Developing consensus on content and format of e-portfolio for MHPE students: A Delphi study

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Abstract

Objectives: To build a consensus on portfolio framework for master's in health professional education students and document programme learning outcomes, tasks for students related to each outcome, and the pieces of evidence regarding the completion of each task.

Method: The modified Delphi study was conducted from February to July 2020 at Riphah International University, Islamabad, Pakistan, and comprised a three-round electronic-based survey of faculty members associated with the master's in health professional education programme, alumni, and current students as well as portfolio experts. The panellists had to choose from 10 programme learning outcomes, 75 tasks for students to achieve those outcomes, and 510 pieces of evidence to confirm that the tasks had been done to achieve the outcomes. A consensus cut-off of ≥80% was decided to select the item.

Results: Of the 45 stakeholders approached, 41(91.5%) responded in round 1. Of them, 31(75.6%) responded in round 2, while round 3 comprised responses from 31(96.7%) subjects. The draft template was originally derived from the master's in health professional education programme guide, expert opinions, and systematic literature review available for portfolios of other higher education degrees. The list of items was refined through a pilot study. The final template was approved by the expert panel after 3 iterations. The final list of items included 59 (78.6%) tasks and 105(21%) pieces of evidence related to all the 10 programme learning outcomes.

Conclusion: The important programme learning outcomes, their related tasks, and the required pieces of evidence to be added in the e-portfolio of master's in health professional education programme students were identified, and recommendations for the format of implementation and assessment were given.

Keywords: e-Portfolio, MHPE, Delphi, Medical education, Programme learning outcomes, Evidence for e-portfolio.
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Introduction

Students of master's in health professional education (MHPE) come from very diverse backgrounds ranging from fresh graduates to senior professors. Majority of them are accustomed to teacher-oriented learning and are usually reluctant to make their own learning goals, identify their own learning needs, and perform self-assessment of their learning activities by keeping a reflective log.[1] For the faculty, keeping a track of individual student learning and inculcating reflective practices required to make them a life-long learner is difficult. Moreover, measuring the impact of MHPE in terms of translation of this learning into useful practices at workplace seems an unapproachable task.

In a rapidly progressing society where knowledge is created and disseminated fast via electronic tools and the internet as well as the changing educational paradigm to post-positivist approach that is focused on real, student-centred and autonomous learning, the use of new educational tools, like e-portfolio, has become necessary.[2] A portfolio has been defined as a purposeful collection of a person's work or achievements or learning activity, depending upon the type and purpose of the portfolio, along with reflections on one's effort during the process. It has been identified as an important tool to stimulate and monitor self-directed learning (SDL) in medical education literature.[3] Electronic modification of portfolio has gained more popularity than paper-based portfolios because of having a private webspace and opportunity to collect and organise artifacts, called pieces of evidence (PoEs), in many formats like audios, videos, hyperlinks, graphics and text. Other advantages include easy editing and accessibility at different places.[4] Alongside the traditional methods of assessment, the use of e-portfolio for evaluation and training of MHPE graduates will empower MHPE students to achieve personalised competencies by fostering critical thinking and reflective practices. Reflection has been emphasised over artifacts so that the e-portfolio may not become an electronic scrapbook.[5,6]

The advantages of a learning e-portfolio are often overrun

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by the challenges in deciding the purpose; one or many; choosing the tool; generic or specific; selection of evidence; the numbers, level and quality; improving acceptance and motivation among the users; and defining the required skills in students for creating the e-portfolio.[7]

Creating and maintaining e-portfolios have different meanings for deans, faculty, students and accrediting bodies, so when the implementation of e-portfolio is considered, one should not only consider the decisions of the faculty, but also the versatility and choices of the users. Data on students' perspectives of e-portfolio and its effect on successful outcomes suggests that the successful implementation of e-portfolio requires informed practices involving communication and engagement of all the stakeholders, especially the students.[8,9] So far, no e-portfolio has been designed for MHPE and its introduction requires consensus on its content and format structure. Therefore, the current study was planned to reach a consensus on the desired content and format requirements of MHPE students' e-portfolio in congruence with content standards for the MHPE programme.

