

LIMEs and LEMONS: Critically Examining the Effect of a Blog Post on Junior Faculty Learners

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AMM reports no conflict of interest.

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Abstract

Introduction

The usage of asynchronous resources such as blogs and podcasts is pervasive in academic medicine, despite little understanding of their actual effect on learner knowledge. This study sought to examine the objective effect of a blog post on knowledge acquisition and application amongst junior faculty in emergency medicine via randomized-controlled study.

Methods

All accredited emergency medicine residency programs in the United States and Canada were contacted to identify assistant and associate program directors and medical education fellows for recruitment into this study. Upon enrollment, participants were randomized as to whether they received access to a supplemental blog post prior to listening to a podcast episode. After listening to the podcast episode, all participants completed an assessment which included a test of knowledge application and knowledge acquisition; demographic information was also obtained.

Results

Ultimately, 103 participants completed the study; the study closed for enrollment in July 2019. Data was non-normally distributed and groups were compared using the Wilcoxon Rank-Sum test. There were no significant differences between the demographics of the two groups, nor was there a significant difference in knowledge between the two groups.

Conclusion

31 The addition of a supplementary blog post did not increase junior faculty knowledge of a podcast
32 episode.

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54 **Introduction**

55 Asynchronous teaching modalities have been integrated into the core curricula of many
56 residency programs and abundant research has demonstrated the use of blogs and podcasts
57 among medical students and residents.¹⁻⁶ “FOAM” or “FOAMed,” Free Open Access Medical
58 Education was coined by Cadogan in 2012 to describe “a means of collating and curating the
59 growing wealth of online education resources which are free and easy to access.”⁷ Despite the
60 manifest popularity of FOAMed there is little educational research to measure the effect of these
61 asynchronous teaching methods on learning.^{3-5,8}

62

63 Studies demonstrating the purported “effectiveness” of asynchronous learning resources have
64 largely relied on learner-reported augmentation of their learning rather than an objectively
65 measured effect on learning.⁹ To address this knowledge gap, the present study quantitatively
66 measures the effect of a blog post on learners, specifically junior faculty in emergency medicine
67 (EM). . This study is one of the first to explore the effect of an asynchronous resource on junior
68 faculty via randomized-controlled trial and looks beyond Kirkpatrick level one outcomes, the
69 junior faculty’s reaction to the learning, focusing instead on knowledge acquisition and
70 knowledge application, Kirkpatrick level two outcomes.¹⁰

71

72 The study was based on the authors’ personal experience with the Key Literature in Medical
73 Education (KeyLIME; <https://keylimepodcast.libsyn.com>) podcast, a medical education podcast
74 which discusses a medical education article weekly. As educators, we noted that the podcast is
75 very well done but may use terms and concepts unfamiliar to listeners who are more novice
76 medical educators, specifically junior faculty. We hypothesized that if junior faculty were
77 provided with a blog post that explains the more advanced terms and concepts that will be
78 discussed in the KeyLIME podcast episode prior to listening to the podcast episode, this would
79 enhance their ability to understand the podcast episode and thus increase learning. This
80 hypothesis has its roots in Vygotsky’s work describing the concept of scaffolding, wherein
81 learners are provided with additional support (scaffolding) to support their learning.¹¹ The
82 “zone” in which scaffolding is used to support learners is called the Zone of Proximal
83 Development; this is where Vygotsky posited that learning occurs. In the present study, the
84 “teacher” providing the scaffolding is the blog post itself with the podcast episode providing the
85 learning activity. This study will explore the hypothesis that the addition of a preparatory blog
86 post will scaffold junior faculty members so that they will learn more from the KeyLIME
87 podcast episode. We therefore created the Key Literature in Education and Medicine Online for
88 Novices (KeyLEMON) blog to provide background, supplemental information of a journal
89 article.

90

91 **Methods**

92 **Development of the blog post and assessment tool**

93 A single KeyLIME podcast episode was chosen by one of the study authors (XXX). All
94 KeyLIME episodes prior to September 2018 were considered. KeyLIME episode 150
95 (<http://keylimepodcast.libsyn.com/2017/12>), “Faculty Development – We have come so far, and
96 we have so far to go,” was ultimately chosen based on the importance of the topic discussed and
97 its relevance to all medical educators. Once the podcast episode was chosen, the accompanying
98 Key Literature in Education and Medicine Online for Novices (KeyLEMON) blog post was
99 written. The blog post (<https://keylemon.home.blog/2019/05/09/saemf-grant-blog-post/>) was
100 vetted by experts in medical education for clarity and to ensure that it accurately reflected the
101 content presented in the KeyLIME podcast episode and did not present any novel information
102 not presented in the KeyLIME podcast episode. It was additionally edited for clarity and online
103 readability by experts in FOAMed. The final version was published online and password
104 protected during the study period to ensure that only those randomized to receive access to the
105 blog post could view its contents. .

