise, with clarity regarding the knowledge, skills, and attitudes, and appropriately tailored to professional curricula to be evaluated.
10. Psychological safety of the learner is considered and is appropriately supported.
11. Faculty have a responsibility for patient safety and to raise concerns regarding learner performance within educational settings, including SBE interventions.

In situ Simulation (ISS)

12. Every ISS exercise has clearly defined learning objectives that achieve individual, team, unit level and/or organisational competencies.
13. Local processes and procedures are carefully reviewed to deliver ISS activity authentically.
14. Faculty delivering the ISS activity are proficient in SBE and have the required expertise on a given topic (Refer to standards on faculty development above).

Resources

Simulation Facilities and Technology

15. A variety of simulation modalities, including simulated patients, are incorporated into simulation programmes to create appropriate realism of the learning environment and achieve the objectives of the session being taught.
16. The facility has a clear strategic plan which addresses wider organisational and stakeholders needs.
17. A designated individual oversees the strategic delivery of SBE programmes and ensures that appropriate maintenance of simulation equipment is undertaken.
18. Training is provided to all faculty to engage with Simulated Patients, where there is an active Simulated Patient (SP) programme.

Management, Leadership, and Development

19. A designated lead with organisational influence and accountability manages the simulation activity.
20. There is a clear vision and mission statement to demonstrate aims and objectives of the faculty or the programme.
21. There is a clear alignment to the wider organisational and stakeholders needs, acting as a quality and risk management resource for organisations to help achieve the goals of improved patient safety and care quality.

Note: ISS: In situ simulation, SBE: simulation-based education

Preparation of physiotherapy educators as simulation facilitators is an important aspect. “Train the trainer” courses exist to equip educators specifically with a range of skills pertaining to facilitating SBL activities.[19 20] This includes for example scenario development, scenario programming, scenario facilitation, and debriefing, and may include a whole shadowing and mentorship process once the initial training has been completed. This generally includes helping new facilitators grasp all the aspects related to the importance of conducting a good pre-briefing (See section 4 for further details), and hence preparing for it.[21] The same principles apply to the debriefing phase (See Part 6 for further details on de-briefing), which can be followed by a debriefing of the new facilitator, as a form of meta-debriefing.[21 22] Such an approach enables the facilitator to refine their skills through guided reflection as is done with their learners but with a different focus.

Part 3

Designing scenarios and how to prepare for simulation-based learning activities[23-25]

How to Write a Scenario

Irrespective of the type of SBL, the clarity and realism of the written scenario is a key factor influencing the success of the learning activity.[26] Templates are widely available to guide the content of a SBL[27] with example at https://www.nvcc.edu/medical/_files/ScenarioDesignWorksheet.pdf

Writing effective objectives for a scenario

- Perform a needs assessment or gap analysis based on academic level, a priori knowledge, and needs of the learners (INACSL Standard: Criterion 1). e.g. are there new protocols, outcome measures or equipment to assist in the management of patients (e.g. NICE Guidelines, STarTMSK screening tool, red flags) that need to be considered?
- Write SMART[17] (specific, measurable, attainable, relevant and timely) objectives to guide SBL planning (INACSL Standard: Criterion 2) (Box 1)

» Specific: What exactly are we going to do for whom?
» Measurable: Is it quantifiable and can we measure it?
» Achievable: Can we get it done in the proposed timeframe with the resources and support we have available?
» Realistic: Will it have an effect on the desired goal or outcome?
» Timely: When will this objective be accomplished?

Box 1. SMART for objectives

Things to consider for any scenario:
(to support fulfilment of INACSL Standard: Criteria[5, 6, 10])

» Scenario authenticity: a scenario based on a real patient could be used, or an amalgam of a number of cases. Need to ensure anonymity if using a scenario based on a case. Co-production/design with experienced practitioners, patients, carers, service users may assist with authenticity.
» Type of SBL – planned university-based SBL event, substitutional SBL, preparatory adjunctive SBL for PBL or desktop exercise.

- SBL involving low-cost student role play, or high-cost human computerised manikins or standardised patients (actors) (INACSL Standard: Criterion 6).[28]
- Moulage and actors to enhance realism.
- Resource requirements: staffing (skilled and trained), reimbursements etc. for embedded participants or standardised patients.
    - Session timing: pre-briefing, simulation, and debriefing (e.g., **5/15/30**, or **10/20/30** minutes, respectively). (See Figure 9)
    - Desktop SBL: plan time-based on objectives.
      ***Debriefing time should be equal to or more than the time spent on the simulation.*[22]
- Multi-professional or inter-professional aspects need the relevant professions' input to develop the scenarios and conduct the debriefing.
- SBL experiences should be piloted prior to full implementation.

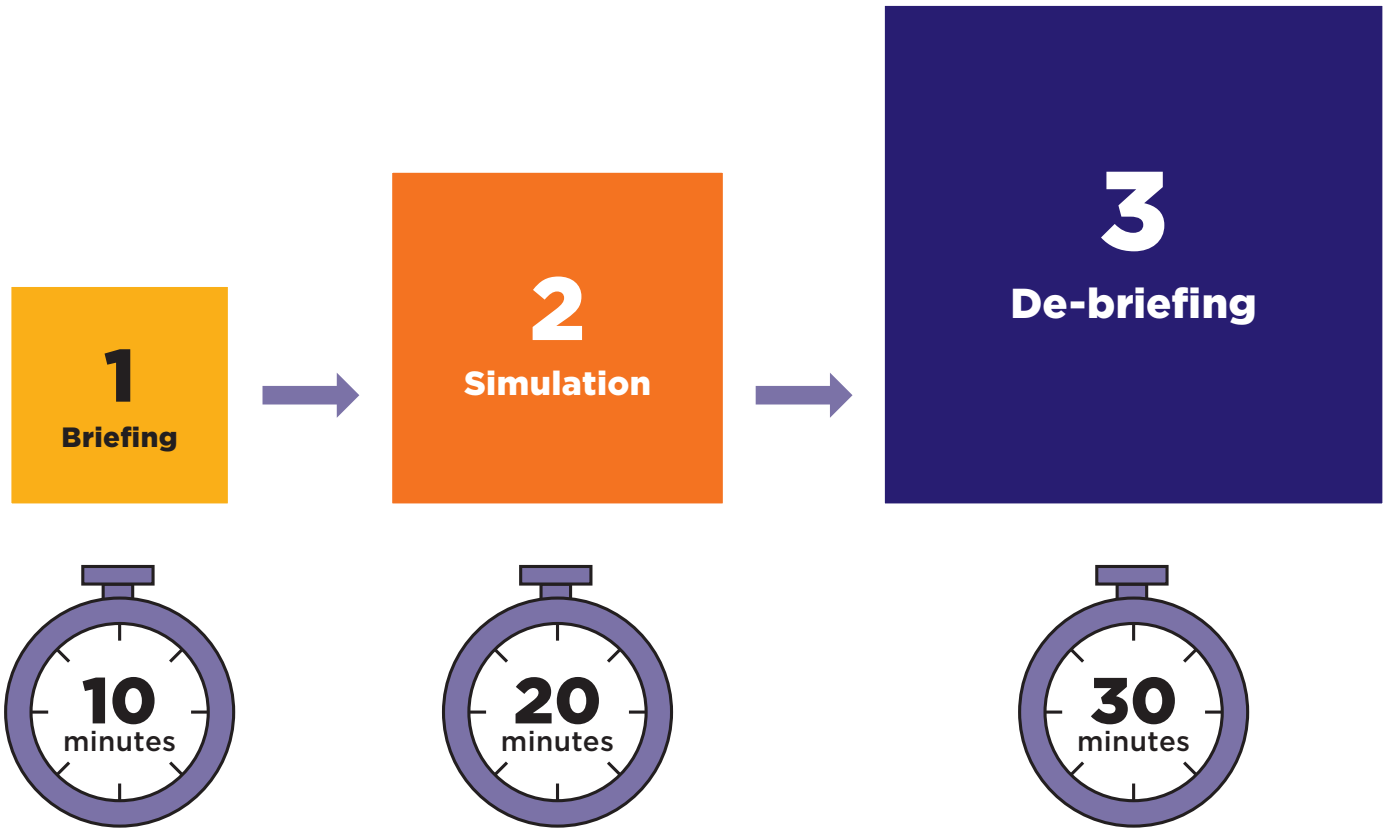

Figure 9. Delivering a SBL event

Part 4

Pre-Briefing of learners before SBL activities[28]

