This open-access article is distributed under Creative Commons licence CC-BY-NC 4.0.

How to plan for simulation integration into undergraduate physiotherapy training

A van der Merwe,[1] MSc (Physiotherapy), PhD (Physiotherapy); **R Y Barnes,**[1] PhD (Physiotherapy); **M J Labuschagne,**[2] MMed (Ophthalmology), PhD (HPE)

[1] *Department of Physiotherapy, Faculty of Health Sciences, University of the Free State, Bloemfontein, South Africa*
[2] *Clinical Simulation and Skills Unit, Faculty of Health Sciences, University of the Free State, Bloemfontein, South Africa*

Corresponding author: *A van der Merwe (gonzalesa@ufs.ac.za)*

Background. The benefits of simulation in healthcare education are undeniable, and in the current healthcare climate, a drastic change in delivering healthcare training is critical. Therefore, integration of simulation is essential, and necessitates detailed planning and well-trained educators.
Objectives. To develop a conceptual framework for the integration of simulation in South African (SA) undergraduate physiotherapy programmes.
Methods. A non-experimental descriptive research design using a modified Delphi survey was conducted. Results from a systematic review identifying simulation integration framework elements informed the Delphi survey. A purposive sample of 15 healthcare educationalists from SA and abroad were approached to participate. Data were analysed as percentages, and feedback was provided to panel members following each round.
Results. A response rate of 73.3% (n=11) was achieved. Planning was explored as one of the themes. Both institutional- and discipline-specific needs analyses were identified as essential (93%), and societal needs were useful to consider (64%). Resource identification and sharing (84%) were regarded as vital, and expert collaboration in curriculum development (79%) with scaffolded skills integration (75%) was advised. The necessity for trained facilitators (93%) and educator role identification (71%) was evident. Statements related to mastery learning/deliberate practice and the use of simulation for assessment purposes yielded the least consensus.
Conclusion. A constructively aligned curriculum based on both student and institutional needs and resource availability in guiding simulation integration was regarded as essential. Educator competency in both the development and delivery of the programme, especially debriefing methods, is vital for optimising student learning.

Afr J Health Professions Educ 2022;14(2):61-65. https://doi.org/10.7196/AJHPE.2022.v14i2.1446

Healthcare educationalists are faced with fewer clinical opportunities owing to a changing healthcare climate,[1] resource distribution towards primary healthcare,[2] increased student numbers,[3] and South Africa (SA)'s unique quadruple burden of disease[4] that has an impact on the availability, variety and complexity of patients for student training. Contributing to the challenges are the COVID-19 pandemic, which also impacts the case mix and teaching platform used for student training. Improving safe patient management[5] with limited resources[6] is also essential in SA healthcare education. Additionally, the underpreparedness of students entering the tertiary education environment[7] and student dissatisfaction with the presented curricula[8] pose further challenges to national healthcare education. Healthcare training therefore requires adjustments and a widened training platform to ensure the continued throughput of skilled graduates.[9,10]

Simulation is defined by the *Healthcare Simulation Dictionary*[11] as an educational methodology that involves designing a realistic situation where student learning and skills practice are facilitated. Simulation, in the context of the present study, refers to the integration of a variety of simulation modalities in both immersive and practical skills-based, simulation-based learning experiences (SBLEs) in a healthcare training programme. The benefits of integrating simulation into healthcare education are undeniable,[12,13] and in light of all the challenges, the ability to produce learning opportunities when clinical practice settings are limited[14] is critical. Simulation has also been used in the development of skills, ensuring both patient and student safety, and facilitating ethical conduct.[5] Additionally, simulation addresses the learning needs of the current student population, making learning an interactive and realistic process that provides 'hands-on', student-centred education.[9]

Any programme innovation and/or integration requires educator preparation and training, taking into account curricular content, reasons for the proposed changes and the educator's role in the programme.[15] Detailed planning prior to the development, integration and execution of SBLEs is therefore essential,[15] and should aim to empower educators in authentic SBLE integration and decrease educator resistance to simulation integration.[16]

A systematic review performed by the principal researcher (AvdM) revealed few frameworks for healthcare simulation integration, published only in developed countries, between January 2005 and December 2017. Of these identified frameworks, none was based in physiotherapy. The available simulation-based physiotherapy research focuses on integrating only selected simulation modalities or the training of specific skills, and does not present a framework for the integration of a variety of simulation modalities. This Delphi survey aimed to develop a conceptual framework for the integration of simulation in SA undergraduate physiotherapy programmes. For the purpose of this article, one of the emerging themes, planning, has been explored in detail.