106
107 The assessment tool was then created by a study author (XXX). The assessment tool is
108 comprised of 13 multiple choice questions:, seven demographic questions, questions to elucidate
109 whether the study participant had previously listened to the KeyLIME podcast episode or read
110 the paper associated with the episode, and to ascertain what percentage of the KeyLIME podcast
111 episode the study participant listened to for the purposes of the study; two knowledge retention
112 questions (KRQs; questions 8, 10); and four knowledge application questions (KAQs; questions
113 9, 11, 12, 13). The KRQs and KAQs were formatted as multiple choice questions. Some
114 knowledge questions had several correct and incorrect answers from which to choose; in these
115 cases, respondents were asked to select all correct responses. For all questions, participants were
116 awarded one point for every correct response and one point was deducted for each incorrect
117 response. Content-related validation of the assessment tool was obtained from several experts
118 within medical education after which it was piloted amongst junior faculty members within EM
119 who were not part of the final study cohort. The range of possible scores for the assessment was
120 +13 if all correct and no incorrect answers were chosen, and -14 if all incorrect and no correct
121 answers were chosen. The assessment tool can be found as **Supplemental Digital Appendix**.

122 123 **Participant recruitment**

124 We wanted to study those with an interest in medical education but also those that did not likely
125 already possess the background knowledge necessary to fully grasp all of the content of the
126 KeyLIME podcast episode, and therefore chose to target junior faculty with an interest in
127 medical education. For the purposes of this study, we used assistant and associate program
128 directors (PDs) and medical education fellows within EM in the United States and Canada to
129 represent junior faculty members with an interest in medical education. Assistant/associate
130 program directors (PDs) and medical education fellows were used as a surrogate group
131 representing those likely to be more junior in their career but with a clear interest in medical
132 education.

133

134 We created a list of target programs comprising all Accreditation Council for Graduate Medical
135 Education (ACGME)-accredited EM residency programs in the United States and Accreditation
136 of Residency Education (CanERA)-accredited EM residency programs in Canada. All programs
137 were contacted via email in January 2019 and asked: (1) how many assistant/associate PDs does
138 your residency program have, and (2) what is their email contact information. Programs with
139 medical education fellowships were also asked to provide contact information for their medical
140 education fellow. Repeat emails were sent twice more over the next month to programs that did
141 not respond. For all programs that did not respond after three emails, individualized emails were
142 sent until March 2019, when the final list with contact information for assistant/associate PDs
143 and medical education fellows was created.

144

145 **Study methodology**

146 The listserv was used to contact potential study participants who were enrolled on a rolling basis
147 from March-June 2019 and randomized to the blog group (BG) or the no blog group (NBG) via
148 random number generator. Those in the BG were asked to read the KeyLEMON blog post then
149 listen to the KeyLIME podcast episode, and then complete the assessment, administered via
150 Qualtrics (Seattle, WA); those in the NBG were instructed to listen to the KeyLIME podcast
151 episode then complete the assessment. Participation in the study was anonymous, voluntary and
152 uncompensated. This study was granted exemption from the Institutional Review Board at XXX.
153

154 Participants were asked to complete the assessment within two weeks. A mass email was sent to
155 all enrolled participants in early July 2019 to request that they complete the assessment, if they
156 had not already. The study closed on August 1, 2019.

157

158 **Statistical analysis**

159 Descriptive statistics are reported for the overall cohort. The BG versus the NBG were compared
160 using medians and interquartile range for non-normally distributed data and unpaired t-test when
161 data distribution was normal. Categorical differences were analyzed using Pearson's Chi-squared
162 or Fisher's Exact test, where appropriate; when there were > 2 categories for a given response, an
163 overall chi-squared test was used (i.e., testing global H_0 of equality between groups). The
164 normality assumption for survey responses was assessed using the Shapiro-Wilk test and data
165 were found to be non-normally distributed. Therefore, individual responses in each group for
166 questions 8-13 from the assessment tool were compared using the Wilcoxon Rank-Sum test.
167 Median total test score (TTS) for all types of assessment questions (questions 8-13; TTS group)
168 and for KAQs (KAQ group) were also compared using the Wilcoxon Rank-Sum test. A pre-
169 specified sub-group analysis, consisting of only participants in their first five post-residency
170 years, was performed for the TTS and KAQ question groups. Statistical analysis was performed
171 using SAS version 9.4 (SAS Institute, Cary, NC).