Pre-briefing is a process, which involves **preparation** and **orientation of learners to a process and environment**, with the latter centred on the process of SBL rather than the specifics of a scenario. Pre- briefing ensures that simulation learners are prepared for the educational process, the different phases of a simulation session (Figure 10), and are aware of the ground rules for the simulation-based experience. (INACSL Standard: Criterion 8)[28]

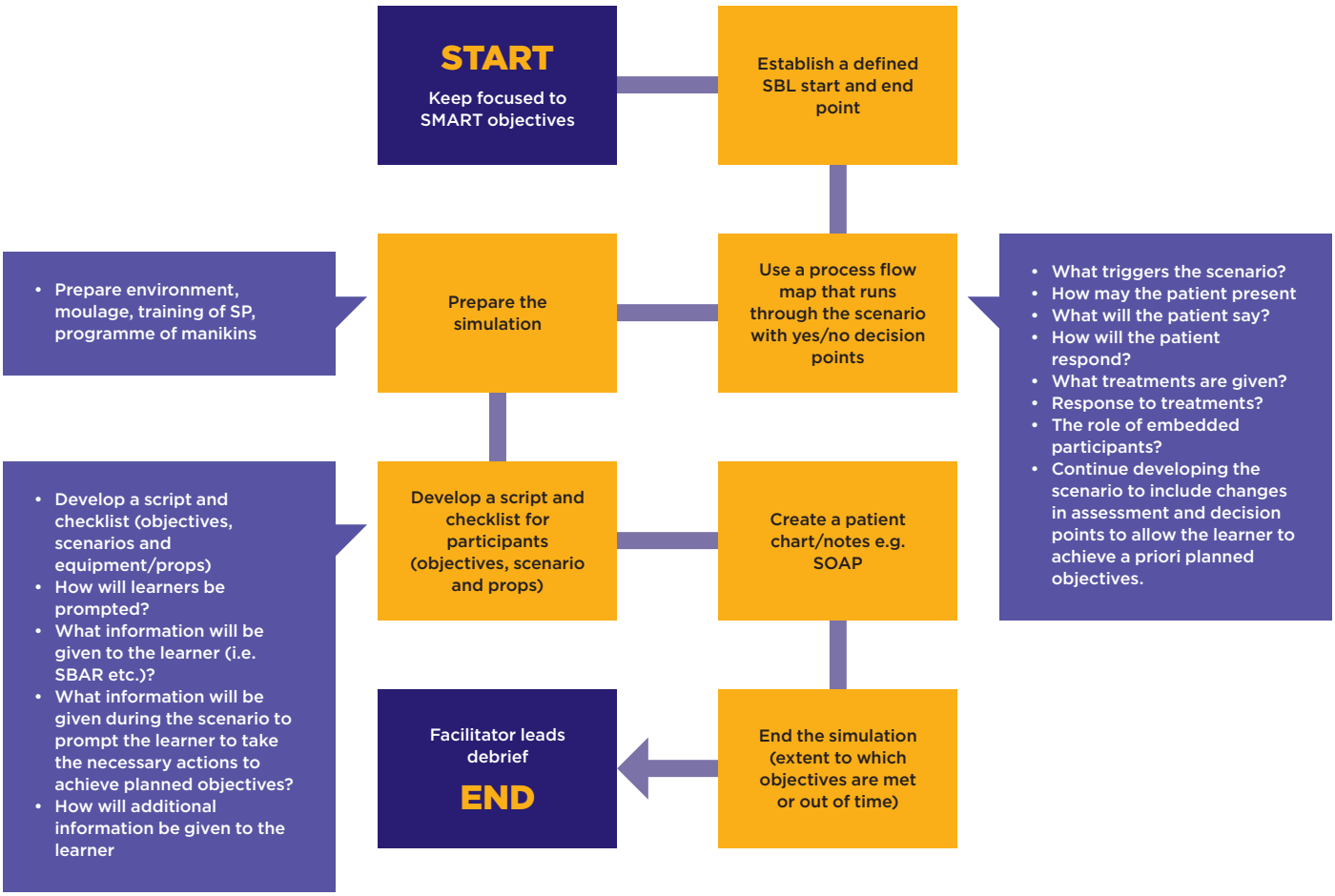

Figure 10. Process map of conducting a SBL activity

SBL including the pre-brief phase requires careful planning and scripting to ensure appropriateness and to maximise learning opportunities and student performance. Learning objectives are required to ensure learning is purposeful and appropriate to the learner; appropriateness ensuring alignment to academic level and professional

preparedness. Pre-briefing sets out performance expectations (i.e. interacting with and treating the SP like a real patient), detailing the opportunities for development of, or transfer of acquired knowledge, skills, behaviour, and attributes in the management of patients. Pre-briefing enables learners time to familiarise themselves with the clinical environment and any equipment to be used, enables psychological preparation of the learners to create a safe learning environment which creates an opportunity to promote in-depth engagement and aid the development of clinical reasoning.[28]

INACSL Best Practices: Pre-briefing[28]

1. The simulation facilitator should be knowledgeable about the scenario and competent in concepts related to pre-briefing.

2. Pre-briefing should be developed according to the purpose and learning objectives of the simulation-based experience.

3. The experience and knowledge level of the learner should be considered when planning the pre- briefing.

Pre-briefing instructions (some specific to each scenario and others common across all scenarios)

- An overview of the evidence supporting SBL and this affording learners a safe, and in some instances, a controlled/standardised approach to learning; being appropriate to the level and needs of learners. Pre-briefing should include setting ground rules and consider issues to support open dialogue/communication, confidentiality, and respect for all participants (Psychological safety for learners, educator, and 'patient').
- Learners should be aware of the learning outcomes and that these be SMART (Box 1). For example, "the learner is able to assess a patient with a chronic OA knee and offer ideas/reasons to explain a recent exacerbation" (knowledge, skills, behaviour), "the learner can identify indicators which may necessitate immediate onward referral for a patient complaining of low back pain" (knowledge, skills).
- Introduction and outline of the scenario should be provided including background information on the topic (e.g. communication skills, safety etc.).
- Content, volume and number of pre-SBL resources should be reflective of academic level and carefully managed; to avoid learner overload and an impediment to learning.
- Educators/facilitators must agree to commit to and invest in the pedagogy of SBL (ASPiH standards) to ensure learning outcomes are met and development of knowledge, skills, attributes and behaviours is optimised.
- In the case of role-play, learners should have an opportunity to plan and prepare for the different roles; patient, educator, learner. (See http://www.peerpatient.com/about-peer-patient.html)
- SBL encompasses a range of modalities which range from the relatively inexpensive (student role-play, expert patient) through to more expensive options (i.e. virtual wards, virtual/augmented reality computer simulation, computer-controlled manikins, and actors).
- To promote the development of clinical reasoning skills and decision making, focus should be towards performance expectations (macro-level) rather than the individual components (i.e. procedural skills) (micro-level).

