Thinking Critically About Appraising FOAM

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The dawn of the 21st century has certainly left us with new issues and problems that we have seldom encountered before. “Fake news,” misinformation are rife on social media, and the need for increased criticality in reading anything in our daily lives has never been so important. Critical appraisal is now being taught by elementary school teachers and encouraged all along the educational spectrum; online medical education should not be exempt from these discussions. As such, we thank Drs. Munz and Chen for their commentary¹ on our paper,² which highlights many key findings in our study and agrees with us that it is imperative for our discipline to bring critical appraisal to online educational resources.

Indeed, as we continue to develop digital scholarship, we must evaluate the nature and usefulness of the innovations that we create. Most movements begin with an engaged initial set of innovators and early adopters,³ who seek to create new spaces for themselves by breaking apart from the pack to discover bluer waters.⁴

FOAM has evolved over time in a similar way. Initially created as a reaction to paywalls, a desire to democratize education through the power of Web 2.0 and provide informal, focused educational resources,⁵ FOAM has undergone successive waves of evolution to adopt “structural” elements and organizational/

systems thinking. This enhanced collaboration, but at the cost of incorporating a formerly disruptive field into more mainstream influences. As trainees continue to use FOAM resources,^{6–8} many educators began to engage with students in that space. Not surprisingly, many skeptics emerged, doubting the veracity of a field where textbooks had formerly dominated with historical precedent but no evidence.⁹ Blogs then evolved to these response calls for increasing rigor by adapting traditional structures including peer review,^{10,11} editorial boards,¹² and online journal clubs.^{13–15}

This is where the METRIQ study collaboration began.¹⁶ After describing the expansion and use of FOAM within emergency medicine,^{8,17} it has innovated to quantify the impact^{18,19} and quality^{19–22} of FOAM. Impact was investigated first by developing an impact metric, the Social Media Index (SMi), which consolidated metrics of online readership and followership. When applied to journals, the correlated with traditional measures of journal impact. Initially, this effort was criticized for focusing on impact and/or popularity rather than resource quality,^{23,24} but these objections have faded away with the evolution of this program of research.

Research on quality assessment of FOAM resources was spurred by this and the finding that gestalt assessment of online resources was quite unreliable.^{25,26}

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Efforts were made to develop standardized approaches to improving the quality of FOAM resources. In response to the criticism that these resources were not peer reviewed, novel ways to incorporate expert review into online resources were developed and described.^{10,11} The evaluation of FOAM was supported through systematic reviews²⁷ and Delphi studies^{28,29} of quality metrics that were incorporated into quality assessment checklists²² and scores.²¹ Review processes to identify high-quality resources were developed using these tools^{20,30} and assessed through the online recruitment of a large number of FOAM users.³¹

As Munz and Chen point out, it is crucial for us be critical of our educational interventions—and FOAM is not exempt from this process. While much of the recent literature around social media has focused on selling scientists and knowledge producers a method to engage with the lay public and front-line clinician colleagues,^{32–36} we have also encouraged a healthy skepticism when consuming online education resources. In the age of “fake news,” we must both role model and encourage our trainees to think critically of what they read and what they adopt into their practice.^{37,38}

Unfortunately, the decentralized explosion of FOAM resources is a double-edged sword, as consumers of FOAM are faced with a potentially unworkable abundance of options. Some very popular sites have proven themselves by consistently producing high-quality content, but there is no guarantee that popularity or word of mouth is a consistent marker of quality.³⁹ Similarly, trainees may not have the skills to identify quality resources, nor the ability to recognize their peers’ or own educational needs.⁴⁰ While many consumers of FOAM currently rely on (and will likely to continue to rely on) word of mouth and ad hoc recommendations, our prior work has found that these gestalt recommendations may be unreliable.^{25,26} The goal of critical appraisal tools is to help square this circle—to provide rating schemes that learners can use to identify quality online educational resources, either by applying the tools themselves or by using others’ ratings. Unfortunately, to date, critical appraisal tools have not been shown to be more reliable than gestalt recommendations.⁴¹ While this is disappointing, substantial work in this area is ongoing and this body of research has led to an increase discussion around how to evaluate online, secondary educational resources.³⁸ It is imperative that we remain vigilant and encouraging our trainees and teachers to remain skeptical of resources regardless of their origin and triangulate the

findings reported in such resources with the primary literature. For ease of reference, Table 1 summarizes a list of available critical appraisal tools for guiding readers toward high-quality, secondary online educational content.

