Supplemental Digital Appendix 1

Physician Attitudes, Experiences, and Expectations about Educational Technologies for Continuous Professional Development, in Original 7-Point Scale, From a National Survey of U.S. Physicians, 2015–2016

eTable 1.1. Prior experiences using online learning and simulation-based education

Item	Total N	Mean (SD), median[a]	N.E.[b]	1 Strongly disagree % (No.)	2 Disagree % (No.)	3 Slightly disagree % (No.)	4 Neutral % (No.)	5 Slightly agree % (No.)	6 Agree % (No.)	7 Strongly agree % (No.)
I have found online learning to be effective for my professional development	442	5.2 (1.5), 6	13	9	28	23	40	95	155	79
I have found online learning to be effective for my personal life (i.e., outside of medicine)	442	5.2 (1.5), 6	35	8	21	22	63	72	151	70
I have found simulation-based education to be effective for my professional development	442	4.5 (1.7), 5	70	23	37	27	84	73	91	37

The instructions asked participants to "Consider your use of online learning and simulation over the past 5 years, and indicate your agreement with the following statements."
[a] Mean (SD) and median for ratings 1-7 (after excluding those with no experience)
[b] N.E. = no experience with this modality and application

eTable 1.2. Physician attitudes about educational technologies in general

Item	Total N	Mean (SD), median	1 Strongly disagree % (No.)	2 Disagree % (No.)	3 Slightly disagree % (No.)	4 Neutral % (No.)	5 Slightly agree % (No.)	6 Agree % (No.)	7 Strongly agree % (No.)
Primary survey items[a]									
I would like to use more online learning in my own professional development	937	4.6 (1.5), 5	32	91	68	228	188	255	75
I would like to use more simulation-based training in my own professional development	935	4.2 (1.7), 4	66	125	86	226	181	197	54
I can quickly find answers to patient-specific questions using resources available in my workplace	934	5.9 (1.1), 6	6	15	22	37	119	454	281
Relevant information on my patient outcomes would help me make better choices in professional development	936	4.8 (1.5), 5	33	68	50	180	222	291	92
My practice provides adequate point-of-care knowledge resources at no direct cost to me	934	4.3 (1.9), 5	75	150	92	139	143	230	105
Secondary survey items[a]									
Online learning generally is highly effective	443	5.2 (1.4), 6	4	23	30	63	98	171	54
Online learning will play a vital role in professional development in the near future	443	5.7 (1.1), 6	2	7	8	45	78	200	103
Simulation-based education generally is highly effective	442	5.0 (1.4), 5	7	23	28	89	92	150	53
Simulation-based education will play a vital role in professional development in the near future	441	5.1 (1.4), 5	8	18	16	98	90	154	57

Online learning opportunities are currently integrated into my professional practice	437	4.5 (1.7), 5	18	65	40	64	94	108	48
I could easily find online learning activities if I wanted to	442	5.4 (1.3), 6	2	19	23	49	94	161	94
I have ready access to the technology and support needed to participate in online learning when I need it	441	5.5 (1.4), 6	4	20	25	32	76	188	96
My personal technical skills are adequate to engage in online learning	439	5.8 (1.2), 6	2	9	19	24	57	196	132
Point of care online learning is vital to effective patient care	423	5.3 (1.3), 6	6	13	12	76	90	143	83
I currently use objective performance data to help me determine where I need to improve	423	3.8 (1.7), 4	44	72	66	76	84	67	14

[a] The questionnaire was split into two sections, and about 55% of the respondents completed only the first section (primary items).

eTable 1.3. Anticipated use of various educational technology innovations

Item	Total N	Mean (SD), median	1 Strongly disagree % (No.)	2 Disagree % (No.)	3 Slightly disagree % (No.)	4 Neutral % (No.)	5 Slightly agree % (No.)	6 Agree % (No.)	7 Strongly agree % (No.)
I would regularly use an email "clinical question of the week" with immediate feedback	442	4.8 (1.7), 5	25	43	36	50	96	133	59
I would regularly use a mobile app with case-based questions and feedback	441	4.5 (1.8), 5	30	50	44	70	94	98	55
I would regularly use a series of 5-minute "quick clinical updates" on hot topics in my specialty	442	5.5 (1.4), 6	13	14	10	31	96	195	83
I would regularly use a series of 20-minute "hot topics" micro-seminars on key changes in my specialty	440	5.0 (1.6), 5	16	30	27	64	101	141	61
I would regularly use an app that monitored my clinical practice performance and identified topics for my further study	440	4.1 (1.8), 4	47	65	46	78	81	87	36
I would regularly use an app that gave me MOC or CME credit for finding answers to patient-focused clinical questions	443	5.2 (1.7), 6	19	33	20	44	85	140	102
I would regularly use an educational game for my smartphone that teaches new approaches for common problems in my specialty	443	4.4 (1.8), 5	44	52	34	76	99	86	52
I would regularly use a series of simulated virtual patients representing a mix of common and rare diseases relevant to my practice	443	4.6 (1.7), 5	33	30	34	71	124	106	45

I would regularly use an on-site simulation-based activity using a lifelike manikin for collaborative team training	443	3.7 (1.8), 4	58	80	57	88	73	59	28
I would regularly use simulation-based training using virtual reality for an important procedure that I perform infrequently	440	4.2 (1.8), 4	49	59	34	95	79	82	42
It would be helpful to have a central Web site that lists CME opportunities along with participant reviews	421	5.7 (1.2), 6	5	5	7	55	79	161	109
It would be helpful to have a central repository that automatically tracks my CME completion data	421	5.7 (1.3), 6	3	15	9	53	56	167	118