Part 5

How to facilitate SBL activities

Guidance

- Educators should be suitably skilled in the simulation content (e.g. musculoskeletal, cardiorespiratory, neurological, frailty, mental health physiotherapist etc.) and simulation pedagogy INACSL Standard: Criterion 1).[28]
- Learners should be afforded an opportunity to rotate roles across different scenarios, giving them multiple perspectives e.g. the interviewer; peer observation; and note taker to develop skills in giving and receiving feedback.
- A focus on application of and transfer of knowledge, skills, behaviours, and attributes should be evident in the objectives and a focus for each SBL event.
- In- and post-simulation discussion should be informed by learning objectives and outcomes to ensure focus.
- Incidental or unplanned learning should be discussed and supported with post-simulation activities/study.
- Management of psychological support or safety, allowing participants to 'feel safe enough to practise at the edge of their abilities and to analyse mistakes to identify and mitigate learning gaps'.[29] Areas of concern relate to physical environment and equipment, welcoming participants to the SBL space and other participants, confidentiality, purpose of SBL (formative or summative assessment), fidelity, cognitive load, psychological distress, respect, and feedback.[29]

Psychological safety[30]

To create a safe SBL environment, (See Figure 11) facilitators should:

- be understanding, approachable, and empathetic.
- offer clear guidance on SBL process, including goal setting.
- cultivate trusting relationships and nurture participants to apply existing knowledge and skills in SBL for personal and professional growth.
- foster open dialogue to allow participants to comfortably communicate mistakes through sharing experiences.
- be respectful of others' opinions and perspectives.
- be able to identify signs and symptoms of psychological distress.
- act sensitively and in a timely manner to manage participants in distress.

Furthermore, creating this safe environment may influence how learners learn, with the type and level of stress influencing learners' experiences. The term 'Relaxed Alertness' positively describes a state by which the facilitator strives to ensure learner engagement (enjoyable) whereby a balance is achieved between positive and negative stress, the latter being a result of fear.[31] Psychological safety is an important consideration for both the SBL activity and debrief. [31]

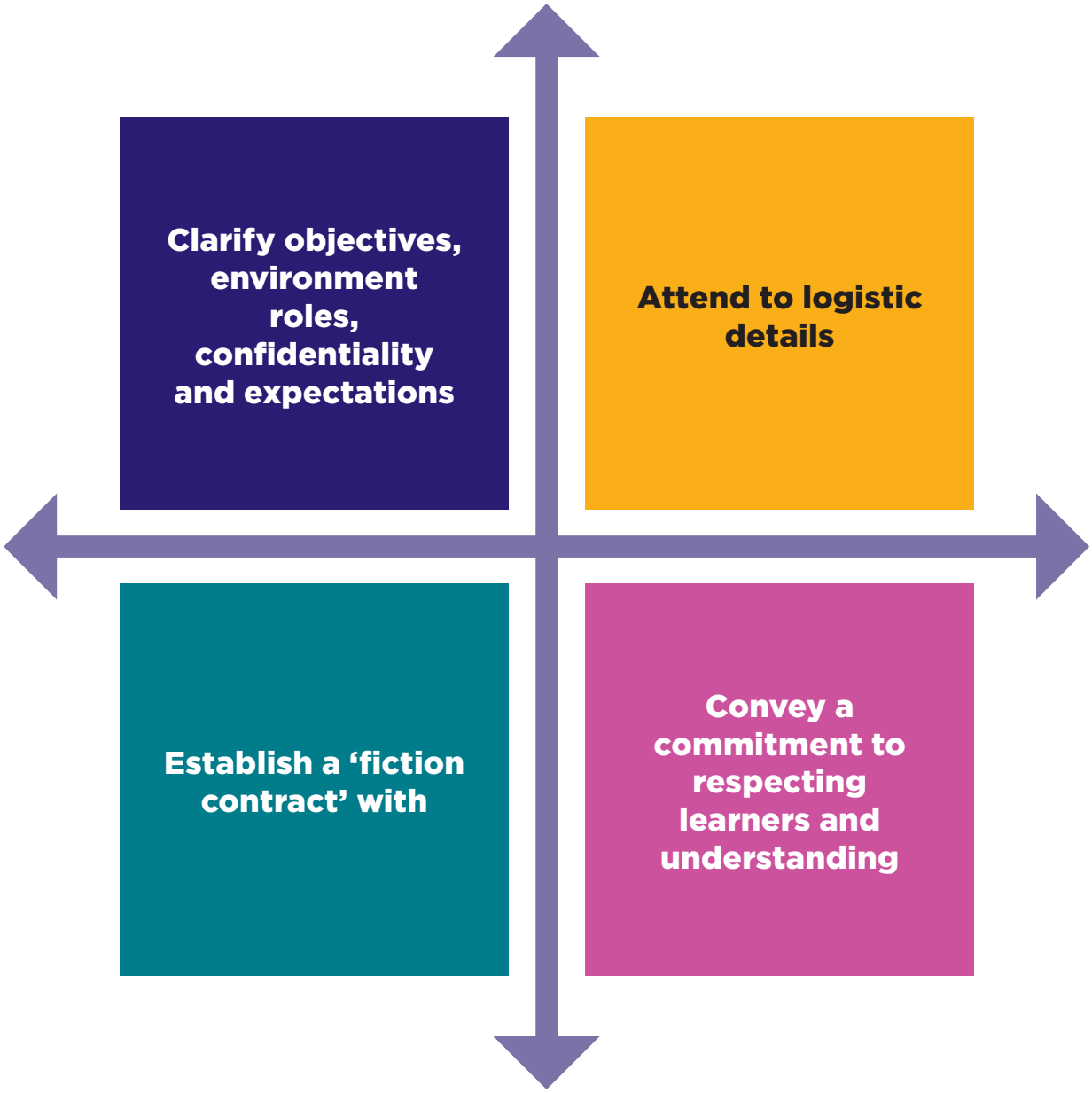

Figure 11. Creating psychological safety

- Different types of simulation offer opportunities for different styles of learning or approaches e.g. stop/star simulation (i.e. as a patient is being assessed or managed), stop simulation-review- recommence (i.e. where something untoward or serious arises).
- Recording (audio/video) of SBL may afford learners an opportunity for self-reflection, and further review (with careful consideration for maintenance of psychological safety); recordings may also be used as an adjunctive resource for subsequent learner cohorts; no two 'patients' are the same. It may also be used for live broadcast with a larger group of peers observing the SBL activity with another educator facilitating their learning from this experience or to subsequently assist or contribute to the debriefing with the activity participants. Organisations need to develop their own policy/policies regarding recording, storage, use and sharing of videos to avoid misuse or use in unrelated situations (e.g. performance management or court cases at a later date).

Part 6

Debriefing SBL activities

Reflective practice is guided and directed by a facilitator, and the debriefing encourages learner-guided discussions resulting in deeper learning. (INACSL Standard: Criterion 9)

"Debriefing is the intentional discussion following the simulation experience that allows participants to gain a clear understanding of their actions and thoughts process to promote learning outcomes and enhance future clinical performance." [32]

Post-SBL debriefing, is the most important element of SBL. This takes the form of a 'structured and guided reflection process in which learners actively appraise their cognitive, affective, and psychomotor performance'.[33] It engages the learner(s) and facilitators, and can include the actor role player(s) and simulated patient, and peer learners who may have remotely observed the SBL activity.

Debriefing facilitators who are formally trained in this process[28 34] provide learners the opportunity to recall what aspects of reality are simulated and how the experience is related to a priori learned concepts. Co-creation of a safe learning space for learners to reflect on both the simulation and real-life experiences, using the structured approach of a debrief model can promote self-evaluation.

Models of debriefing (of which there are many) include stages to reflect and re-frame, and include stages for learners to share their responses, analyse and consider new ways of thinking.