Materials and Methods

The modified Delphi study was conducted from February to July 2020 at Riphah International University, Islamabad, Pakistan, after approval from the ethics review committee of the Islamic International Medical College, Islamabad, and comprised national and international experts to achieve consensus on content and format of the e-portfolio of MHPE students. Opinions and consensus of expert panel was sought about the content and format of the e-portfolio for MHPE. The panellists were free to give their opinion anonymously. Iteration allowed the panelists to change their response and resolve disagreement. Controlled feedback about the group responses was sent to the experts after each round. Conducting and Reporting Delphi studies (CREDES) guidelines were followed throughout the process.[10,11]

The Delphi information sheet along with the informed consent form was sent to all the participants, assuring them of confidentiality and anonymity.

Using the hierarchical stopping criteria for Delphi studies given by Heiko A,[12] all items were categorised as 'included', 'excluded' or 'non-consensus'. A consensus cut-off of $\geq$80% was decided to select the item (Table-1). The end-point was a maximum 3 rounds as it enables adequate reflection on group responses and is considered optimal to reach consensus[13] and also to limit the responder's attrition and fatigue.

Table-1: Inclusion/exclusion criteria for items.

Decision	Criteria
Included	Stability (McNemar test of significance) + Consensus i.e., >80% agreement
Excluded	Stability (McNemar test of significance) + >80% experts disagreed to include the item
Non-consensus	Items which do not meet any of the above criteria

The panel had a maximum variation of experts, including the implementers, the assessors, and the users.

The items for the survey questionnaire were based on the MHPE programme guide, opinions of 6 experts and systematic literature search.[14] Two experts were specialists in the field, while 4 were MHPE students. A three-point Likert scale was used conforming to its practical convenience, applicability and adequacy.[15] Experts were asked questions at three levels.

The first question was: which of the following domains / programme learning outcomes (PLOs) would you like to include in the e-portfolio of MHPE? For each PLO selected, a list of items was provided enlisting the tasks to be performed by the students to achieve the selected PLO.

The second question was: which of the following tasks from the above domain would you like to include in the e-portfolio of MHPE? For each task selected, the experts had to choose some PoEs / artefacts confirming that the selected 10 PLOs are achieved.

The third question was: which of the following PoEs / artefacts would you like to include in the e-portfolio of MHPE for the said task?

A pilot study on 17 participants was conducted to assess the procedures for usability and analysis of survey questionnaires.

In round 1, Google form was used to collect data from the participants. The questionnaire included 10 PLOs, 75 tasks across the PLOs, and 5-7 PoEs for each task. Six additional questions were asked for the implementation and assessment format of the e-portfolio. Participant's demographics were also collected in this round. The survey remained open for 4 weeks. Comment boxes were also provided. They were also required to choose one or more PoE for all the tasks they selected from a given set of 7 PoEs. The approximate time to complete the survey was 40-45 minutes.

In round 2 all the variables from round 1 along with everyone's response and group summary were sent to all the participants using the same scale. The participants were given 2 weeks to respond. Reminders were sent

weekly via email and WhatsApp groups.

In round 3, a close-ended questionnaire, based merged and rephrased items on which consensus or stability was not achieved in the first two rounds, was sent via Google form to the same panellists accompanied by a summary of group responses plus their own responses from the previous round.

Results

Of the 45 stakeholders approached, 41(91.5%) responded in round 1. Of them, 31(75.6%) responded in round 2, while round 3 comprised responses from 30(96.7%) subjects (Table-2).

Consensus was reached on all the 10 PLOs (Table-3). The 10 PLOs were teaching and learning (T&L), curriculum development (CD), programme evaluation (PE), research and scholarship (R&S), assessment planning and design (AP&D), educational leadership (EL), communication skill (CS); SDL, educational psychology (EP) and total quality management (TQM (Table-4). Of the 75 tasks presented to

Table-2: Characteristics of the panellists in the three rounds.