Methods

Design

A descriptive research design using a modified Delphi survey was utilised. Statements were obtained from the systematic review, after which expert opinions were solicited regarding the content of the conceptual framework. A three-point Likert scale with options 'essential', 'useful' and 'not applicable' was used.

Sampling and participants

A purposive sample of 15 national and international healthcare educationalists in physiotherapy and/or other healthcare fields, as well as healthcare simulation experts, were identified (Table 1). The majority of panel members were South Africans, to provide a contextualised point of view unique to the SA environment and educational challenges.

Data collection

Panel members received an information leaflet detailing the study aim and procedure. A document explaining the SA undergraduate physiotherapy context was also provided to panel members to increase content validity. Panel members were made aware that they would remain anonymous to one another, and that data would remain confidential. Informed consent was obtained prior to participation.

The Delphi survey was distributed online by means of SurveyMonkey, with a 2-week completion deadline per round. Data were analysed, followed by an authors' consensus meeting to ensure that all comments and suggestions were accurately incorporated during the subsequent round, to limit bias.[17,18] A continuous iteration and feedback between panel members was used throughout the survey to achieve shared understanding on the topic. Statements failing to achieve 70% consensus, panel member comments and the consensus meeting outcome were formulated into subsequent survey rounds.[17] Statements achieving consensus were removed from subsequent rounds.

Data analysis

In line with previous Delphi surveys in similar research areas,[17,19] consensus was defined as ≥70% of panel members agreeing on the inclusion or exclusion of a statement. Stability was declared when individual panel member selections remained similar across survey rounds, with suggestions provided for the specific statement not resulting in further content or contextual changes, additions or omissions.[19] Data saturation was achieved when the repeated rounds yielded either a convergence of panel member opinions, or individual response stability per statement.

Pilot study

A pilot study was performed with one healthcare educationalist experienced in both simulation-based education (SBE) and the Delphi process. Minor grammatical changes were made following the pilot study.

Ethical approval

The first survey round was developed after approval from the Health Sciences Research Ethics Committee at the University of the Free State (ref. no. HSREC 108/2017) was obtained.

Results

Data saturation was declared after survey round 3. An overall response rate of 73.3% (*n*=11) was achieved, with 4 panel members dropping out during the Delphi survey. Reasons for dropout were not explored. In round 3, 36.4% (*n*=4) of panel members were from outside the country, and 63.6% (*n*=7) were South African.

Data were analysed as percentages to assess whether consensus had been achieved per statement. Due to limited justification regarding selected options or opinions related to statements by panel members, content analysis of comments could not be performed. Feedback to participants therefore included only the summary of statements achieving consensus, as the provision of statistical results with no supporting information would have yielded less accurate results.[19]

Four themes, with supporting categories, emerged from the data, namely planning (*n*=12), implementation (*n*=3), evaluation (*n*=2) and revision (*n*=1). For the purpose of this article, both statements achieving consensus (Appendix: https://www.samedical.org/file/1807) and stability (Table 2) relating to the planning theme have been explored.

When integrating simulation, the inclusion of both institutional and discipline-specific needs analyses was indicated as essential (93%), with a societal needs analysis regarded as useful (64%) by panel members. Identification of available human (86%) and physical resources (73%) also achieved consensus, with 84% of panel members indicating that facilities should be shared between healthcare disciplines. A collaborative approach to curriculum development and integration (79%), with scaffolding of non-technical training aspects according to the learning outcomes (75%), was deemed essential.