Debriefing may vary in duration according to the model used, complexity of the scenario, learner numbers, and involvement of other professions. It is closely related to the debriefing approach adopted, characteristics of the group, performance of the learner(s), and the type of simulation activity. Models can be used flexibly although it is well established that time allocated to the debriefing session should equal or exceed that of the simulation. Debriefings aim to facilitate reflective thinking and therefore should immediately follow on from the simulation.[22]

INACSL Best Practices: Debriefing[34]

1. Facilitator is competent in debriefing and the chosen approach used.
2. Environment is conducive to learning with confidentiality, trust, open communication, self-analysis, feedback, and reflection.
3. Facilitator gives concentrated attention to the simulation in order to effectively conduct the debriefing.
4. Debriefing is structured, purposeful, and based upon theory.
5. Debriefing aligns with objectives and outcomes of the simulation.

Models and resources (taken from Abulebda K, Auerbach M, Limaiem F. Debriefing Techniques Utilized in Medical Simulation. 2021 In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing)[32]

Single-Phase Debriefing Techniques

Plus-Delta
Easily utilised by novice debriefers
SHARP debriefing Tool
Easily utilised by novice debriefers https://www.imperial.ac.uk/media/imperial-college/medicine/surgery-cancer/pstrc/lw2222ic_debrief_book_a5.pdf

Three-Phase Debriefing Techniques

Reaction, analysis and summary (RAS)
Rudolph JW, Simon R, Dufresne RL, Raemer DB. There's no such thing as "non-judgmental" debriefing: a theory and method for debriefing with good judgment. Simul Healthc. 2006 Spring;1(1):49-55
3D model (defusing, discovery and deepening)
Zigmont JJ, Kappus LJ, Sudikoff SN. The 3D model of debriefing: defusing, discovering, and deepening. Semin Perinatol. 2011 Apr;35(2):52-8
GAS (gather, analyze and summarize)
Burke H, Mancuso L. Social cognitive theory, metacognition, and simulation learning in nursing education. J Nurs Educ. 2012 Oct;51(10):543-8
Diamond debriefing that includes description, analysis, and application
Jaye P, Thomas L, Reedy G. 'The Diamond': a structure for simulation debrief. Clin Teach. 2015 Jun;12(3):171-5

Multiphase Debriefing Techniques

Promoting Excellence and Reflective Learning in Simulation (PEARLS)
Bajaj K, Meguerdichian M, Thoma B, Huang S, Eppich W, Cheng A. The PEARLS Healthcare Debriefing Tool. Acad Med. 2018 Feb;93(2):33

Team-Guided team self- correction, Advocacy-Inquiry, and Systemic-constructivist (TeamGAINS)
Kolbe M, Weiss M, Grote G, Knauth A, Dambach M, Spahn DR, Grande B. TeamGAINS: a tool for structured debriefings for simulation-based team trainings. BMJ Qual Saf. 2013 Jul;22(7):541-53. doi: 10.1136/bmjqs-2012-000917. Epub 2013 Mar 22. PMID: 23525093.

The healthcare simulation after-action review (AAR)
Sawyer TL, Deering S. Adaptation of the US Army's After-Action Review for simulation debriefing in healthcare. Simul Healthc. 2013 8(6):388-97

Other resources and references

Objective Structured Assessment of Debriefing The London Handbook for Debriefing
https://emergencypedia.files.wordpress.com/2014/03/london-debrifing.pdf

Advocacy There's No Such Thing as "Non-judgmental" Debriefing: A Theory and Method for Debriefing with Good Judgment
https://emergencypedia.files.wordpress.com/2014/07/no-such-thing-as-non-judgemental-debriefing.pdf

Guidance for debriefing[22]

- Allow plenty of time for debriefing and incorporate extended opportunities for reflection if required e.g. self-study and revisit at a later date (the gap between the simulation and additional debriefing should be limited to ensure recall).

- All learners need to be given an opportunity to benefit from the process of simulation; a multimodal approach to debriefing may be appropriate using a range of approaches (e.g. individual/group, verbal/written, discussion fora etc).
- The performance of the group within the SBL event should be reflected on and aligned with learning outcomes; an emphasis on positive reinforcement.
- The facilitator assists the collective and individual reflections of 'patient' and observers. Using open questions and prompts, the facilitator seeks to achieve analysis and deeper learning through guided questioning and facilitated discussion.
- The facilitator seeks to manage the time to ensure balance and that the a priori objectives are met. Additional to the in-session learner discussion, online discussion fora/boards can be useful to continue the discussion; with oversight or guidance from the facilitator (depending on academic level).
- Discussion should centre on the application of and development of knowledge, skills, attributes and behaviours, focusing on performance of the learners; linking back to specific learning objectives and ensuring time apportioned appropriately.
- Debriefing may involve the following:
  - Audio and video recordings of simulated interviews; with facilitator using these to explore both effective and ineffective practice relating to behaviours, skills or attributes (e.g. leading open styles of communication) and to analyse key concepts such as knowledge (e.g. biopsychosocial model of practice).
  - Real-time within SBL skills feedback as a dual purpose of assessing and reinforcing learner competency. As the learner provides care to a standardised patient (SP) in a simulation, the facilitator/educator may interrupt if the learner makes errors or to provide immediate feedback on a specific skill. Immediate feedback reinforces critical thinking and clinical reasoning skills.
- Debriefing of SBL with an SP could actively involve the SP to help explore their perceptions and experiences if they are sufficiently experienced, or are supported with coaching.

Part 7

Evaluation of SBL and outcome measures directory

Evaluation of SBL

- Informal and formal **evaluation** of SBL is required to enhance quality of the educational activity, learning processes etc. (INACSL Standard: Criterion 10)

EVALUATION OF THE LEARNING

The **Kirkpatrick Model** (Figure 12) is a commonly used ranking model that **evaluates** training programs and transfer of learning outcomes.[1]

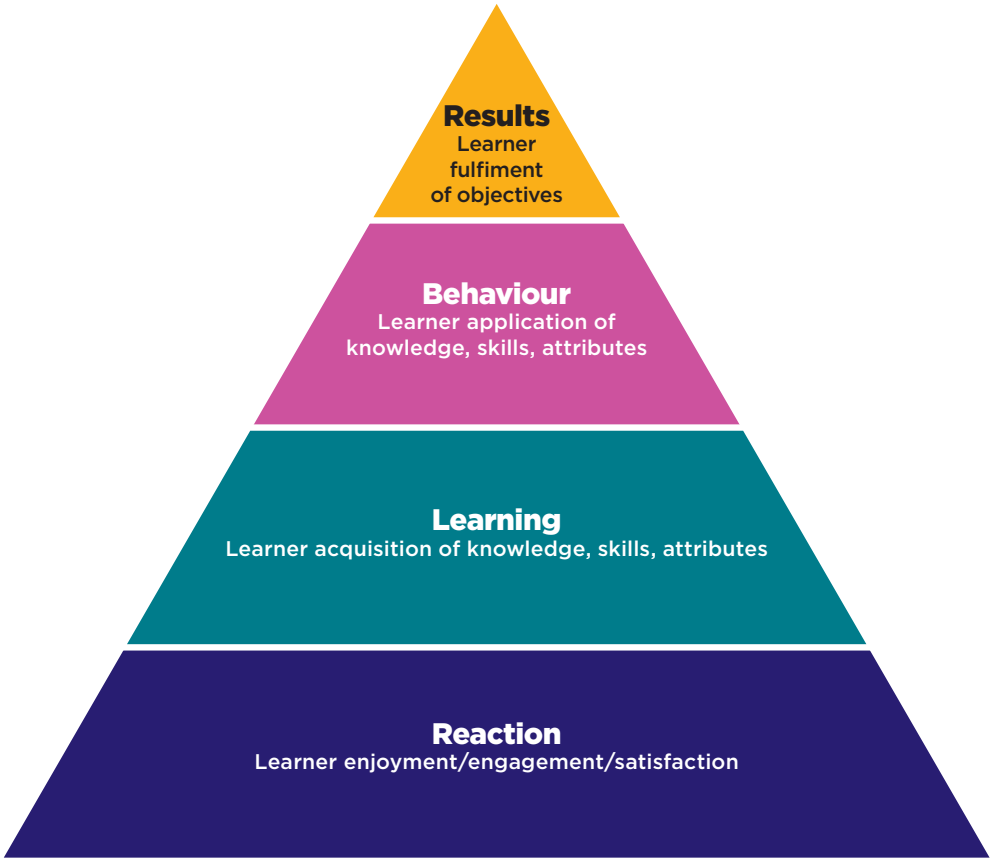

Figure 12. Kirkpatrick Model of evaluation

This model depicts four sequential levels of evaluation:

(a) *Reaction* — measures participant's satisfaction with training.
(b) *Learning* — measures knowledge, skills, and attitudes (KSAs) gained from training.
(c) *Behaviour* — measures changes that occurred as a result of training.
(d) *Results* — improving quality and safety; increased return on investment following training such as productivity, revenue, and employee retention.

OUTCOMES

Informed by the KNOWBEST scoping review findings,[9] a number of outcome measures are listed according to focus: knowledge, skills, attributes, and behaviours. (See Figure 13)

A recent publication by Brentnall et al[35] provides a contemporary review of measures used to evaluate clinical reasoning although few are in widespread use in physiotherapy or have been fully evaluated for measurement properties (i.e. Clinical Decision Making Survey Tool).

Figure 13. Pre-registration physiotherapy outcome measures (from scoping review Heneghan et al.[9])

Knowledge

- Professionalism in Physical Therapy: Core Values Assessment (PPTCVA) https://www.apta.org/contentassets/aec54663ee514f0580449b7ee59ac18c/core-values-self-assessment.pdf

- Inventory for Assessing the Process of Cultural Competence Among Healthcare Professionals-revised or Student Version (copyright only) Olt H, Jirwe M, Gustavsson P, Emami A. Psychometric Evaluation of the Swedish Adaptation of the Inventory for Assessing the Process of Cultural Competence Among Healthcare Professionals—Revised (IAPCC-R). Journal of Transcultural Nursing. 2010;21(1):55-64. doi:10.1177/1043659609349064

- Pain attitudes and beliefs scale for physiotherapists (PAB-PT)
Ostelo RWJG, den Berg SGM S-v, JWS V, PMJC W, HCW d V. Health care provider's attitudes and beliefs towards chronic low back pain: the development of a questionnaire. Man Ther. 2003;8(4):214–22 Mutsaers J-H a M, Peters R, Pool-Goudzwaard AL, Koes BW, Verhagen AP. Psychometric properties of the pain attitudes and beliefs scale for physiotherapists: a systematic review. Man Ther. 2012;17(3):213–8

Skills

- Assessment of procedural skills in physiotherapy education
Sattelmayer, K., Jagadamma, K., Sattelmayer, F. et al. The assessment of procedural skills in physiotherapy education: a measurement study using the Rasch model. Arch Physiother 10, 9 (2020). https://doi.org/10.1186/s40945-020-00080-0

- History skills Checklist;

- Physical Examination skills Checklist;

- Arizona Clinical Interview Rating Scale

- Self-Perceived Communication Competence (SPCC)
http://www.as.wvu.edu/~richmond/measures/spcc.pdf

- Inventory for Assessing the Process of Cultural Competence Among Healthcare Professionals-revised or Student Version (* see above also in Knowledge)

Attributes

- Student confidence
Wright, A., Moss, P., Dennis, D.M. et al. The influence of a full-time, immersive simulation-based clinical placement on physiotherapy student confidence during the transition to clinical practice. Adv Simul 3, 3 (2018). https://doi.org/10.1186/s41077-018-0062-9

- Satisfaction and Self-Confidence in Learning
Jeffries, P. R., & Rizzolo, M. A. (2006). High fidelity simulation: Factors correlated with nursing student satisfaction. NLN publications

- State-Trait Anxiety Inventory (STAI) for anxiety
https://www.advancedassessments.co.uk/resources/Mental-Health-Test.pdf

- General Self-efficacy scale
https://www.drugsandalcohol.ie/26768/1/General_Self-Efficacy_Scale%20(GSE).pdf

Behaviours

- Assessment of Physiotherapy Practice (APP) (+v5)
https://bond.edu.au/files/1542/End%20Unit%20Summative%20Assessment%20%202016.pdf

- Professional Behaviors Assessment (PBA)
https://rampages.us/wp-content/uploads/sites/7871/2015/09/Professional-Behavior-Assessment1.pdf

- Global Consultation Rating Scale (GCRS) for communication skills
Burt J, Abel G, Elmore N, et al. Assessing communication quality of consultations in primary care: initial reliability of the Global Consultation Rating Scale, based on the Calgary-Cambridge Guide to the Medical Interview. BMJ Open 2014;4: e004339. doi:10.1136/ bmjopen-2013-004339

- Modified Standardized Patient Satisfaction Questionnaire (MSPSQ)
Riopel MA, Litwin B, Silberman N, Fernandez-Fernandez A. Promoting Professional Behaviours in Physical Therapy Students Using Standardized Patient Feedback. Physiother Can. 2019;71(2):160-167. doi:10.3138/ptc.2018-04.e

Part 8

Evidence supporting the use of SBL in physiotherapy pre-registration education

Simulation-based learning as part of the core University curriculum rather than as a bridge to clinical placements or as an adjunct or in preparation to hospital-based provision.

A number of studies have been conducted exploring SBL in pre-registration physiotherapy education[10 36] with one systematic review concluding that simulation-based learning could replace clinical placement time without impairing students' learning.[10] Based on studies published up to 2013, this review did not consider more recent evidence and other approaches which have emerged with advances in technology.

Findings from a 2021 scoping review[9] revealed the majority of studies were from Australia and USA with most focused on exploring new approaches, examining acceptability of such approaches, and investigating development in student confidence, clinical reasoning and knowledge acquisition through qualitative, survey or descriptive interrogation. Figure 4 illustrates themes and findings from the scoping review findings.

Figure 13. Word cloud of scoping review findings

SBL was used as a means of supporting student development. A number of studies were focused on specific specialist areas (MSK, cardiorespiratory) of practice, although some examined development of generic professional practice skills/attributes such as development of cultural empathy, communication etc. A range of modalities were used in these studies and a wide range of different outcome measures making comparison difficult. However the consensus is that the majority of studies reported favourably on the use of simulation as a means of supporting student development, a finding echoed in other systematic reviews[10 37] where, notwithstanding the need for further high quality evidence, support for SBL as a substitute for PBL exists[37]. Further information with respect to a) models, b) methods, and c) structure/content of SBL is detailed below.

