

Emergency Medicine and Critical Care Blogs and Podcasts: Establishing an International Consensus on Quality

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Study objective: This study identified the most important quality indicators for online educational resources such as blogs and podcasts.

Methods: A modified Delphi process that included 2 iterative surveys was used to build expert consensus on a previously defined list of 151 quality indicators divided into 3 themes: credibility, content, and design. Aggregate social media indicators were used to identify an expert population of editors from a defined list of emergency medicine and critical care blogs and podcasts. Survey 1 consisted of the quality indicators and a 7-point Likert scale. The mean score for each quality indicator was included in survey 2, which asked participants whether to “include” or “not include” each quality indicator. The cut point for consensus was defined at greater than 70% “include.”

Results: Eighty-three percent (20/24) of bloggers and 90.9% (20/22) of podcasters completed survey 1 and 90% (18/20) of bloggers and podcasters completed survey 2. The 70% inclusion criteria were met by 44 and 80 quality indicators for bloggers and podcasters, respectively. Post hoc, a 90% cutoff was used to identify a list of 14 and 26 quality indicators for bloggers and podcasters, respectively.

Conclusion: The relative importance of quality indicators for emergency medicine blogs and podcasts was determined. This will be helpful for resource producers trying to improve their blogs or podcasts and for learners, educators, and academic leaders assessing their quality. These results will inform broader validation studies and attempts to develop user-friendly assessment instruments for these resources. [Ann Emerg Med. 2015;■:1-7.]

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INTRODUCTION

During the past two decades, there has been a substantial increase in the number of digital medical education resources, particularly in emergency medicine and critical care.¹ The proliferation of resources such as blogs and podcasts, driven in part by the popularity of the free open-access medical education movement,² has paralleled their increasing use by emergency medicine residents.^{3,4} Recent surveys from Canada³ and the United States⁴ have found high rates of use of resources including blogs, podcasts, video podcasts, and wikis.

Despite their widespread use, these resources have been met with caution by the academic community because of uncertainty about their influence and quality.⁵⁻¹² Despite their parallels to traditional resources such as textbooks and lectures,¹³ few tools have been developed to assess blogs and podcasts for use in medical education. The Social Media Index is a tool that aggregates social media and

Web-analytic metrics to rank Web sites by their relative impact.¹⁴ When applied to journals, both the Social Media Index and its components were found to correlate with traditional impact metrics.¹⁴

That said, impact is not equivalent to quality. Having a method to assess the quality of novel educational resources such as blogs and podcasts could make it easier for learners to assess their quality, educators to recommend appropriate resources to their learners, resource producers to improve the quality of their products, and academic leaders to assess the contributions of resource producers. In a previous study, we conducted a literature search, qualitative analysis, and series of focus groups to develop a list of quality indicators that are applicable to online educational resources such as blogs and podcasts.¹⁵ The qualitative analysis subcategorized an extensive list of quality indicators into three major themes (credibility, content, and design) and 151 items.¹⁵

Editor's Capsule Summary*What is already known on this topic*

Podcasts and blogs are an increasingly popular way for emergency physicians to keep up with changes in their field.

What question this study addressed

Which items, from a list of 151 possibilities, do experts in emergency medicine social media believe are the best indicators of quality?

What this study adds to our knowledge

The experts used a modified Delphi method to select 31 items they deemed particularly important. They did so with a high degree of agreement despite the exercise being conducted without an explicit definition of "quality."

How this is relevant to clinical practice

This will not change practice but provides the basis for further research into how physicians may identify the most reliable social media sources.

The primary focus of this study was to determine the relative importance of each quality indicator for blogs and podcasts, using an iterative, consensus-building, modified Delphi process among an expert group of emergency medicine and critical care bloggers and podcasters.

MATERIALS AND METHODS

This study received ethics approval from the Hamilton Integrated Research Ethics Board in Hamilton, ON, Canada.