Characteristic of study panellists in three rounds	Frequency n (%) R1 N=41	Frequency n (%) R2 N=31	Frequency n (%) R3 N=30
Designation			
Professor	5(11.9)	4(9.5)	3(7.1)
Associate professor	4(9.5)	2(6.5)	2(4.8)
Assistant professor	17(40.5)	12(28.6)	14(33.3)
Lecturer	12(28.6)	10(23.8)	8(19)
Head of department (HOD)	3(7.1)	3(7.1)	3(7.1)
Qualification			
MBBS or BDS	11(26.2)	10(2.8)	9(21.4)
Fellowship	18(42.9)	13(31)	12(28.6)
Masters or M Phil	8(19)	7(16.7)	6(14.3)
Doctorate	4(9.5)	1(2.4)	3 (7.1)
HPE-related qualification			
PhD	3(7.1)	1(3.2)	3(10)
MHPE	17(40.5)	10(32.3)	8(26.7)
MHPE in progress	16(37.1)	15(48.4)	14(46.7)
CHPE	4(9.5)	4(12.9)	4(13.3)
Diploma	1(2.4)	1(3.2)	1(3.3)
Expertise in portfolios			
Fundamental awareness	8(19.5)	7(22.6)	7(23.3)
Novice with limited experience	13(31.7)	12(38.7)	9(30.0)
Intermediate with practical application	11(26.8)	7(22.6)	8(26.7)
Advanced with applied theory	6(14.6)	5(16.1)	5(16.7)
Expert a recognized authority	3(7.3)	0	1(3.3)
Experience as medical educationist	4.9 ± 6.1	3.5 ± 3.9	4.7 ± 5.0

MBBS: Bachelor of Medicine & Bachelor of Surgery, HPE: Health professional education, MHPE: Masters in health professional education, CHPE: Certificate in health professional education.

Table-3: Agreement on Programme Learning Outcomes (PLOs).

PLO	Round 1 agreement N=41 (%)	Round 2 agreement N=31 (%)	McNemar P-value	Decision after round 2	Round 3
PLO Teaching & learning-001 (T&L)	100%	100%	Cannot be		
PLO Curriculum development-002 (CD)	100%	100%	computed because	All PLOs should	
PLOs Programme evaluation 003 (PE)	100%	100%	2 data sets are	be included in	
PLOs Research & scholarship 004 (R&S)	100%	100%	the same	e-portfolio for	
PLOs Assessment Planning & Design 005 (AP&D)	95.1%	97%	1	MHPE students	Not sent for round 3
PLOs Educational leadership 006 (EduLdrshp)	97.6%	97%	1	as agreement	
PLOs Communication skills 007 (CS)	97.6%	97%	1	percent for all of	
PLOs Self-directed & self-regulated learner 008 (SDL)	92.7%	94%	0.289	these is >80%	
PLOs Educational Psychology 009 (EduPsych)	92.7%	90%	1	with stability	
PLOs Total quality management 010 (TQM)	82.9%	81%	1		

Table-4: Frequency of tasks sent, Included and Excluded in each PLO.

PLO	Number of Tasks Sent in each domain			Proportion of tasks for which consensus of inclusion was achieved (n)		
	R1	R2	R3	R1	R2	R3
PLO-001 T&L*1	11	11	11	100% (11)	100% (11)	100% (11)
PLO-002 CD*2	8	8	8	100% (8)	87.5% (7)	87.5% (7)
PLO-003 PE*3	6	6	5	100% (6)	83.3%(5)	100% (5)
PLO-004 R&S*4	9	9	9	100% (9)	100% (9)	88.8% (8)
PLO-005 AP&D*5	12	12	12	100%(12)	100%(12)	91.6% (11)
PLO-006 EduLdrshp*6	6	6	5	100% (6)	83.3%(5)	60% (3)
PLO-007 CS*7	5	5	1	100% (5)	100% (5)	100% (1)
PLO-008 SDL*8	5	5	4	100% (5)	80% (4)	100% (4)
PLO-009 EduPsych*9	4	4	3	75% (3)	75% (3)	100% (3)
PLO-010 TQM*10	9	9	8	100% (9)	88.8% (8)	75% (6)
Total	75	75	66	74	69	59