A) Simulation modalities

The simulation modalities range from relatively inexpensive and accessible ***student role play*** through to purpose build and relatively expensive ***ward-based settings*** and needing ***expert patients/actors*** or ***resources (e.g. ageing suits, obesity suits, high-fidelity computerised manikins, virtual reality technology)*** with audio and video recording equipment and adjacent control and observation rooms.[9]

The majority of studies used ***standardised patients*** (SP)[38-52], including actors, senior students or patients with scripts. ***Student role play*** was used in a number of studies, with benefits to both the simulated patient and therapist being noted (e.g. greater empathy).[53]
The use of computer-controlled patient simulators to provide a highly immersive acute care SBL experience[42 46 54-58] (e.g. adult or paediatric computer-controlled manikin[42 54]) was most commonly associated with cardiorespiratory care and this is because of the nature of what is being taught (e.g. the manikins can display the physiological deterioration of the patient). ***Virtual reality*** simulation was used in a small number of studies with examples of use across different specialities.[59-62]

Two studies used what they termed a ***simulation learning environment*** (SLE) to aid student preparation for clinical placements. A SLE comprising small group tutorials, practical sessions and interactions with and without SP; all centred on ***case scenarios*** (standardised patients videos) with X-rays, test results, and clinical reasoning and reflection tasks to replicate clinical settings.[40 63]

B) Simulation Models to "enhance" or "replace" Practice-based learning in Physiotherapy

A number of placement models using adjunctive SBL are reported in the literature; all from Australia. The majority involve University-based simulation (1-, 2-weeks) in preparation for a hospital-based placement (3-, 4-weeks). (See Table 1)

Different curriculum models have been investigated, where SBL has occurred in tandem with or a priori to PBL (See Figure 5). Blackstock et al,[42]; Watson et al.[40] compared replacing 25% of PBL time with simulation using actors to portray patients with cardiorespiratory and musculoskeletal pathologies respectively. More recently Blackford et al.[64] replaced the first week of a five-week acute ward PBL placement with SBL

replicating an acute hospital ward (actors portraying conditions such as Parkinson's disease and stroke).

No significant differences in student competency between the simulation and control groups in their final examination were revealed; controls having the same duration of weeks in PBL setting. Simulation increased students' self-reported confidence levels immediately after the intervention. Table 1 Illustrates the common models of how simulation can be used to support practice-based learning

		Weeks				
	Models	1	2	3	4	5
Blackstock et al, (2013)[42]; Watson et al. (2012)[40]	1	SBL	PBL			
	2	PBL		PBL		
		SBL				
Blackford et al. (2015)[64]	3	SBL	PBL			

SBL: simulation-based learning, PBL: practice-based learning

Table 1. Models of SBL to enhance PBL

C) Structure and content of simulation-based learning

Many of the studies failed to fully detail ***training requirements*** (either expert patients or students for role- play etc.) and methods used to enable replication. One study reported that 30 hours was spent training the SP [38] although a further study suggested that training senior physiotherapy students to be SP with just one- hour of coaching and was beneficial to both the involved senior and junior students; enhanced self-efficacy and satisfaction[43]. The importance of ***preparation (planning the SBL and pre-briefing) and debriefing*** were emphasised as important elements of the SBL experience.

Part 9

Additional resources and reading

iRIS Health Simulation authoring platform https://irissimulationauthoring.com/ a web-based scenario development solution that helps educators to **easily design and develop high quality training scenarios** in collaboration with peers and subject matter experts.

iRIS draws on **best practice frameworks** (INACSL, ASPiH, PEARLS Healthcare Debriefing Tool, etc.) across the **full spectrum of simulation approaches**.

Association for Simulated Practice in Healthcare (ASPiH) https://aspih.org.uk/
The Association for Simulated Practice in Healthcare (ASPiH) is the national (UK) learned body that focuses on the development and application of simulation-based education (SBE) and technology-enhanced learning (TEL). They have also developed evidence- based **Standards for SBE in Healthcare** (http://aspih.org.uk/wp-content/uploads/2017/07/standards-framework.pdf) and an accreditation process for educators and institutions.[18]

Society in Europe for Simulation Applied to Medicine (SESAM) is the European-wide healthcare simulation society. www.sesam-web.org

Society for Simulation in Healthcare (SSH) is the international, US-based, learned society dedicated to SBE. They propose a certification process for educators and technicians, and an accreditation process for simulation programmes (e.g. simulation centres). www.ssih.org

Simulation Education Diversity Assessment tool V10 https://sim-versity.eu/wp-content/uploads/2019/06/Simulation-Education-Diversity-Assessment-Tool-10.pdf

International Nursing Association for Clinical Simulation and Learning (INACSL) Standards of Best Practice: Simulation https://ctl.sinclair.edu/ctlevents/assets/File/16C-INACSL%20Standards%20of%20Best%20Practice%20-%20Simulation.pdf
Peer patient or role-play http://www.peerpatient.com/about-peer-patient.html

Health Education England
- National Framework for simulation-based education (HEE TEL) Oct 2018 (.pdf)
- National strategic vision for simulation and immersive technologies in health and care (HEE TEL) Nov 2020 (.pdf)
- Key lessons from the initial response of the UK simulation community to the COVID-19 pandemic (HEE TEL) Nov 2020 (.pdf)
- A description of simulation-based techniques relevant to education and practice in health and care (HEE TEL) Nov 2020 (.pdf)
- HEE TEL Simulation Framework: Faculty development guidance March 2021 (.pdf)
- Technology Enhanced Learning - Simulation-based education strategy - YouTube

https://healtheducationengland.sharepoint.com/Comms/Digital/Shared%20Documents/

Forms/AllItems.aspx?id
=%2FComms%2FDigital%2FShared%20Documents%2Fhee%2Enhs%2Euk%20
documents%2FWebsite%20files%2F Immersive%20Technologies%20
Toolkit&p=true&ga=1

Clinical Skills Managed Educational Network (CSMEN) Scottish network supported by NHS Education for Scotland for people interested and involved in skills and simulation-based education. https://www.csmen.scot.nhs.uk

Covid-19 Guidance (HEE and ASPiH)

- COVID-19 toolkit for safe simulation in health and care (HEE TEL & ASPiH) July 2020 (.pdf)

- COVID-19: National guidance on the safe delivery of simulation-based education (HEE TEL & ASPiH) Sept 2020 (.pdf)

Further selected reading

Dieckmann P, Gaba D, Rall M. Deepening the theoretical foundations of patient simulation as social practice. Simul Healthc. 2007 Fall;2(3):183-93. doi: 10.1097/SIH.0b013e3180f637f5

Dieckmann P, Patterson M, Lahlou S, Mesman J, Nyström P, Krage R. Variation and adaptation: learning from success in patient safety-oriented simulation training. Adv Simul (Lond). 2017 Oct 31;2:21. doi: 10.1186/s41077-017-0054-1.

Rall, Marcus and Peter Dieckmann. "Simulation and patient safety: The use of simulation to enhance patient safety on a systems level." Current Anaesthesia & Critical Care 16

(2005): 273-281.

Part 10

Glossary of terms (informed by INACSL Standards[27 28] ASPiH Standards Framework and Healthcare Simulation Dictionary[65])

Adjunctive SBL – SBL embedded into the curriculum to complement learning and can also be used to specifically prepare students for clinical placement in the week prior or can be integrated into the practice-based learning PBL (sequential).

Artificial Intelligence Patient – Computer generated patient that you interact with virtually. The computer-generated patient mimics human behaviour and responds to interventions that have been pre-programmed. Some are linked to machine learning, where the software will learn and adapt the virtual patient based on previous interactions with other learners.

Assessment - the process that provides feedback about performance to a learner or group of learners. Assessment can be summative or formative. Refers to knowledge, skills and attitudes.

Briefing – structured and guided session to orientate students to the environment, equipment, student roles, time allocation (briefing), and to the scenario objectives and clinical situation (pre-briefing).

Clinical scenario – Set outline of an encounter with a patient with specific learning outcomes, adapted to the level of the learner with description and progress of the situation, expected student actions, structure of the process (briefing, simulation, de-briefing) and scripts for the simulated or standardise patient, and list of equipment needed and environmental setup to perform the activity.

Screen-based simulation – Computer-based simulations provide SBL using solely a computer; affording opportunities to tailor the simulation and learning to the needs of the individuals.

Confederate facilitator or embedded participant – An individual other than the scripted patient who is involved in the SBL to add to the authenticity of the scenario, providing additional challenges, or further information for the learner.[66]

Clues/prompts/cueing – Information and equipment that helps student process and progress through a given scenario to fulfil the predetermined learning objectives and outcomes.