Selection of Participants

The success of the Delphi process hinges on the identification of a knowledgeable or expert group of respondents.¹⁶ Although Delphis frequently use methodologies such as the snowball technique to identify experts,¹⁶⁻¹⁸ this is appropriate only when the expert group is ill defined and not easily quantified. In this study, we elected to use the Social Media Index, which was recently shown to correlate with traditional impact metrics,¹⁴ to select the top 20 blogs and top 20 podcasts from the Web sites considered for inclusion. A list of 245 potential Web sites was obtained with a previously published methodology¹ that included a prospective snowball sampling technique to identify all possible emergency medicine and critical care blogs and podcasts during a

decade (2002 to 2013) and a Boolean search of Google's search engine in November 2013, using the terms: ("emergency medicine" OR "critical care" OR "intensive care") AND (podcast OR blog). Web sites were considered if they were freely accessible (ie, access was not limited by pay wall) blogs or podcasts related to emergency medicine and critical care, were written in English, and had posted new content within the previous six months.

The lead editors of the 40 selected Web sites (20 blogs and 20 podcasts), as ranked by the Social Media Index on January 18, 2014, were invited to participate in this consensus study. This number was selected because previous literature in relation to Delphi proceedings has suggested that sample sizes of 15 to 20 are adequate for building consensus.¹⁹ When Web sites were judged by the authors to have two prominent editors, both were invited to participate. Members of the investigatory team who were active in both the emergency medicine and online medical education communities (B.T., T.M.C., W.K.M., M.L.) reviewed the final list of Web sites to assess its content validity and ensure that no editors were inappropriately included or excluded.

The Delphi methodology, which has been used in several contexts,^{17,18,20,21} uses a series of iterative surveys to build consensus among expert groups.¹⁶ We used a modified Delphi methodology, which incorporated two Web-based surveys in an effort to garner international participation. Both surveys were distributed with the Web-based Google Forms tool hosted on the McMaster University Medportal system. The surveys were pilot tested for clarity and face validity by a subgroup of the authors before distribution. Invitations for both surveys were sent by one of the authors (B.T.) by e-mail. Three reminders were sent by one of three authors (B.T., T.M.C., or M.L.) during the subsequent two weeks.

Survey 1 consisted of the assessment of 151 quality indicators previously identified with a qualitative analysis of the educational literature and four focus groups.¹⁵ For each item, we asked participants to respond to the following statement: "Please indicate the strength of your agreement with the inclusion of each proposed quality indicator for emergency medicine and critical care (blogs OR podcasts) on the following Likert scale." A 7-point Likert scale with 1="strongly disagree" and 7="strongly agree" was used. Demographic information that was thought to demonstrate expertise with each modality (number of years blogging or podcasting, number of blog page views/year, and number of podcast downloads/year) was also collected in survey 1. No items were removed from consideration after survey 1.

In addition to the 151 items, survey 2 included the mean Likert responses (with SDs) from the first survey.

Table 1. Characteristics of the expert emergency medicine and critical care blogs and podcasts of the participants.

Survey 1 Participants, No. (%)	Survey 2 Participants, No. (%)	Page Views (Bloggers) or Downloads (Podcasters) in Last 12 Months				Years Blogging/Podcasting		
		<50,000	50,000–99,999	100,000–500,000	>500,000	0–2	3–5	>5
Bloggers								
83.3 (20/24)	90.0 (18/20)	2	2	10	6	5	8	7
Podcasters								
90.9 (20/22)	90.0 (18/20)	6	5	8	1	8	12	0

The participants were asked “to decide whether you would like to endorse each item for the final list of quality indicators for (blogs OR podcasts)” by selecting “include” or “don’t include” for each item. Only the bloggers and podcasters who completed the first survey were invited to complete survey 2.

The overall agreement among and between bloggers and podcasters was assessed by calculating Cronbach’s α for bloggers, podcasters, and both groups. This provided a measure of the overall level of agreement within each of the quality indicator themes (credibility, content, and design).