T&L: *1 Teaching & Learning, CD: *2 Curriculum development; PE: *3 Programme evaluation; R&S: *4 Research and Scholarship; AP&D: *5 Assessment planning & design; EduLdrshp: *6 Educational leadership; CS: *7 Communication skill; SDL: *8 Self-directed learner; EduPsych: *9 Educational psychology; TQM: *10 Total quality management.
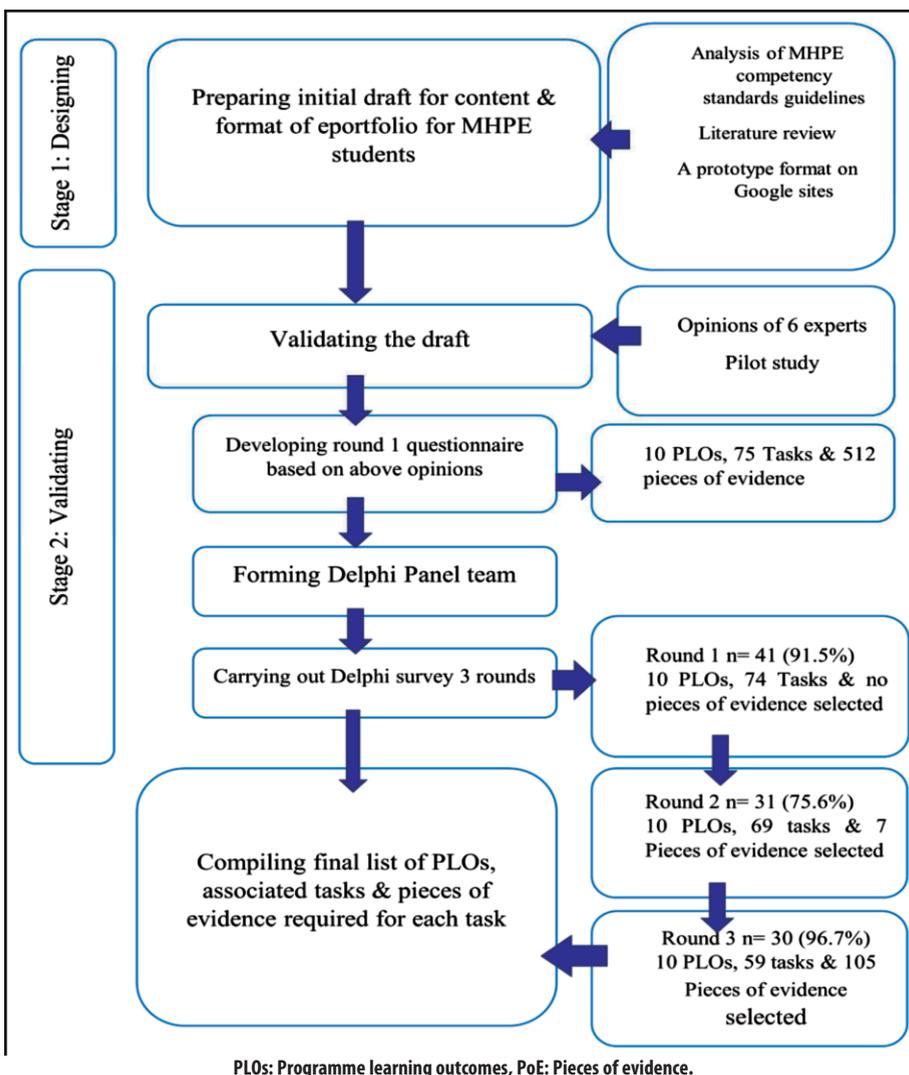

PLOs: Programme learning outcomes, PoE: Pieces of evidence.