172

173 **Sample size calculation and power analysis**

174 A sample size of 62 participants per group was calculated to be sufficient to detect a difference
175 of 20 percentage points in mean score between the BG and NBG with 80% power and an alpha
176 of 0.05, assuming normally distributed response data. Prior data on the expected distribution and
177 variance of participant responses was not available so an effect size of 20% (SD 11) was chosen
178 as one which balances an educationally meaningful difference with feasibility of subject
179 recruitment for this preliminary work. Given that response scores were found to be non-normally
180 distributed, a post-hoc power calculation was performed using distributional data from the actual
181 study responses. With the given sample size of 103 subjects (see results section) our study has
182 30% power to detect a difference in median TTS between the BG and NBG of 1 point, with an
183 alpha of 0.05.

184

185 **Results**

186 A total of 268 EM residency programs in the United States and Canada (237 ACGME-accredited
187 and 31 CanERA-accredited as of January 2019) were contacted and asked to provide contact
188 information for their assistant/associate PDs and medical education fellows. Ultimately, 430
189 potential participants were identified. All were emailed as described in the methods section, 172
190 (40%) of whom agreed to participate in the study. Of these, 87 (51%) were randomized to the
191 BG and 85 (49%) to the NBG. Ultimately, of the 172 that agreed to participate, 106 (62%)
192 completed the study, 59 (56%) from the BG and 47 (44%) from the NBG. Three respondents
193 were excluded because they did not meet the inclusion criteria or did not complete the
194 assessment. Final data analysis was performed on the remaining 103 participants (**Figure**).

195
196 The majority (92%, n=95) of participants were assistant/associate PDs, with 26% (n=27) holding
197 an advanced degree such as a Master of Science or Master of Medical Education. Participants
198 had been in their current roles for < 1 to 24 years, with a mean of 3.67 (SD 3.74) years; number
199 of years post-residency ranged from <1 to 35, with a mean of 7.71 (SD 6.15) years.

200
201 Full comparison of the BG and NBG is shown in **Table 1**. The BG and NBG did not differ
202 significantly in terms of their work roles and years therein, number of years post-residency, and
203 percentage with an advanced degree. Most participants in both groups listened to >75% of the
204 podcast, with a similar percentage having listened to the podcast prior to participating in the
205 study; however, more participants in the BG read some (19 versus 9%) or all (19 versus 4%) of
206 the journal article discussed on the KeyLIME episode compared to the NBG (p=0.01).

207 Comparisons of scores on questions 8-13 are listed in **Table 2**. For the individual questions, only
208 the median score on question 8 was significantly different in the BG compared to the NBG (4
209 versus 3, p=0.03). Median TTS was similar in the BG and NBG (7 versus 6, p=0.13); for KAQs,
210 scores were also similar (3 versus 2, p=0.51). No significant differences were found in the sub-
211 group analysis that only included faculty members within five years of residency completion
212 (early faculty).

214 **Discussion**

215 This study found that the addition of a blog post did not significantly improve junior faculty
216 knowledge of content presented in a podcast episode. Although this study tested a single blog
217 post in one type of learner and is not generalizable to all blog posts or all asynchronous
218 resources, to the authors' knowledge it is one of the first randomized-controlled trials to
219 examine the efficacy of a blog post on junior faculty and is hypothesis-generating. It is important
220 to make clear that the intervention under investigation in this study is the blog post, not the
221 podcast episode. The authors chose a podcast episode as the teaching tool because it is free,
222 easily accessible and offered all study participants the same experience without any variability.
223 Also, we chose to study junior faculty in EM because EM has shown early adoption and
224 acceptance of asynchronous resources.^{2,3,12}

225
226 It was quite unexpected to find that the supplementary blog post did not significantly positively
227 affect study participant's knowledge and understanding of the KeyLIME podcast episode. This
228 was true both when examining raw total scores between the two groups and when comparing
229 scores for the more challenging knowledge application questions, which required higher-order
230 thinking as compared to the straightforward knowledge retention questions. Additionally,
231 significantly more of those assigned to the BG reported having read some or all of the article
232 discussed in the KeyLIME podcast episode. Despite this potential advantage, the BG still did not
233 outperform the NBG. The authors performed additional post-hoc analyses to look for any
234 significant differences in the performances of any subgroups and found none; subgroup analyses
235 included examining a difference between the groups based on years out of residency and on
236 whether a participant possessed an advanced degree.