We determined a priori that the cut point for inclusion in the final list of quality indicators would be the endorsement of more than 70% of expert respondents in the second survey. After data collection, it was determined that the reporting of higher cutoffs (>90%) should be considered to create a more user-friendly list of the most important quality indicators for readers of the article. The greater than 70% cut point was preserved for analysis, and all data meeting this criterion are included in [Appendix E1](#), available online at <http://www.annemergmed.com>.

RESULTS

A total of 22 podcasters and 24 bloggers (2 podcasts and 4 blogs had more than 1 editor) were invited to complete the surveys ([Table 1](#)); 83.3% (20/24) of bloggers and 90.9% (20/22) of podcasters completed survey 1, whereas 90% of the invited bloggers (18/20) and podcasters (18/20) completed survey 2. The Web sites of the bloggers and podcasters who were invited to participate according to the rankings of the Social Media Index are outlined in the [Figure](#). The majority of participants had greater than 3 years of experience and greater than 100,000 page views per year (bloggers) or downloads per year (podcasters).

There was a high amount of agreement among bloggers and podcasters within each theme and among themselves ($\alpha > .90$). The Cronbach’s α for each group and theme is outlined in [Table 2](#).

[Appendix E1](#) (available online at <http://www.annemergmed.com>) lists the 44 quality indicators for blogs and 80 quality

indicators for podcasts that met the a priori 70% inclusion criteria, along with their results from surveys 1 and 2. In general, bloggers formed consensus on fewer quality indicators in each theme (credibility 35.8%, content 31.8%, and design 20.4%) and endorsed substantially fewer indicators classified under design. Podcasters consistently endorsed approximately half of the indicators classified under each theme (credibility 52.8%, content 54.5%, and design 53.7%). The podcasters endorsed 41 quality indicators that the bloggers did not, whereas the bloggers endorsed 5 quality indicators that the podcasters did not. The 14 and 26 quality indicators that were selected for inclusion by greater than 90% of bloggers and podcasters, respectively, are presented in [Table 3](#).

LIMITATIONS

Rather than using a snowball technique to identify experts, as is often done in Delphi surveys,^{16–18} we used the Social Media Index. Although this was beneficial because it provided a reproducible method of identifying the highest-impact bloggers and podcasters, it may be viewed as a limitation because it has not previously been used for this purpose.¹⁴ However, as outlined in [Table 1](#), the Social Media Index effectively identified groups of bloggers and podcasters with substantial, real-world expertise (as measured by longevity, page views, and podcast downloads) and content validity (as assessed by B.T., T.M.C., W.K.M., and M.L., all of whom are familiar with online emergency medicine and critical care education resources).

The sampling process resulted in a population that, although likely to be very knowledgeable about the topic, may have been affected by subject bias.¹⁶ We intentionally elected to survey expert bloggers and podcasters despite this potential bias because the Delphi process relies on participants with technical expertise that readers and listeners may not be aware of. To balance this bias, we recently conducted a modified Delphi study of a group of medical education experts at the 2014 International Conference on Residency Education and will incorporate both sets of data into the subsequent derivation of a quality assessment tool.

Blogs

Academic Life in Emergency Medicine	http://aliem.com/
Blogborygmi	http://blogborygmi.blogspot.com/
BoringEM	http://boringem.org/
Crit-IQ	https://www.crit-iq.com/
Dr. Smith's ECG Blog	https://hqmeded-ecg.blogspot.com/
ED Trauma Critical Care	http://www.edtcc.com/
Emergency Medicine Updates	http://emupdates.com/
EMS 12 Lead	http://www.ems12lead.com/
EM Lit of Note	http://www.emlitofnote.com/
EM Lyceum	http://emlyceum.com/
GruntDoc	http://gruntdoc.com/
ImpactEDnurse (now The Nurse Path)	http://thenursepath.com/
Life in the Fast Lane	http://lifeinthefastlane.com/
PulmCCM	http://pulmccm.org/
Resus.ME	http://resus.me/
Resus	http://www.resus.com.au/
SonoSpot	http://sonospot.com/
St Emlyn's Blog	http://stemlynsblog.org/
The Central Line	http://thecentralline.org/
The Poison Review	http://www.thepoisonreview.com/