Figure-1: Delphi survey flowchart.

the panel, 59(78.7%) were approved, and, of the 507 PoEs presented, 105(21%) were approved with consensus. The most selected PoE was evidence from workplace (EfW) plus group project 41(39%), followed by assignment with score (AwS) 28(26.7%). The final list contained 3 types of PoEs for the selected 10 (100%) PLOs and 59(78.6%) tasks: PoEs that met stable agreement for inclusion 58(11%); PoEs that met stable agreement for exclusion 401(79%); and PoEs that did not meet stability criteria, but a majority agreed to include these in the final e-portfolio 47(9%). The consensus was built in 3 rounds gradually (Figure-2).

A majority 28(70%), 22(73%) and 27(87%) in all 3 rounds opined that e-portfolio should be mandatory for students. The panellists agreed that the assessment should be both formative and summative 27(87%) and qualitative and quantitative 27(87%). The most agreed upon implementation format was to give the task to students immediately after admission and the completed e-portfolio should be submitted before the last contact session 20(64.5%). Few panellists 18(58%) agreed to add the scores of each assignment, ongoing assessments,

Table-5: Lists of PLOs and tasks according to final pieces of evidence chosen.

	Tasks	Pieces of Evidence
PLO Teaching & learning	• Gagne's 9 events	EfW (Feedback, Video, Class performance)
	• Metacognitive strategies	EfW (Feedback, Class performance) Reflection,
		Reflection, EfW (Feedback from students)
	• Small group teaching	
	• Large group teaching	EfW (Feedback, Video, Class performance)
	• Microteaching skill	Video, Feedback from students, teachers & peers
	• Teaching in the clinical environment	EfW (Feedback, Video)
	• E-learning	Reflection
	• Reflective teacher	Reflection, EfW (Feedback)
	• Learning cycle & learning theories	AwS, Reflection
	• Constructive Feedback	EfW (Feedback from teachers, students & peers)
	• Twelve roles of a teacher	EfW (Feedback from teachers, students & peers)
PLO Curriculum development	• Planning a curriculum	AwS, Group project
	• TOS/ Blueprint	AwS
	• Curriculum mapping	AwS
	• Curricular philosophies & components	AwS
	• Writing aims, goals, outcomes and LOs	AwS, EfW
	• Bloom's & Dave's Taxonomy	AwS
	• Integrating a curriculum	AwS, Group project
PLOs Assessment of students	• Planning the assessment	AwS
	• Basic principles & psychometric qualities of Assessment	AwS
	• Standard-setting	AwS, Group project
	• Designing TOS	AwS, EfW (Group project)
	• Designing MCQs, EMQs, Case cluster MCQs	AwS, Class performance, Group Project
	• Designing OSCE	AwS, EfW (Group Project)
	• WPBA	EfW
	• Item analysis	Class performance +/or Group project
	• Using Formative assessment	AwS, EfW
PLOs Program evaluation	• Design evaluation plan for an educational programme	AwS, Group project
	• Write Programme evaluation report	AwS, Group project
	• Critique Evaluation approaches & models	Group project
	• Evaluate sources, tools & techniques of evaluation	AwS
	• Design tools to evaluate a programme	AwS, Group project
	• Conduct programme evaluation	Group project
PLOs Educational leadership	• Leadership skill	EfW, Reflection
	• Leadership styles and theories	AwS
	• Analyze & solve education management problems	EfW, Reflection

	Tasks	Tasks	Pieces of Evidence
PLOs Educational Psychology	• Theories of psychosocial and cognitive development	Applying knowledge to enhance cognitive development of students	Reflection, EfW
	• Theories of cognitive psychology and knowledge construction	Guide students in developing their learning strategies	EfW (Feedback from students)
	• Learning & motivation	Motivate students for learning	Feedback from students, Reflection
	• Improved quality of T&L	Improved quality of T&L	EfW (Class performance)