Although no other statements detailing the role of the educator achieved consensus, defining the role of the educator was viewed as vital (71%), and the identified role(s) should guide essential facilitator training (93%), notably in debriefing methods (100%). The inclusion of peer assessment as part of mastery learning/deliberate practice in formative assessments was

Table 1. Expert panel targeted to be recruited for the Delphi survey

Area of expertise	*n*	Nationality	Profession
Healthcare educationalists and simulation experts (conducted simulation-based research, congress presentations, published work)	6	2 international, 4 SA	National: nursing educationalist and simulation expert (*n*=1); general* (*n*=3); international: physiotherapy (*n*=1); general* (*n*=1)
Medical simulation expert (conducted simulation-based research, congress presentations, published work)	6	3 international, 3 SA	National: medical specialist† (*n*=3); international: medical specialist‡ (*n*=3)
Healthcare simulation facility directors	2	2 SA	n/a
Physiotherapy educationalist with simulation expertise (congress presentation, currently not published in SBE)	1	1 SA	n/a

SA = South Africa; n/a = not applicable; SBE = simulation-based education.
*A participant described as general is a qualified healthcare professional working in a simulation unit or centre with various healthcare professions students.
†National medical simulation experts included two anaesthesiologists and one general medical practitioner.
‡International medical simulation experts included 2 anaesthesiologists and 1 surgeon.

Table 2. Statements achieving stability during the Delphi survey

Category	Stability statements related to planning	Round	Essential, %	Useful, %	n/a
Needs analysis	Identified societal needs should form the background context of SBLEs, depending on the desired learning objectives for each planned learning experience.	3	-	64	-
Mastery learning/ deliberate practice	The educator's role in formative SBLEs, not used for formal assessment, would be that of facilitator and providing feedback.	3	64	-	-
	The educator's role in summative SBLEs is that of post-simulation feedback/debriefing and discussion. *Further options regarding assessment will be explored in theme 3.*	3	40	40	-
	Students should be allowed to redo all formative SBLEs until they have reached their individual level of satisfaction. *This would be dependent on the course structure, available time and resources.*	3	-	55	-
	Educators should identify which formative simulation-based learning experiences, according to the set learning outcomes, should be repeated until an educator's set benchmark is achieved. *This would be dependent on the course structure, available time and resources.*	3	-	55	-
	Attainment of the educator-set benchmark for identified summative SBLEs should be assessed by the educator at all times. *Options for peer- and/or self-assessment are provided in the following questions.*	3	55	-	-
Assessment	All SBLEs should have an element of self-reflection.	3	64	-	-
	Educators should identify which SBLEs are to be used for summative assessment. Only these identified assessments should be performed on a one-to-one student-educator basis.	3	55	-	-
	Educators should identify which SBLEs could accommodate a peer-assessment element, and it should be implemented as such.	3	55	-	-
	Educators should identify which SBLEs are to be used for formative assessment. Only the identified assessments should be performed on a one-to-one student-educator basis. *An element of peer-assessment could be added if deemed appropriate by the educator.*	3	45.5	-	-

Note: The percentage stability achieved is indicated under the corresponding importance option; 'round' refers to the Delphi round where stability was achieved.
n/a = not applicable; SBLE = simulation-based learning experiences.
Italic text represents supplemental clarification provided to panel members.

judged as useful (73%), with statements relating to educators assessing the achievement of mastery learning (55%) and the use of SBLEs for summative assessment (55%) remaining in dissensus. No consensus could be reached regarding to whose satisfaction SBLEs should be repeated – individual students (55%) or the educator (55%). It was noted that the development of specific assessment tools for SBLEs was viewed as essential (83%). According to 64% of panel members, the inclusion of a self-reflection component in SBLEs should be considered.

Discussion

SA may experience challenges, including lack of funding and resources, national healthcare deficits and an underprepared and diverse student population,[3,8] when adopting educational strategies designed for a developed economy.