Debriefing – Post-simulation activity led by a trained facilitator and informed by learning objectives and outcomes of the scenario. Learners are encouraged to reflect on their performance (linked to knowledge, skills, behaviours and attributes) to transfer learning to future situations. Several models or debriefing approaches exist.
Facilitator – the trained individual who provides guidance and support during simulation-based learning experiences

Feedback – Educator feedback is 'Information provided to a learner to reduce the gap between current performance and a desired goal' (Sadler, 1989); in physiotherapy, student performance against level appropriate knowledge, skills, behaviours, and attributes. Feedback from others may also be included e.g. peer, patient user.

Fidelity – the extent to which a simulation aligns with reality. The level being influenced by the environment (physical fidelity), patient realism/authenticity (conceptual fidelity), and degree to which the simulation mirrors the clinical environment (psychological fidelity).

Haptic gloves – gloves worn by the participants that combined with virtual reality enable the participant to see a virtual object, to touch and interact with it and receive tactile feedback.

In situ simulation – simulation-based training that occurs in a 'real-world' or clinical setting rather than in a University or training establishment.

Inter-professional education – educational activities that involve learners from more than one professional field.

Moulage – techniques used to enhance the realism of a situation thereby increasing the whole sense of clinical immersion. This can include makeup, e.g. blood and bruising, walking/prosthetic aids, specialist therapeutic equipment e.g. catheters, drip stands, bandages etc.

Pre-briefing – An information session held prior to the start of SBL activity in which instructions or preparatory information is given to the participants. The purpose is to set the stage for a scenario, and assist participants in achieving scenario objectives.

Psychological safety – participants' feeling comfortable to participate, speak, sharing thoughts, and ask for help without concern for the consequences e.g. reprisal or humiliation.

Practice-based learning (PBL) – traditionally, learning that takes place during clinical placements or in a clinical setting. Note: this has now been expanded to include other settings e.g. research or leadership.

Realism – The ability to impart the suspension of disbelief to the learner by creating an environment that mimics that of the learner's work environment; realism includes the environment, simulated patient, and activities of the educators, assessors, and/or facilitators.

Scenario – the recreation of a clinical situation using a set of events and timelines to achieve programme objectives. Scenarios can be run 'ad hoc' or are programmed into the simulator and/or supporting devices.

Sequential simulation – SBL that illustrates key elements in a patient's care pathway or journey and can highlight the consequences of interventions at each and subsequent stages (See https://www.imperial.ac.uk/engagement-and- simulation-science/our-work/projects/sequential-simulation-sqs/).[67]

Simulation – a pedagogical strategy using one or more educational methods or types of equipment to provide a simulated experience to promote or validate students' development towards professional competence.

Simulation centre/laboratory – a designated physical space, designed for the purpose of professional specific simulation. This 'realistic' space may include materials and equipment relevant to physiotherapy; creating a safe space to promote and foster shared learning.

Standardised and Simulated patient – A person/patient/trained actor who repeatedly portrays his or her diagnosis or a set of symptoms, or a healthy individual who has been coached to accurately portray a specific patient diagnosis or set of symptoms in an identical way for consecutive learners, hence providing a "standardised" learning experience to students.[68] Unlike a standardised patient, a simulated patient has slightly more liberty in the acting as doing it on a single occasion but still focusing on a pre-defined set of learning objectives.

Substitutional SBL – SBL to replace PBL experience. Examples being SBL to promote safe practice (i.e. assessing patients with red flags), or where opportunities for PBL may be limited (i.e. paediatric assessment) or both (i.e. ICU).

Virtual reality – The use of computer technology to create an interactive 3-dimensional world in which the objects have a sense of spatial presence; virtual environment and virtual world are synonyms for virtual reality.

References

1. Maran NJ, Glavin RJ. Low- to high-fidelity simulation – a continuum of medical education? . Med Educ 2003:22-8.

2. Gaba DM. The future vision of simulation in health care. Qual Saf Health Care 2004:2-10.

3. Tun JK, Alinier G, Tang J, et al. Redefining Simulation Fidelity for Healthcare Education Simulation & Gaming
2015;46(2):159-74.

4. Alinier G, Oriot D. Simulation-based education: deceiving learners with good intent. Adv Simul 2022;7(8)

5. World Health Organization. Transforming and scaling up health professionals' education and training 2013 [Available from: https://www.who.int/publications/i/item/transforming-and-scaling-up-health-professionals%E2%80%99-education-and-training accessed 1/5/2022.

6. Lateef F. Simulation-based learning: Just like the real thing. Emerg Trauma Shock 2010;3(4):348-52.

7. Goldberg S, Storie V, Eyre A. Simulation in Emergency Medical Services. In Comprehensive Healthcare Simulation: Emergency Medicine: Springer, Cham. 2021:189-194.

8. Imms C, et al. Simulated versus traditional occupational therapy placements: A randomised controlled trial. Aust Occup Ther J 2018;65(6):556-64.

9. Heneghan NR GZ, Radones MF BK, Herbland A AK, et al. Simulation in pre-registration physiotherapy education: a scoping review. HSK Research Conference. University of Hertfordshire, 2022.

10. Mori B, et al. Use of Simulation Learning Experiences in Physical Therapy Entry-to-Practice Curricula: A Systematic Review. Physiother Can 2015;67(2):194-202.

11. Anderson LW, Krathwohl DR. A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. New York: Longman 2001.

12. Higgs J, Jones M. In: Higgs J JM, Loftus S, Christensen N. Clinical decision making and multiple problem spaces: Clinical reasoning in health professions. Amsterdam: Elsevier; 2008.

13. Kolb DA. Experiential learning: experience as the source of learning and development. Englewood Cliffs, NJ: Prentice Hall. 1984.

14. Miller GE. The assessment of clinical skills/ competence/ performance. Acad Med 1990;65(s67)

15. Alinier G. A typology of educationally focused medical simulation tools. Med Teach 2007(8):e243-50.

16. Irwin PM, Brown RA, Butler S. The undergraduate simulation framework: standardising design and delivery.
Higher Education, Skills and Work-Based Learning 2021;11(2):576-86.

17. Der Sahakian G, Buléon C, Alinier G. In Clinical Simulation Educational Foundations of Instructional Design Applied to Simulation-Based Education: Academic Press 2019:185-206.

18. England AfSPiHAaHE. Simulation-based Education of Healthcare. Standards Framework and Guidance 2016.

19. Paige JT, Arora S, Fernandez G, et al. Debriefing 101: training faculty to promote learning in simulation-based trainin. The American Journal of Surgery 2015;209(1):126-31.

20. Forstrønen A, Johnsgaard T, Brattebø G, et al. Developing facilitator competence in scenario-based medical simulation: presentation and evaluation of a train the trainer course in Bergen, Norway. Nurse Education in Practice 2020;1(47):102840.

21. Der Sahakian G, Alinier G, Savoldelli G, et al. Setting Conditions for Productive Debriefing. Simulation & Gaming
2015;46(2):197-208.

22. Oriot D, Alinier G. Pocket book for simulation debriefing in healthcare: Springer International Publishing 2018.

23. Bambini D. Writing a simulation scenario: A step-by-step guide. AACN Advanced Critical Care 2016;27:1.

24. INACSL Standards Committee. INACSL Standards of Best Practice: Simulation: Simulation Design. Clinical Simulation in Nursing 2016;12:S5-S12.

25. Howard S. Increasing fidelity and realism in simulation, 2018.

26. Alinier G. Developing high-fidelity health care simulation scenarios: A guide for educators and professionals.
Simulation & Gaming 2011;42(1):9-26.