	Tasks	Pieces of Evidence
PLOs Research & scholarship	• Select appropriate Research designs and methodologies	AwS, EfW (Group project)
	• Formulating a research question aligned with problem	EfW (Group project)
	• Identify conceptual framework informing a research question	EfW (Group project)
	• Write a research proposal	AwS
	• Critical appraisal of the literature/ Literature review	AwS, EfW (Group project)
	• Literature search strategies	AwS, EfW (Group project)

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	Tasks	Pieces of Evidence
PLOs Communication skills	• Scientific writing/Article publication	EfW (Group project)
	• Principles & key elements of scholarship	AwS
	• Initiate and implement an educational scholarship project	EfW (Group project)
	• Micro-teaching	Feedback from teachers
	• Participation in Class presentations	Feedback from peers of MHPE session
	• Participation in Role plays	Feedback from teachers, peers
	• Conducting workshops	Feedback from teachers, peers
	• Providing Feedbacks	Feedback from students, peers, Video
PLOs Self-directed & self-regulated learner	• Personal development plans (PDP) with SMART goals	Reflection, AwS
	• Achievement of PDP	Reflection, EfW
	• Reflections on past employment and voluntary experience	Reflection
	• Regularity & responsible behaviour of learning	Feedback from teachers & peers, Reflection
	• Awards and Honours	EfW
PLOs Total quality management	• Models & approaches for QM in higher education	AwS
	• Quality assurance in HPE	EfW
	• WFME standards	AwS
	• SWOT analysis	AwS
	• Internal audit	EfW
	• Role of external peer reviewer	EfW

PLO: Programme learning outcomes, PoE: Pieces of evidence, AwS: Assignment with score, EfW: Evidence from workplace.

and marks sheets for each semester in the e-portfolio. Consensus was achieved 27(87%) that formal student-teacher meetings with duly signed proformas should be a part of e-portfolio implementation. Regarding the application/software choice for making an e-portfolio, the Google site was the most favourite choice in the first 2 rounds 26(70%) & 21(70%), but it did not reach the
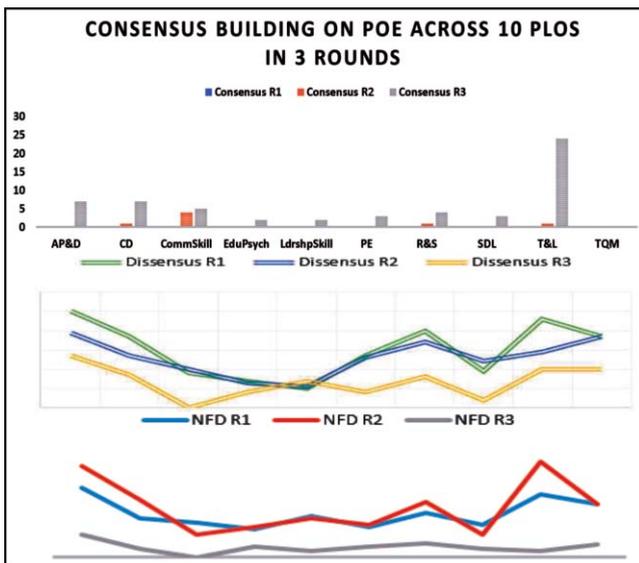

AP&D: Assessment Planning & Design; CD: Curriculum development; CommSkill: Communication skill; EduPsych: Educational psychology; LdrshpSkill: Educational leadership; PE: Programme evaluation; R&S: Research and scholarship; SDL: Self-directed learner; T&L: Teaching & Learning; TQM: Total quality management.

Figure-2: Increasing consensus and decreasing dissensus on PoE over 3 rounds.

consensus cut-off. In the third round, students' own choice 27(87%) reached the consensus value.