Podcasts

Broome Docs	http://broomedocs.com/
Emergency ECG of the Week	http://ekgumem.tumblr.com/
Emergency Medicine Cases	http://emergencymedicinescases.com/
Emergency Medicine Ireland	http://emergencymedicineireland.com/
Emergency Ultrasound Podcast	http://www.ultrasoundpodcast.com/
EMCrit	http://emcrit.org/
EM Basic	http://embasic.org/
EMJ Club	http://emjclub.com/
EM PEM	http://empem.org/
Everyday Medicine	http://www.ryanastanton.com/every/
ERCast	http://ercast.org/
Free Emergency Medicine Talks	http://freeemergencytalks.net/
Intensive Care Network	http://intensivecarenetwork.com/
iTeachEM	http://iteachem.net/
PEM ED	http://www.pemed.org/
PHARM: Prehospital and Retrieval Medicine	http://prehospitalmed.com/
SMART EM	http://www.smartem.org/
The Skeptic's Guide to Emergency Medicine	http://thesgem.com/
The EM Res Podcast	http://emrespodcast.org/
Tox Talk	http://toxtalk.org/

Figure. Blogs and podcasts whose editors were invited to participate in the modified Delphi process (listed in alphabetical order).

Finally, a relatively large number of quality indicators were retained. Because greater than 70% of respondents indicated that these items should be included, we believe they are important. However, we also thought that it would be valuable to provide a shorter list of the quality indicators

that were found to be the most essential. A post hoc reassessment of our data determined that cutoff values of greater than 90% for blogs and podcasts created a smaller list of the most important quality indicators (14 for blogs and 26 for podcasts). We believed that these smaller lists

Table 2. Interrater agreement between bloggers and podcasters within survey 2.

Theme	Cronbach's α		Both
	Bloggers	Podcasters	
All	.98	.98	.98
Credibility	.92	.90	.91
Content	.95	.94	.94
Design	.97	.96	.97

will be more user friendly for content consumers until a quality assessment tool can be derived. We did not perform any post hoc manipulation of the data and have preserved the results with the predetermined greater than 70%

cutoff within [Appendix E1](#) (available online at <http://www.annemergmed.com>).

DISCUSSION

Because blogs and podcasts are proliferating¹ and increasingly being used by learners,^{3,4} assessing their quality is an important task. Through the widespread adoption of free open-access medical education, emergency medicine and critical care has become a leader in online medical education,² and to our knowledge this study represents the first collaborative effort by experts in this field to develop consensus around quality. These efforts may be informative to other medical specialties as the use of blogs and podcasts

Table 3. Quality indicators included by greater than 90% of bloggers and podcasters.