27. World Health Organization for Europe. Simulation in nursing and midwifery education. In: WHO, ed., 2018.

28. INACSL Standards Committee, McDermott DS, Ludlow J, et al. Healthcare Simulation Standards of Best PracticeTM Prebriefing: Preparation and Briefing. Clinical Simulation in Nursing 2021;58:9-13.

29. Madireddy S, Rufa EP. Maintaining Confidentiality and Psychological Safety in Medical Simulation. Treasure Island (FL): StatPearls Publishing 2022.

30. Rudolph JW, Raemer DB, Simon R. Establishing a safe container for learning in simulation: the role of the presimulation briefing. . Simul Healthc 2014;9(6):339-49.

31. Rodgers DL. The Biological Basis of Learning: Neuroeducation Through Simulation. Simulation & Gaming
2015;46(2):175-86.

32. Abulebda K, Auerbach M LF. Debriefing Techniques Utilized in Medical Simulation In: StatPearls [Internet]. Treasure Island StatPearls Publishing 2021.

33. Al Sabei SD, Lasater K. Simulation debriefing for clinical judgment development: A concept analysis. Nurse Educ Today 2016;45:42-47.

34. INACSL Standards Committee. INACSL Standards of Best Practice: Simulation Debriefing. Clinical Simulation In Nursing 2016;12:S21-S25. doi: 10.1016/j.ecns.2016.09.008

35. Brentnall J, Thackray D, Judd B. Evaluating the Clinical Reasoning of Student Health Professionals in Placement and Simulation Settings: A Systematic Review. Int J Environ Res Public Health 2022;19(2):936.

36. Pritchard SA, et al. Simulated Patients in Physical Therapy Education: Systematic Review and Meta-Analysis. Phys Ther 2016;96(9):1342-53.

37. Bogossian FE, et al. Locating “gold standard” evidence for simulation as a substitute for clinical practice in prelicensure health professional education: A systematic review. J Clin Nurs 2019;28(21-22):3759-377.

38. Ladyshewsky R, et al. Reliability and validity of an extended simulated patient case: a tool for evaluation and research in physiotherapy. Physiother Theory Pract 2000;16:15-25.

39. Hale L, et al. Standardized Patients and Multidisciplinary Classroom Instruction for Physical Therapist Students to Improve Interviewing Skills and Attitudes About Diabetes. Journal of Physical Therapy Education 2006;20(1):22-27.

40. Watson K, et al. Can simulation replace part of clinical time? Two parallel randomised controlled trials. Med Educ
2012;46(7):657-67.

41. Smith N, et al. Using simulation and patient role play to teach electrocardiographic rhythms to physical therapy students. Cardiopulm Phys Ther J 2012;23(1):36-42.

42. Blackstock FC, et al. Simulation can contribute a part of cardiorespiratory physiotherapy clinical education: two randomized trial. Simul Healthc 2013;8(1):32-42.

43. Mandrusiak AM, et al. Senior physiotherapy students as standardised patients for junior students enhances self- efficacy and satisfaction in both junior and senior students. BMC Med Educ 2014;23(14):105.

44. Judd BK, et al. Comparison of Psychophysiological Stress in Physiotherapy Students Undertaking Simulation and Hospital-Based Clinical Education, Simulation in Healthcare. The Journal of the Society for Simulation in Healthcare: 2016;11(4):271-77.

45. Judd BK, Scanlan JN, Alison JA, et al. The validity of a professional competence tool for physiotherapy students in simulation-based clinical education: a Rasch analysis. BMC Med Educ 2016;5(16):196.

46. Gough S, et al. Using video-reflexive ethnography and simulation-based education to explore patient management and error recognition by pre-registration physiotherapists. Adv Simul 2016;1(9)

47.Phillips AC, et al. Developing physiotherapy student safety skills in readiness for clinical placement using standardised patients compared with peer-role play: a pilot non-randomised controlled trial. BMC Med Educ 2017;17(1):133.

48. Johnston TE. Assessment of Medical Screening and Clinical Reasoning Skills by Physical Therapy Students in a Simulated Patient Encounter. The Internet Journal of Allied Health Sciences and Practice 2018;16(2):10.

49. Riopel MA, et al. Promoting Professional Behaviours in Physical Therapy Students Using Standardized Patient Feedback. Physiother Can 2019;71(2):160-67.

50. Riopel M, et al. Utilizing Standardized Patient Feedback to Facilitate Professional Behavior in Physical Therapist Students: A Pilot Study. The Internet Journal of Allied Health Sciences and Practice 2018;16(3):4.

51. Ballengee LA, et al. Introduction of a psychologically informed educational intervention for pre-licensure physical therapists in a classroom setting. BMC Med Educ 2020;20:382.

52. Sandoval-Cuellar C, Alfonso-Mora ML, Castellanos-Garrido AL, et al. Simulation in physiotherapy students for clinical decisions during interaction with people with low back pain: randomised controlled trial. BMC Med Educ 2021;21:375.

53. Ward A, et al. Cultural empathy in physiotherapy students: a pre-test post-test study utilising virtual simulation.
Physiotherapy 2018;104(4):453-61.

54. Hassam M, Williams M. Education Via Simulation: Teaching Safe Chest Percussion for Pre-term Infants. Hong Kong Physiotherapy Journal 2003;21(1)

55. Jones A, Sheppard L. Use of a Human Patient Simulator to Improve Physiotherapy Cardiorespiratory Clinical Skills in Undergraduate Physiotherapy Students: A Randomised Controlled Trial. The Internet Journal of Allied Health Sciences and Practice 2011;9(1):12.

56. Ohtake PJ, et al. Simulation Experience Enhances Physical Therapist Student Confidence in Managing a Patient in the Critical Care Environment. Physical Therapy 2013;93(2):216-28.

57. Hough J, et al. Simulation-based education improves student self-efficacy in physiotherapy assessment and management of paediatric patients. BMC Med Educ 2019;19:463.

58. Walker CA, Roberts FE. Impact of Simulated Patients on Physiotherapy Students' Skill Performance in Cardiorespiratory Practice Classes: A Pilot Study. Physiother Can 2020;72(3):314-22.

59. Kelly D, et al. Augmented reality learning environment for physiotherapy education. Physical Therapy Reviews
2018;23(1):21-28.

60. Chong DYK. Benefits and challenges with gamified multi-media physiotherapy case studies: a mixed method study. Arch Physiother 2019;9:7.

61. Kurul R, et al. An Alternative Method for Anatomy Training: Immersive Virtual Reality. Anat Sci Educ
2020;13(5):648-56.

62. Favolise M. The Effectiveness of Augmented and Virtual Reality in the Education of Physical Therapy Students.
Archives of Physical Medicine and Rehabilitation 2021;102(10):e84.

63. Johnston V, et al. Using technology to enhance physical therapy students' problem-solving skills around safe patient handling. Physical Therapy Reviews 2013;18(6):407-15.

64. Blackford J, McAllister L, Alison J. Simulated Learning in the Clinical Education of Novice Physiotherapy Students.
International Journal of Practice-Based Learning in Health and Social Care 2015;3(1):77-93.

65. Lioce L, Lopreiato J, Downing D, et al. Healthcare Simulation Dictionary. 2.1 ed. Rockville, MD: Agency for Healthcare Research and Quality;2020.

66. Nestel D, Mobley BL, Hunt EA, et al. Confederates in Health Care Simulations: Not as Simple as It Seems. Clinical Simulation in Nursing 2014;10(12):611-16.

67. Weldon SM, et al. Sequential Simulation (SqS): an innovative approach to educating GP receptionists about integrated care via a patient journey – a mixed methods approach. BMC Fam Pract 2015;16 109

68. Baylor C, et al. Assessing the Believability of Standardized Patients Trained to Portray Communication Disorders.
Am J Speech Lang Pathol 2017;26(3):791-805.

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