The need for thorough planning, involving all stakeholders, to successfully integrate and sustain simulation in a programme is evident from this study. Financial constraints[6] negatively impact the availability of both human and physical resources in tertiary healthcare education, and institutional investigation into the practicality and benefits when planning simulation integration is essential. The integration of simulation-based learning should, however, not be equated with high costs and high-technology facilities.[13] Instead, lateral, resource-smart planning, interprofessional collaboration and shared facilities could ensure simulation-based learning for all.

Considering the call for curriculum decolonisation by SA students,[8] the advent of the fourth industrial revolution (4IR) and an emerging adult learner population entering tertiary education, both participants and authors viewed it as vital to carefully develop SBLE outcomes aligned with discipline-based and institutional needs.[16,20] In a culturally, linguistically and ethnically diverse country[7] shifting towards primary healthcare,[2] the authors were concerned that the execution of a societal needs analysis when aiming to integrate simulation was only viewed as useful and remained in dissensus, with no supporting feedback provided by panel members. This might be due to panel members viewing societal needs as being addressed through adherence to minimum standards required by the healthcare governing body, the Health Professions Council of SA (HPCSA). It should, however, be noted that the minimum criteria expected of undergraduate healthcare students are internationally benchmarked, and may not result in the unique SA societal needs being optimally met.

Acknowledging the role of contextual differences when aiming to integrate standardised education models is essential,[16] and disregarding differences could reduce the educational impact of simulation on student learning. Because simulation is used only in pockets of certain SA healthcare education disciplines,[14] the collaborative development of an expertly revised, contextually appropriate, scaffolded and constructively aligned curriculum that integrates SBLEs according to educational principles is essential. In the participants' opinion, SBE experts are indispensable in the planning process to identify existing curricular components that could benefit from or be replaced by SBLEs, enhancing the achievement of programme outcomes. Mindful SBLE design during the planning phase, guided by best practice and national regulatory body guidelines, is vital to optimally employing available physical and human resources, and will ensure that developed SBLEs are focused on achievable outcomes.

Defining the educator's role in SBLEs was viewed as essential by panel members, although no consensus could be reached regarding the specific role of the educator during either formative or summative assessments. As SA educators are directly involved throughout the SBLE planning, implementation and evaluation phases,[21] SA panel members possibly viewed the term 'educator' as interchangeable and synonymous with that of facilitator. Panel members not familiar with using simulation for summative assessment may also have been challenged owing to SBLEs currently not being used in SA other than for assessing practical skills in some healthcare disciplines. The Delphi results indicated that the absence of universal, standardised simulation terminology might have caused panel members to interpret the term 'educator' incorrectly, as an instructor of learning, rather than both instructor and facilitator of learning. It is therefore essential to provide a clear indication during the planning phase of what is expected of the educator in terms of their role in the integration of simulation, to identify where additional educator training and/or resources would be required.

With only anecdotal evidence available regarding the use of simulation in SA physiotherapy education, the authors support the panel members' opinion regarding the necessity of contextualised educator training for their required roles, namely SBLE development, providing constructive feedback and debriefing. Completion of accredited training programmes should ensure the achievement of learning outcomes[15,20] through a uniform strategy pertaining to the teaching, evaluation and certification of integrated SBLEs.

Receiving feedback and/or taking part in a debriefing session following SBLE participation is the essence of SBE in facilitating learning through performance-based feedback and/or reflecting on individual performance through addressing student needs.[22] Various feedback and/or debriefing sources and timings have been reported.[15,22,23] Panel members concurred that identification of the timing of feedback and/or debriefing, including the debriefing method and tool used, should be included in the planning phase to allow for both student and facilitator preparation. Further discussion regarding debriefing will be addressed in a follow-up article where the implementation phase of this conceptual framework will be presented and discussed.