Quality Indicator	Bloggers, % "Include"	Podcasters, % "Include"
Included by >90% of bloggers and podcasters		
Is the resource credible?	100	100
Is the editorial process independent from sponsors, conflict of interest, and other sources of bias?	100	100
Does the resource cite its references?	100	100
Is the content of this educational resource of good quality?	100	100
Is the information presented in the resource accurate?	100	100
Is the content of the resource presented in a logical, clear and coherent way?	100	94
Is the resource transparent about who was involved in its creation?	94	100
Is the identity of the resource's author clear?	94	100
Are the authorities (eg, author, editor, publisher) who created the resource free of financial conflicts of interest?	94	94
Included by >90% of bloggers		
Are there comments from other learners/contributors that endorse or refute the information presented in the resource?	94	
Does the resource use correct grammar and spelling?	94	
Is the information presented in the resource of a consistent quality?	94	
Is the topic of the resource well defined and labeled appropriately?	94	
Is the resource stable (ie, does not crash)?	94	
Included by >90% of podcasters		
Are all entities that contributed to the creation of the resource listed?		100
Is the content of the resource professional?		100
Is it clear who created the resource?		100
Is there a way to provide feedback on the resource?		100
Does the resource clearly differentiate between advertisement and content?		100
Do the authorities (eg, author, editor, publisher) who created the resource list their conflicts of interest?		100
Does the resource identify the areas at the limits of what is known within a field and acknowledge limitations?		94
Is the resource composed in a way that makes it easy to understand (not overly convoluted)?		94
Does the resource motivate and interest its intended audience?		94
Is the resource useful and relevant for its intended audience?		94
Does the resource use examples, scenarios, and cases that help learners to understand the content?		94
Are the resource's statements consistent with its references?		94
Is the contact information of the resource's authority (eg, author, editor, publisher) listed?		94
Is the e-mail address of the resource's authority (eg, author, editor, publisher) listed?		94
Does the resource refer learners to additional resources?		94
Is the resource portable (accessible on mobile and nonmobile devices)?		94
Is the functionality of the resource self-evident?		94

for medical education spreads and they develop their own online communities of practice. This study's results should promote further scholarly discussion both within and beyond emergency medicine.

As measured by Cronbach's α (Table 2), the quality indicators were rated similarly by bloggers and podcasters in all of the major themes. Both groups strongly endorsed characteristics valued in traditional resources,¹³ such as clearly identifying the speaker or writer, disclosing conflicts of interest, maintaining independent editorial processes, citing references, and presenting ideas coherently (Table 3). However, there were intriguing peculiarities in both sets of results. For example, bloggers placed less value on identification of discussion participants (eg, those commenting on the blog). This is not surprising, considering the historical importance of anonymity and pseudonymity in blogging.²² In contrast, 89% of podcasters strongly endorsed a very nontraditional quality indicator: the importance of entertainment. This finding may harken to podcast's historical roots in lectures,¹³ in which entertainment is valued.²³

The a priori cutoff of 70% endorsement for inclusion yielded a long list of quality indicators for both blogs (44 items) and podcasts (80 items) (Appendix E1, available online at <http://www.annemergmed.com>). These lists, although unwieldy for end users, are likely to be highly relevant for use as a checklist by content producers. They will also serve as a broad foundation for future research examining the individual components that contribute to quality for online resources. However, with end users such as learners, educators, and academic leaders (eg, promotions committee members) in mind, we reported a higher threshold (>90%) of quality indicators within the article to highlight the most highly valued content (Table 3).

Depending on the needs of the user, these highly endorsed indicators could serve as discussion points for the quality assessment of both individual blog posts or podcasts and entire blog Web sites or podcast series. For instance, an individual reader might take into account the transparency of the writing or editing process for a single blog post, whereas a tenure and promotions officer could examine the overall production process of a faculty member's podcast to assess its scholarly merit. Overall, we hope our findings will spark discourse about the standards and quality assurance of online educational resources.

Although we believe these results will be informative for educators, researchers, content producers, and academic leaders, a more user-friendly way to present the quality indicators will be necessary to make the assessment of blogs and podcasts practical. The aim of this study was to determine which of the quality indicators previously documented in the

literature were the most relevant. Given the track record of other scores²⁴ and processes,²⁵ we believe that a functional assessment instrument should be developed. We plan to use the data from this study and a modified Delphi of expert medical educators to identify vague or redundant quality indicators and create an assessment instrument that focuses on the essential components of quality.

Through use of a modified Delphi process consisting of 2 iterative online surveys of expert emergency medicine and critical care bloggers and podcasters, the relative importance of the quality indicators in a 151-item list was determined. This information may be helpful for resource producers desiring to improve the quality of their Web sites, as well as for learners, educators, and academic leaders struggling to assess the quality of online resources. Future research will combine these results with a similar Delphi of expert medical educators to develop a user-friendly quality assessment tool for blogs and podcasts.

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APPENDIX E1.