We appreciate Drs. Munz and Chen and colleagues questions about the implications of SAEM “endorsing” specific FOAM resources. To clarify, SOAR topic reviews are not intended as an endorsement of any specific resource or a definitive declaration of any resource’s accuracy. Rather, the SOAR topic reviews are intended only as a starting point. Though the enormous amount of decentralized FOAM content seems daunting for users or even educators to collate and curate, in fact a finite amount of FOAM resources exist. We found nearly 400 in our first review of renal/genitourinary content, which was initially selected partly due to its fairly small FOAM footprint. We hope that trainees and educators (particularly those who are less immersed in the FOAM community) find the SOAR topic reviews useful as a centralized resource in a potentially overwhelming world of online resources. Further, as more trainees and educators continue to produce FOAM content, we hope that by identifying which areas have been covered, particularly with high-quality resources, producers will tend toward uncovered topics in creating new FOAM content. Structured critical appraisal tools (including the rMETRIQ score⁴²) are relatively new and, like clinical decision instruments, should not replace good judgment. Given the abundance of online resources, and the variation in quality among them, we used the rMETRIQ score not as a guarantee of quality but as a filter to help educators and trainees eliminate the “noise” so they can focus their efforts to applying their critical eyes to higher quality posts.

For now, FOAM alone does not provide a comprehensive curriculum. However, we would argue that neither is a comprehensive and rigorously edited textbook.⁴³ While primary literature currently remains the best method of advancing our field, we must also acknowledge that simply reading the primary literature is a fool’s errand as vast amounts are produced daily. Trainees need to be guided by curated content bringing them toward the leading edges of where they can then read primarily. One potential resource that may help shorten the knowledge translation interval is FOAM. While recent efforts have been made to boil down the essential papers for our specialty,⁴⁴ these processes take a daunting amount of resources.

Table 1
Critical Appraisal Tools for FOAM

Appraisal Tool (Citation for Paper)	Intended Audience for Tool	Warnings/Tips for Use
ALiEM AIR score ²⁰	Developed by and for a team of expert evaluators	- Evidence supporting its validity and reliability among an expert team who received instruction and feedback on using the score. - Little data to support its use among learners or other evaluators. - An average score of >27 believed to reflect quality by the AIR team. - Use of BEEM score favors posts focusing on newer content as opposed to core content. - Unpublished data indicate that users describe difficulties with: - Applying the BEEM score - Scoring without a description for every anchor.
METRIQ ^{5,8} and rMETRIQ ^{21,42}	- Intended to be used by FOAM users - Developed through multiple modified Delphi processes	- Checklist for specific qualities consistent with quality. - Users describe difficulties with: - Lack of full anchors for each numerical score - Lack of a fully anchored rubric.
Social Media index ^{18,19}	FOAM users	- Initially a list of the most impactful FOAM sites. - Data support a correlation between the sites listed on SMi and quality scoring.
Colmers et al. checklists ²²	Checklist of 19 quality indicators developed from educators, users, a systematic review and multiple modified Delphi processes	- Simple to use. - Little data exist on what evaluation would differentiate quality from not quality.

SMi = Social Media Index.

Based on our review of one tiny area of #FOAMed, we found that it lacked a robust curricular approach—but this too is changing. Several groups have begun using modified versions of classic curriculum development techniques (e.g., needs assessments) and adapting them for the online sphere.^{45–47} Some groups, like the CRACKcast podcast affiliated with the CanadiEM group,¹² are even mapping their entire podcast to major emergency medicine textbooks. Naturally, a rhizomatic and naturally evolving movement like #FOAMed was never going to start out being programmatic. Instead, just as Wikipedia started with humble beginnings, #FOAMed similarly has emerged as a crowdsourced method by which an egalitarian effort by a worldwide network of educators has spontaneously sprung up to serve the online community. We are generally optimistic that efforts such as ours, which map out the areas of unwritten blog posts or podcasts, can help to guide new authors and eager contributors to expand the offerings that are available online. The incorporation of digital scholarship^{48,49} by some institutions like Mayo Clinic⁵⁰ is paving the way for FOAM to become a legitimate method by which future generations of clinician educators might carve out their academic niches. When

Wikipedia first started it too was incomplete ... and now, it is a crowdsourced haven for information that can rival any other institutionally support source of knowledge aggregation. After all, when is the last time you cracked open a physical encyclopedia? Digital is here to stay, but it can only fulfill its potential if our academic community members contribute, collaborate, critique, and comment.

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