The clarification of student roles in preparation for SBLE participation is vital during the planning phase.[24] Planning should include time allocation for acquainting students, who might not be familiar with the educational practice of simulation, with the simulated environment, SBLE outcomes, theoretical content and selected instructional methods. The term 'instructional methods' was included in the Delphi survey based on results from the systematic review, and refers to the overall educational methods, irrespective of the mode of simulation, used during the SBLEs.[23]

Panel members indicated that technical and non-technical skills could not be taught in isolation, which is supported by the literature.[13] Preparing healthcare professionals for adverse events, problem-solving in limited resource environments and multifaceted patient and/or team consultations and treatments is equally important as theoretical preparation for clinical practice. Using SBLEs in training for healthcare professionals could potentially develop the skills required to navigate difficult and emotionally demanding situations.[12] Panel members suggested that where relevant, non-technical training aspects should be scaffolded to the SBLE, and in accordance with the learning objectives. Collaborative planning and design of SBLEs with these skills in mind would not only provide better preparation of graduates for changing healthcare practice, but also instil the value of self-care.

Although positive effects relating to skills transfer to the clinical setting have been demonstrated,[12] both mastery learning and deliberate practice are, according to both the literature[15] and panel member comments, extremely time consuming and resource intensive. Only one mastery learning and deliberate practice statement achieved consensus, which could possibly reflect the panel members' hesitation when confronted with published best practices[25] and the realistic impact on time and resources. The overarching aim of the statements presented to panel members was to identify if and when SBLE repetition should be integrated into the curriculum, thereby focusing on the core similarity between mastery learning and deliberate practice, resulting in the amalgamation of these two concepts.

When viewing the elements of mastery,[12] it is clear that mastery is not based solely on the acquisition of individual skills. Instead, it involves a progression from skills competence and integration toward skill application. Considering the impact of the COVID-19 pandemic,[1] the 4IR[6] and the attributes required of physiotherapy graduates, integrating a combination of skills during an SBLE could be more useful for achieving integrated learning.

The only mastery learning/deliberate practice statement reaching consensus by round 3 indicated that participants viewed it as essential to add a peer-assessment element to mastery learning and deliberate practice sessions. This practice would free up educator time and could be beneficial, as peer assessment has been shown to increase student learning, contribute to collaboration skills and foster reflection.[24] As mastery learning and deliberate practice are deeply embedded in the constructivist learning theory as part of experiential learning, formative assessments will provide students with feedback for reflection, with the aim of identifying implications for action. This action cycle can then be measured by means of summative assessment to ascertain whether skill mastery has occurred, thereby completing Kolb's cycle for experiential learning[21] and assessing the top tier of Miller's[26] pyramid of clinical competence.

With a shrinking clinical platform, increasing interest in the use of SBLEs for the summative assessment of healthcare professionals has been reported.[24] However, SBLEs are viewed as safe[20] and forgiving learning spaces, and formal assessment could potentially lead to undue fear hindering the learning experience. Maintaining a safe learning environment could explain why stability was only achieved in the Delphi survey on statements relating to the student-to-educator ratio during formative and summative assessments, as SBLEs are not routinely used during either immersive or practical skills-based assessments in SA healthcare education.[27] The use of SBLEs for summative assessments therefore requires further investigation. If, however, SBLEs were to be considered for use, especially in summative assessments, identification of valid and reliable assessment tools during the planning phase is essential,[25] which was confirmed by the panel members.

The panel members amended the term 'self-assessment' to 'self-reflection', better illustrating the internal reflection process required of the student when planning SBLE integration and design. Although no consensus was achieved regarding the inclusion of self-reflection in all SBLEs, preparing students with problem-solving, teamwork, reasoning and reflection skills is essential when taking the 4IR into account.[1] Self-reflection is an invaluable attribute, as students are expected to identify their professional and personal shortcomings, and subsequently plan and adapt to address these shortcomings.

Conclusion

Meticulous planning is crucial prior to integrating simulation in a programme, in order to identify simulation-based goals and allow for effective decision-making and resource allocation. Planning simulation integration should be done in accordance with resource availability, desired competencies, learning outcomes and consideration of both institutional and student needs. A definite need for educator competency in both the development and delivery of the programme, especially debriefing methods, has to be emphasised to achieve optimal student learning.