Survey results for quality indicators that met the 70% inclusion criteria for blogs or podcasts.

Quality Indicator	Bloggers		Podcasters	
	Survey 1 Mean (SD)	Survey 2 % "Include"	Survey 1 Mean (SD)	Survey 2 % "Include"
Theme 1: "credibility" quality indicators that reached greater than 70% consensus for blogs or podcasts				
Is the resource credible?	6.3 (1.4)	100	6.5 (0.6)	100
Subtheme 1: transparency				
Is the resource transparent about who was involved in its creation?	6.0 (1.5)	94	6.2 (1.2)	100
Is it clear who created the resource?	5.9 (1.5)	89	6.1 (1.1)	100
Is the identity of the resource's author clear?	5.9 (1.6)	94	6.5 (0.8)	100
Is the author well qualified to provide information on the topic?	5.6 (1.4)	67	5.9 (1.0)	78
Are the author's affiliations stated?	5.3 (1.5)	44	5.2 (1.7)	78
Is the identity of the resource's editor clear?	4.7 (1.9)	72	5.6 (1.4)	72
Is the contact information of the resource's authority (eg, author, editor, publisher) listed?	4.9 (2.0)	78	6.1 (1.1)	94
Is the e-mail address of the resource's authority (eg, author, editor, publisher) listed?	4.2 (2.4)	67	5.8 (1.7)	94
Are all entities that contributed to the creation of the resource listed?	5.4 (1.7)	78	6.1 (1.3)	100
Can other learners/contributors/participants be identified?	4.9 (1.9)	44	5.8 (1.1)	89
Subtheme 2: process				
Is the editorial process independent from sponsors, conflict of interest, and other sources of bias?	5.8 (1.4)	100	5.9 (1.3)	100
Are there comments from other learners/contributors that endorse or refute the information presented in the resource?	5.6 (1.5)	94	5.6 (1.0)	83
Is there a way to provide feedback on the resource?	5.5 (1.2)	89	6.2 (1.0)	100
Subtheme 3: use of other resources				
Does the resource cite its references?	6.3 (0.9)	100	6.1 (1.3)	100
Are the resource's statements consistent with its references?	6.2 (0.8)	89	6.0 (1.3)	94
Are the resource's references peer reviewed?	5.4 (1.5)	50	5.2 (1.5)	72
Does the resource refer learners to additional resources?	5.1 (1.5)	50	5.3 (0.9)	94
Are recommended resources of good quality?	5.4 (1.0)	67	5.5 (0.9)	89
Are recommended resources related to the topic?	5.3 (1.4)	61	5.4 (1.0)	78
Does the resource respect copyright and licensing laws?	5.2 (1.5)	78	5.0 (1.8)	67
Subtheme 4: trustworthiness				
Does the resource respect and protect the privacy of its learners?	6.2 (0.9)	89	6.0 (1.5)	89
Is the resource accountable?	5.0 (1.7)	67	5.2 (1.5)	89
Are appropriate disclaimers about the use of the resource stated?	5.3 (1.7)	78	4.9 (2.0)	67
Subtheme 5: bias				
Are the resource's biases stated clearly?	6.1 (1.1)	67	5.1 (1.6)	78
Do the authorities (eg, author, editor, publisher) who created the resource list their conflicts of interest?	5.9 (1.4)	89	5.7 (2.0)	100
Are the authorities (eg, author, editor, publisher) who created the resource free of financial conflicts of interest?	6.1 (1.2)	94	6.2 (1.0)	94
Are the authorities (eg, author, editor, publisher) who created the resource free of non-financial conflicts of interest?	5.7 (1.3)	67	5.5 (1.2)	78

Continued.