Discussion

As more and more health professionals are getting enrolled in MHPE programmes, the concerns about the assessment of their competency are also raised. The e-portfolios structured around the learning outcomes are used worldwide to improve the learning and assessment of many skills, like critical thinking, application of knowledge, and reflective thinking.[16,17] For MHPE students, e-portfolio was arranged in the spinal column model[18] to increase the reliability of assessment, to maintain uniformity of content and its alignment with the course outcomes, and to help the mentor and the student in staying focussed.[19]

For the 10 main PLOs, 59 tasks and 105 PoEs were approved which makes it flexible for MHPE students to choose any PoE they feel comfortable with, in consensus with their mentors, providing space at the same time for all the students to further their competencies and to display their strengths in line with their background knowledge and experience at the workplace i.e., individualised learning experienced comparing their learning with themselves, and not others.[20-22]

The e-portfolios have also faced criticism as some view it as burdensome and an add-on requirement[23] rather than as a crucial learning strategy. To keep the student motivated, the PoE chosen were very feasible to collect (AwS) which is the "work done"[24] most routinely during

the MHPE programme, and EfW, which is the teaching assignments they are doing routinely at their workplace. Some experts chose both to provide triangulation of evidences from all sources.[25,26]

Through reflection on these assignments, students can easily judge how far they have come in terms of achieving their learning outcomes. But reflective writing could not attain stability for most of the tasks in the current study. This was a bit surprising as many of the panellists were doing reflective writing as an essential course element. This non-selection of reflection shows that many MHPE students did not understand its real potential as a learning tool,[8] or the reflective writing and critical thinking skills are challenging, especially for the busy clinicians-cum-academicians.[23,27] It may also be due to a lack of confidence in how this information will be used or displayed. This is an important finding which points towards not only the need for training of faculty and students in this area, but also the introduction of a strong mentoring and feedback system.[28]

Assessment at a certain level requires longitudinal observation, but it might be possible for some MHPE students to produce evidence from the workplace for some tasks, like applying meta-cognitive strategies, Gagne's 9 events and microteaching principles, in their routine teaching activities. In coherence with the above, feedback from students or peers may work as PoV for 12 such tasks. Some students might have the responsibilities of curricular and assessment alignment, standard setting and item analysis, curricular integration, and planning and designing various levels of assessment at their workplace in groups, so group projects were chosen as PoV for such tasks. It was suggested to carefully individualise the PoE according to the students' contexts. As the learning curves are different for novice, experienced and expert learners, determining the level and quality of pieces of evidence needs more deliberation and maybe another consensus study to avoid a potential pitfall of portfolio implementation by making it too complex.[24]

Formal mentor-mentee meetings were rightly emphasised upon by all the experts without which they thought the students might not be able to identify their learning needs and make correct personal development plan (PDP). Thus, healthy relationships, fruitful conversations and prolific mentor-mentee interactions are necessary to take full advantage of e-portfolios where in-depth feedback from teachers can help students grow, improve and mature as learners and, thus, as teachers in the future.[28,29]

Regarding the platform to be used for the MHPE e-portfolio, majority of the panel chose MS Word or Google Docs and Google sites because these apps are easily available, user-friendly and are equipped with functions of attaching the required documents, videos, audios or images. These platforms are being used for various other disciplines successfully and were preferred by students even if other platforms were provided.[30,31]

The current study may serve as a steppingstone towards a qualitative inquiry via focussed group discussions (FGDs) or cognitive interviews from selected experts to further explore the tasks and PoE which gained the agreement of the majority (>50%) of the group, but failed to reach the cut-off value of >80%, and finalize the quality and quantity of each PoE keeping in mind the diversity of students' background. The current study may also be followed up by experimental research project where this prototype e-portfolio might be implemented and checked for the feasibility of implementation.

The current study is the first Delphi undertaking to identify each item of e-portfolio to be included or excluded from the final product being validated from expert medical educationists.

Conclusion

The expert panel reached consensus over 10 PLOs, 59 tasks and 105 PoEs for an MHPE e-portfolio. The experts emphasised asking the evidence in accordance with the context of the learner, assessing the e-portfolio both formatively and qualitatively as well as summatively and quantitatively, and conducting formal meetings of the mentor and the mentee.

Disclaimer: The text is based on a thesis related to the master's in health professional education programme (MHPE).

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