Non-standardised terminologies used in SBE, the varied roles SA educators are required to fulfil in relation to simulation and the lack of use of SBLEs for assessment purposes might have impacted on panel members' interpretation of statements and opinions regarding what might be possible in a resource-constrained environment. The authors recommend the further exploration of student role clarification with regard to their inclusion in the assessment process through peer assessment, provision of the necessary assessment training and focused training in both providing and receiving constructive feedback. Lengthy statements populated the Delphi survey, which might have been difficult to respond to. The authors suggest that to obtain diverse opinions, pilot studies should include at least two to three Delphi survey experts. Furthermore, we advise that Delphi piloting should also include piloting of the feedback process, to ensure the optimal use of the Delphi methodology.

The COVID-19 pandemic has led to a drastic change in delivering healthcare training, and negatively impacted the clinical training platform for undergraduate healthcare students. Well-planned simulation integration may assist in ensuring the continued throughput of skilled graduates, and undergraduate healthcare students who are still able to work collaboratively and demonstrate adaptability to their fragmented learning environment. The planning theme of the conceptual framework enabled us to present a detailed means of addressing current healthcare education challenges in SA by means of simulation integration.

Declaration. The research for this study was done in partial fulfilment of the requirements for AvdM's PhD (physiotherapy) degree at the University of the Free State.**Acknowledgements.** Dr Daleen Struwig, medical writer/editor, Faculty of Health Sciences, University of the Free State, for technical and editorial preparation of the manuscript.

Author contributions. All authors contributed to the article. AvdM developed the protocol and collected the data for the larger study from which this research emanated. AvdM wrote the first draft of the manuscript; RYB and MJL contributed to the interpretation of the data and writing of the article; AvdM made the final editorial adjustments to the manuscript; all authors approved the final version of the article.

Funding. National Research Foundation (NRF) (grant number TTK180418322303); Health and Welfare Sector Education and Training Authority (HWSETA).

Conflicts of interest. None.