Quality Indicator	Bloggers		Podcasters	
	Survey 1 Mean (SD)	Survey 2 % "Include"	Survey 1 Mean (SD)	Survey 2 % "Include"
Does the resource clearly differentiate between advertisement and content?	6.3 (1.2)	89	6.2 (1.2)	100
Does the resource make a clear distinction between fact and opinion?	5.8 (1.4)	78	5.7 (1.1)	89
Theme 2: "content" quality indicators that reached >70% consensus for blogs or podcasts				
Is the content of this educational resource of good quality?	6.4 (1.4)	100	6.6 (0.6)	100
Subtheme 1: professionalism				
Is the content of the resource professional?	5.6 (1.1)	78	6.0 (0.9)	100
Is the conduct of the resource authority (eg, author, publisher, etc) and the learners professional?	5.3 (1.4)	78	5.5 (1.2)	78
Are interactions between learners moderated effectively to ensure professional conduct?	5.1 (1.2)	72	4.5 (1.7)	44
Subtheme 2: engagement				
Does the resource motivate and interest its intended audience?	6.0 (1.0)	89	6.2 (1.3)	94
Does the resource provide an experience that supports learner goals?	5.5 (1.3)	67	5.8 (0.8)	83
Is the resource entertaining?	4.8 (1.9)	28	5.2 (1.6)	89
Is the resource emotionally engaging?	4.6 (1.8)	28	5.3 (1.6)	72
Does the resource encourage higher-order thinking (eg, application, problem solving, analysis)?	5.1 (1.6)	50	5.6 (1.6)	83
Is the resource useful and relevant for its intended audience?	6.0 (1.4)	83	6.2 (1.3)	94
Does the resource use examples, scenarios, and cases that help learners to understand the content?	5.6 (1.5)	67	5.8 (1.5)	94
Does the tone of the resource engage and excite the learner to read/listen?	5.3 (1.4)	56	5.8 (1.4)	83
Does the authority (eg, author, publisher) address comments made by learners about the resource in an open and timely fashion?	5.2 (1.5)	56	5.2 (1.2)	78
Does the resource contain an appropriate amount of information for its length?	5.8 (1.2)	89	5.3 (1.6)	72
Subtheme 3: academic rigor				
Is the information presented in the resource of a consistent quality?	6.1 (1.0)	94	5.7 (1.3)	83
Is the information presented in the resource accurate?	6.6 (0.8)	100	5.5 (0.9)	100
Is the content of the resource presented in a logical, clear, and coherent way?	6.4 (0.7)	100	6.0 (1.4)	94
Is the topic of the resource well defined and labeled appropriately?	6.2 (0.9)	94	5.3 (1.5)	72
Does the resource identify the areas at the limits of what is known within a field and acknowledge limitations?	5.3 (1.1)	72	5.5 (1.4)	94
Does the resource use efficient, accurate language that is appropriate for its target audience?	5.6 (1.0)	56	5.6 (1.5)	89
Does the resource use precise language (ie, nonambiguous) that is exact, to the point, and free of jargon, slang, and confusing terminology?	5.6 (1.0)	67	5.1 (1.7)	72
Does the resource use correct grammar and spelling?	6.0 (1.2)	94	5.4 (1.7)	78
Is the resource composed in a way that makes it easy to understand (ie, not overly convoluted)?	6.1 (1.0)	89	5.8 (1.3)	94
Does the resource add to the field?	5.6 (1.0)	56	5.3 (1.5)	72
Theme 3: "design" quality indicators that reached >70% consensus for blogs or podcasts				
Does the resource's learner interface use multimedia design principles to optimize learning in a convenient and efficient manner?	5.1 (1.6)	56	5.6 (1.4)	89

Continued.