Supplemental Digital Appendix 2

Subgroup Analyses for Selected Key Demographics, From a National Survey of U.S. Physicians, 2015–2016

We conducted planned subgroup analyses for three key demographic subgroups:
- Age: classified as <45, 45–59, and ≥60 years old (results reported in main text)
- Practice Type: classified as self-employed, group practice (medical group, hospital, or government), and academic practice
- Specialty: classified as generalist (non-subspecialist family medicine, internal medicine, and pediatric physicians), surgeon, and non-surgical specialist.

eTable 2.1. Prior experiences using online learning and simulation-based education, by subgroups

	Mean rating by Practice Type				Mean rating by Specialty			
	Self	Group	Academic	P	Generalist	Surgeon	Non-surgical Specialist	P
I have found online learning to be effective for my professional development	5.3	5.3	4.8	.06	5.3	5.1	5.3	.46
I have found online learning to be effective for my personal life (i.e., outside of medicine)	5.2	5.3	4.8	.07	5.2	5.1	5.3	.55
I have found simulation-based education to be effective for my professional development	4.5	4.6	4.3	.43	4.5	4.6	4.5	.98

eTable 2.2. Physician attitudes about educational technologies in general, by subgroups

	Mean rating by Practice Type				Mean rating by Specialty			
	Self	**Group**	**Academic**	**P**	**Generalist**	**Surgeon**	**Non-surgical Specialist**	**P**
Primary survey items								
I would like to use more online learning in my own professional development	4.4	4.7	4.5	.012	4.7	4.5	4.6	.47
I would like to use more simulation-based training in my own professional development	4.3	4.2	4.1	.63	4.3	4.4	4.0	.02
I can quickly find answers to patient-specific questions using resources available in my workplace	6.0	5.9	6.0	.47	5.9	5.9	6.0	.43
Relevant information on my patient outcomes would help me make better choices in professional development	4.5	5.0	4.8	.002	4.9	5.0	4.7	.09
My practice provides adequate point-of-care knowledge resources at no direct cost to me	3.5	4.5	4.9	<.001	4.7	4.1	4.2	<.001
Secondary survey items								
Online learning generally is highly effective	5.2	5.3	4.7	.013	5.1	5.2	5.2	.91
Online learning will play a vital role in professional development in the near future	5.6	5.8	5.5	.09	5.7	5.7	5.8	.77
Simulation-based education generally is highly effective	5.0	5.1	4.9	.55	5.0	4.9	5.1	.60
Simulation-based education will play a vital role in professional development in the near future	5.1	5.2	4.9	.52	5.2	5.0	5.1	.67
Online learning opportunities are currently integrated into my professional practice	4.6	4.6	4.1	.08	4.7	4.5	4.4	.30
I could easily find online learning activities if I wanted to	5.4	5.5	5.2	.48	5.5	5.2	5.5	.20
I have ready access to the technology and support needed to participate in online learning when I need it	5.7	5.4	5.5	.16	5.6	5.4	5.5	.62
My personal technical skills are adequate to engage in online learning	5.8	5.8	5.8	.98	5.7	5.8	6.0	.13
Point of care online learning is vital to effective patient care	5.2	5.4	5.2	.19	5.6	4.9	5.4	.0005

I currently use objective performance data to help me determine where I need to improve	3.6	3.8	3.8	.58	4.0	3.8	3.6	.17

Response options ranged from 1=strongly disagree to 7=strongly agree.

eTable 2.3. Anticipated use of various educational technology innovations, by subgroups

	Mean rating by Practice Type			Mean rating by Specialty		
	Self	Group	Academic	Generalist	Surgeon	Non-surgical Specialist
I would regularly use an email "clinical question of the week" with immediate feedback	4.7	4.9	4.3	4.8	4.6	4.8
I would regularly use a mobile app with case-based questions and feedback	4.5	4.6	4.1	4.3	4.5	4.6
I would regularly use a series of 5-minute "quick clinical updates" on hot topics in my specialty	5.4	5.7	5.0	5.5	5.3	5.6
I would regularly use a series of 20-minute "hot topics" micro-seminars on key changes in my specialty	5.0	5.1	4.4	4.9	4.8	5.1
I would regularly use an app that monitored my clinical practice performance and identified topics for my further study	4.0	4.2	4.0	4.1	4.2	4.0
I would regularly use an app that gave me MOC or CME credit for finding answers to patient-focused clinical questions	4.9	5.4	5.0	5.1	5.1	5.3
I would regularly use an educational game for my smartphone that teaches new approaches for common problems in my specialty	4.3	4.4	4.3	4.4	4.1	4.5
I would regularly use a series of simulated virtual patients representing a mix of common and rare diseases relevant to my practice	4.6	4.7	4.4	4.7	4.3	4.7
I would regularly use an on-site simulation-based activity using a lifelike manikin for collaborative team training	3.5	3.9	3.6	4.1	3.6	3.5
I would regularly use simulation-based training using virtual reality for an important procedure that I perform infrequently	4.1	4.3	3.9	4.3	4.4	3.9
It would be helpful to have a central Web site that lists CME opportunities along with participant reviews	5.8	5.7	5.3	5.7	5.5	5.7
It would be helpful to have a central repository that automatically tracks my CME completion data	5.3	5.8	5.6	5.8	5.5	5.6