1. Ferrel MN, Ryan JJ. The impact of COVID-19 on medical education. Cureus 2020;12(3):e7492. https://doi.org/10.7759/cureus.7492
2. Maillacheruvu P, McDuff E. South Africa's return to primary care: The struggles and strides of the primary health care system. J Global Health 2014,4(2):10-14. https://www.ghjournal.org/south-africas-return-to-primary-care-the-struggles-and-strides-of-the-primary-health-care-system/ (accessed 1 September 2020).
3. Academy of Science of South Africa. Reconceptualising health professions education in South Africa, 2018. ASSAf, 2018. http://research.assaf.org.za/handle/20.500.11911/95 (accessed 1 September 2020).
4. Basu D. Diseases of public health importance in South Africa. South Afr J Public Health 2018;2(3):48. https://doi.org/10.7196/SHS.2018.v2.i3.72
5. Phillips AC, Mackintosh SF, Bell A, Johnston KN. 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. https://doi.org/10.1186/s12909-017-0973-5
6. Allen S. Deloitte Insights: 2020 Global Health Care Outlook. Laying a foundation for the future. London: Deloitte Development LLC, 2020. https://documents.deloitte.com/insights/2020globalhealthcareoutlook (accessed 1 September 2020).
7. Singh RJ. Current trends and challenges in South African higher education. S Afr J Higher Educ 2015;29(3):1-7. https://doi.org/10.20853/29-3-494
8. Mekoa I. Challenges facing higher education in South Africa: A change from apartheid education to democratic education. Afr Renaissance 2018;15(2):227-246. https://doi.org/10.31920/2516-5305/2018/v15n2a11
9. Johnston CL, Wilson JC, Wakely L, Walmsley S, Newstead CJ. Simulation as a component of introductory physiotherapy clinical placements. N Z J Physiother 2018;46(3):95-104. https://doi.org/10.15619/NZJP/46.3.02
10. Wright A, Moss P, Dennis DM, 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 2018;3(1):3. https://doi.org/10.1186/s41077-018-0062-9
11. Lopreiato JO (ed). Healthcare Simulation Dictionary. 2016. https://www.sesam-web.org/media/documents/sim-dictionary1.pdf (accessed 8 September 2020).
12. McGaghie WC, Harris IB. Learning theory foundations of simulation-based mastery learning. Simul Healthc 2018;13(3S Suppl 1):S15-S20. https://doi.org/10.1097/SIH.0000000000000279
13. Kneebone R, Nestel D, Bello F. Learning in a simulated environment. In: Dent JA, Harden RM, Hunt D (eds.). A Practical Guide for Medical Teachers. 5th ed. London: Elsevier, 2017:92-100.
14. Thurling CH. The design and development of a programme for simulation best practices in South African nursing education institutions. PhD thesis. Johannesburg: University of the Witwatersrand, 2017. http://wiredspace.wits.ac.za/handle/10539/23150 (accessed 8 September 2020).
15. Motola I, Devine LA, Chung HS, Sullivan JE, Issenberg SB. Simulation in healthcare education: A best evidence practical guide. AMEE Guide No. 82. Med Teach 2013;35(10):e1511-e1530. https://doi.org/10.3109/0142159X.2013.818632
16. Chung HS, Issenberg BS, Phrampus P, et al. International collaborative faculty development program on simulation-based healthcare education: A report on its successes and challenges. Korean J Med Educ 2012;24(4):319-327. https://doi.org/10.3946/kjme.2012.24.4.319
17. Avella JR. Delphi panels: Research design, procedures, advantages, and challenges. Int J Doct Stud 2016;11:305-321. https://doi.org/10.28945/3561
18. Hallowell MR. Techniques to minimise bias when using the Delphi method to quantify construction safety and health risks. Paper presented at the Construction Research Congress, Seattle, Washington, USA, 5 - 7 April, 2009. https://ascelibrary.org/doi/10.1061/41020%28339%29151 (accessed 8 September 2020).
19. Slade SC, Dionne CE, Underwood M, et al. Consensus on exercise reporting template (CERT): Modified Delphi study. Phys Ther 2016;96(10):1514-1524. https://doi.org/10.2522/ptj.20150668
20. Khamis NN, Satava RM, Alnassar SA, Kern DE. A stepwise model for simulation-based curriculum development for clinical skills, a modification of the six-step approach. Surg Endosc 2016;30(1):279-287. https://doi.org/10.1007/s00464-015-4206-x
21. Spies C. A strategy for meaningful simulation learning experiences in a postgraduate paediatric nursing programme. PhD thesis. Bloemfontein: University of the Free State, 2016. https://scholar.ufs.ac.za/handle/11660/4803 (accessed 8 September 2020).
22. Cheng A, Eppich W, Sawye T, Grant V. Debriefing: The state of the art and science in healthcare simulation. In: Nestel D, Kelly M, Jolly B, Watson M (eds.). Healthcare Simulation Education. New York: Wiley Blackwell, 2018:158-164.
23. Chiniara G, Cole G, Brisbin K, et al. Simulation in healthcare: A taxonomy and a conceptual framework for instructional design and media selection. Med Teach 2013;35(8):e1380-e1395. https://doi.org/10.3109/0142159X.2012.733451
24. Viggers S, Østergaard D, Dieckmann P. How to include medical students in your healthcare simulation centre workforce. Adv Simul 2020;5:1. https://doi.org/10.1186/s41077-019-0117-6
25. Association for Simulated Practice in Healthcare. Simulation-based education in healthcare: ASPiH standards framework and guidance. ASPiH, 2016. https://aspih.org.uk/standards-framework-for-sbe/ (accessed 8 September 2020).
26. Miller GE. The assessment of clinical skills/competence/performance. Acad Med 1990;65(9):S63-S67.
27. Swart R, Duys R, Hauser, ND. SASS: South African simulation survey – a review of simulation-based education. South Afr J Anaesth Analg 2019;25(4):12-20.

Accepted 1 September 2021.