Quality Indicator	Bloggers		Podcasters	
	Survey 1 Mean (SD)	Survey 2 % "Include"	Survey 1 Mean (SD)	Survey 2 % "Include"
Subtheme 1: aesthetics				
Is the resource's content attractively designed with a strong visual component that holds the learner's attention?	5.1 (1.4)	56	5.0 (1.7)	78
Are the resource's text and multimedia elements formatted to optimize readability and aesthetic appeal?	5.4 (1.3)	78	5.4 (1.5)	89
Is the resource's text formatted to make the content easy to read?	5.7 (1.0)	78	5.2 (1.6)	67
Are the images high quality? Do they increase the visual appeal of the content?	5.5 (1.5)	67	5.4 (1.6)	72
Are the resource's videos and animations high quality? Do they increase the visual appeal of the content?	5.4 (1.5)	67	5.4 (1.5)	89
Is the resource's audio high quality? Does it increase the affective appeal of the content?	5.4 (1.5)	61	5.9 (1.3)	83
Are the pace and speed of speech of the audio appropriate?	5.3 (1.5)	50	5.9 (1.3)	83
Is the resource's information structure (layout) organized logically, consistently, and concisely?	5.5 (1.4)	78	5.4 (1.4)	89
Does the resource's layout avoid unnecessary text and multimedia elements that may divert attention from the core content or message?	5.5 (1.4)	61	5.0 (1.7)	78
Are the aesthetic components of the resource consistent throughout the resource (eg, formatting, font, layout, textual cues, headers, labeling)?	5.0 (1.4)	56	5.0 (1.6)	83
Subtheme 2: interaction				
Does the resource enable learner-to-educator interaction through the use of communication technologies?	4.4 (1.9)	28	4.6 (1.5)	72
Does the resource have a strategy for disseminating content (eg, e-mail list, social media posts, RSS feed, search engine optimization)?	5.2 (1.5)	67	5.2 (1.8)	83
Subtheme 3: functionality				
Does the resource have high technical quality and functionality?	5.1 (1.4)	50	5.8 (1.4)	72
Is the resource stable (ie, does not crash)?	5.8 (1.5)	94	5.8 (1.4)	83
Is the resource optimized to respond and load quickly?	5.7 (1.3)	89	5.5 (1.4)	83
Is the resource always available or does it have significant down time?	5.8 (1.0)	83	5.8 (1.5)	89
When the resource requires downloads, is it possible to select between downloading individual files and entire file sets?	4.4 (1.7)	22	5.0 (1.7)	83
Is the resource accessible in multiple ways?	4.5 (1.5)	39	5.5 (1.5)	83
Is the resource portable (ie, accessible on mobile and nonmobile devices)?	5.1 (1.4)	56	6.2 (1.4)	94
Is the resource compatible with multiple browsers (eg, Chrome, Firefox, Safari) and operating systems (eg, Windows)?	5.3 (1.8)	67	6.0 (1.4)	89
Is the resource maintained such that its text and multimedia elements remain functional?	5.1 (1.2)	67	5.5 (1.4)	72
Are the hyperlinks contained within the resource functional?	5.6 (1.3)	83	5.8 (1.4)	78
Does the resource use technologies that are universally available to allow learners with standard equipment and software access?	5.3 (1.7)	56	5.6 (1.7)	78
Subtheme 4: ease of use				
Does the resource's interface have a learner-friendly design?	5.6 (1.2)	72	5.7 (1.3)	89

Continued.

Quality Indicator	Bloggers		Podcasters	
	Survey 1 Mean (SD)	Survey 2 % "Include"	Survey 1 Mean (SD)	Survey 2 % "Include"
Is the functionality of the resource self-evident without training?	5.6 (1.2)	83	5.8 (1.4)	94
Are the icons and buttons used in the resource logically and intuitively designed?	5.4 (1.6)	61	5.6 (1.4)	72
Is navigating the resource intuitive? Does it allow learners to access information quickly?	5.5 (1.4)	72	5.6 (1.4)	83
Are the resource's navigation layout and hierarchical content structure logically organized and learner friendly?	5.5 (1.5)	61	5.6 (1.5)	83
Are the resource's hyperlinks clearly marked and used carefully?	5.5 (1.3)	83	5.5 (1.4)	61
Are the hyperlinks within the resource appropriately and logically labeled to indicate their content and the type of destination site (eg, text, audio, video site)?	5.2 (1.5)	50	5.3 (1.6)	72