237
238 This lack of difference between the two groups can be interpreted in different ways. One
239 interpretation is that blogs are not helpful in teaching faculty level learners. This is clearly too
240 sweeping of a conclusion to draw after one study, and it could be that this particular blog post
241 alone was not helpful to junior faculty. The authors did put great effort into ensuring that the
242 blog post was of high quality in terms of content, and also visually appealing and easy to read on
243 a computer screen.

244

245 Another possibility as to why this study did not reveal a difference between the groups is that the
246 assessment tool may be imperfect and not capable of detecting a real difference between the
247 groups. As with the blog post, attention was given in the development of the assessment tool and
248 it was both content validated and piloted. Despite this, it may not have been robust enough to
249 detect a difference between the groups. The authors were aware of the significant time required
250 of participants to complete the study and therefore did not want to create an assessment tool that
251 was onerously long; creating a shorter assessment tool may have come at the cost of gathering
252 more information from the participants.

253

254 The authors in no way want to disavow the utility of asynchronous resources. This study does
255 suggest that we need to continue rigorous research into their effect on junior faculty learners'
256 acquisition of knowledge. Future studies should expand to other asynchronous resources and
257 should include different types of learners and learners outside of EM.

258

259 **Limitations**

260 The first limitation is low statistical power, with a Type II error probability of 70%. This
261 occurred because participant score distributions differed markedly from the assumptions used in
262 the sample size calculation. A significantly larger study would be needed to detect the observed
263 one-point difference in median TTS – 80% power would require 201 participants per group.

264 While the authors did their best to recruit participants into this study, we were unable to achieve
265 that level of participation. Future studies may want to expand the pool of potential participants,
266 recognizing that this may concurrently results in increased heterogeneity of the participants.

267

268 Another limitation is our use of assistant/associate program directors and medical education
269 fellows as a surrogate group of “junior faculty.” “Junior faculty” does not have a uniform
270 definition; medical education fellows more than likely just completed their EM residency
271 however assistant/associate program directors may have completed their EM residency decades
272 previously and are not “junior” in the chronological sense of the word. Despite this, they are still
273 in an academic position that is generally considered to be a more junior faculty position, and
274 therefore we chose to include all assistant/associate program directors regardless of
275 chronological age or years since residency graduation. We acknowledge that this inclusive

276 definition may therefore include those that are more senior in their career, or even those not
277 actually interested in medical education but working as an assistant/associate program director
278 nonetheless.

279

280 **Conclusion**

281 This study found that the addition of a supplementary blog post did not increase faculty-level
282 learner knowledge retention and application of a podcast episode.

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Table 1 Comparison between blog group and no-blog group

	Blog Group (n= 57)	No-Blog Group (n= 46)	P-Value
Listened to podcast prior? [N (%)]	20 (35)	19 (41)	0.52
Work role [N (%)]	APD: 51 (89) MEF: 5 (9) APD/MEF: 1 (2)	APD: 44 (96) MEF: 2 (4) APD/MEF: 0	0.44
Years in Role [Mean (SD)]	3.58 (3.50)	3.78 (4.06)	0.78
Years post-Residency [Mean (SD)]	7.06 (5.52)	8.50 (6.81)	0.24
Holds Advanced Degree [N (%)]	15 (26)	12 (26)	0.98
To what percentage of podcast did you listen? [N, (%)]	0-24%: 0 26-50%:1 (2) 51-75%: 4 (7) 76-100%: 52 (91)	0-24%: 1 (2) 26-50%: 0 51-75%:1 (2) 76-100%: 44 (96)	0.34
Amount of paper read [N (%)]	None: 35 (62) Some: 11 (19) All: 11 (19)	None: 39 (87) Some: 4 (9) All: 2 (4)	0.01

Table 2 Score comparison between the blog group and no-blog group

	Blog Group (n= 57)	No-Blog Group (n= 46)	P-Value[^]
Question 8*	4 (1)	3 (2)	0.03
Question 9	1 (1)	1 (1)	0.55
Question 10	1 (0)	1 (0)	0.21
Question 11	1 (2)	1 (1)	0.24
Question 12	1 (2)	0 (1)	0.52
Question 13	0 (2)	1 (1)	0.13
TTS (8-13)	7 (3)	6 (3)	0.13
KAQ (9, 11-13)	3 (3)	2 (2)	0.51
Early Faculty[§] TTS [N, median, IQR)	30, 8 (3)	18, 5(2)	0.17
Early Faculty[§] KAQ [N, median, IQR)	30, 3(2)	18, 2(2)	0.22

*Values are listed as Median and interquartile range (IQR); [^]Kruskal-Wallis test

[§]Early faculty: ≤ 5Yrs Post-residency

Author

