

Scholar 12: Beta Trial of an Osteopathic Research Cultural Development Computer Application

Marija J. Rowane, OMS III; Daniel E. Hellmann, PharmD, OMS III; Rachel A. Branning, OMS III; Heather M. Cola, OMS III; Jude M. Fahoum, OMS II; Brittany M. Snyder, PharmD, BCPS, OMS III; Amber M. Healy, DO; Xiaojun Qi-Lytle, MD, PhD; Michael P. Rowane, DO, MS, FAAO, FAAFP; Mark A. Terrell, EdD; Robert W. Hostoffer, Jr., DO, LhD, MSMEd, MBA, FACOP, FAAP, FCCP, FACOI

Abstract

Context: Research is emphasized as a critical component of Accreditation Council for Graduate Medical Education (ACGME) Osteopathic Recognition (OR) criteria, yet there remains a deficit of osteopathic contributions to the literature. Scholar 12 combines discrete research development tools into an interactive application and blog forum that guides students from research team formation with an agreed-upon query to a scholarly product and presentations.

Objective: This study aims to evaluate a beta test of Scholar 12 in developing a scholarly culture within medical school education.

Methods: An unblinded prospective cohort beta trial by 6 osteopathic medical students across different campuses provided feedback for improvement measures and self-assessed research skill competency before and after completing Scholar 12 on an accelerated time frame. The pre- and post-Scholar 12 surveys scored 12 skills based on learning objectives for each unit on a 5-point Likert scale.

Results: The composite results from self-assessments of 6 medical students demonstrate a statistically significant improvement in research skill familiarity by the completion of Scholar 12 ($p < 0.001$).

Conclusions: The osteopathic profession has opportunity to advance clinical practice and fulfill ACGME OR initiatives with evidence-based medical research. Scholar 12 is a foundational educational tool and aims to engage medical students, residents, and attendings with scholarly work, regardless of experience level. The present survey provides a preliminary measure of the efficacy of Scholar 12 in improving medical students' knowledge of creating new scholarly work. General feedback has been communicated to the application developer and editorial staff for improvement measures before the 2020 nationwide launch. Despite the statistical significance of these students' self-reported progress, additional beta trials; blinded, long-term evaluation of students' and mentors' productivity as a result of this research learning tool; and controlled

From the Ohio University Heritage College of Osteopathic Medicine in Athens, Ohio.

Disclosures: none reported.

Correspondence address:

Marija J. Rowane, OMS-III
Allergy/Immunology Associates, Inc.
5915 Landerbrook Dr, Suite 110
Mayfield Heights, OH 44124
(216) 904-9935 (m)
mr388917@ohio.edu

Submitted for publication April 29, 2020; final revision received Dec. 28, 2020; manuscript accepted for publication April 13, 2021.

comparison to other research development programs are warranted. Scholar 12 is designed to accommodate students' academic obligations with a convenient, virtual tool to learn the research process on a flexible schedule, in order to meet generational needs.

Introduction

The Accreditation Council for Graduate Medical Education (ACGME) criteria for osteopathic recognition (OR) has emphasized research as a critical component of integrating osteopathic principles and practice (OPP) into clinical decision making.¹ Despite this objective, there remains a deficit of osteopathic contributions to the literature.²⁻¹³ Peppers et al² described the first published improvement of a regional community hospitals' scholastic environment through Scholar 7, a series of professional lecture videos and interactive sessions on hypothesis, introduction, specific aims, preliminary data, materials and methods, conclusion, and Institutional Review Board

(continued on page 28)

(continued from page 27)

protocol development. The Scholar Series has since expanded from Scholar 7 to include Scholar 4, Scholar Specific, Scholar Teacher, the *Scholar: Pilot and Validation Studies* journal, and, most recently, Scholar 12.

Scholar 12 combines the discrete Scholar Series research development tools into an interactive application and blog forum that guides students from research team formation with an agreed-upon query to a scholarly product and presentations. This report describes an unblinded prospective cohort beta trial by osteopathic medical students that provided feedback for improvement measures and self-assessed research skill knowledge before and after completing Scholar 12. We hypothesize that Scholar 12 will enhance the development of a scholarly culture within medical education by providing the tools to improve competency in understanding and succeeding with the research process.

Methods

Scholar 12 was developed as a culmination of the Scholar Series, as well as the thesis proposal for the Lake Erie College of Osteopathic Medicine (LECOM) Masters of Medical Education program (MSMED), into an interactive course through a web-based application (<https://scholar12.org>). Scholar 12 participants are guided through a registration process and welcomed to a blog forum assigned to their institution or training program. The scholarly development process is comprehensively covered by 12 units. Each unit is comprised of a learning question, objectives, and activities, which involve reading journal articles, writing reflections and blog posts, and watching instructional videos. The associated blog forum is indefinitely accessible to facilitate group discussion under institutional forums that are moderated by their attendings and research coordinators.

An “alpha” trial by the editorial team and website developer revised and improved the Scholar 12 application. A beta trial was pursued during the 2019-2020 academic year by an Ohio University Heritage College of Osteopathic Medicine (OU-HCOM) team of 6 medical students, mentored by 3 faculty. The students completed the Scholar 12 units on an accelerated timeframe and communicated assigned reflections and any suggestions for technical and/or formatting improvement via the Scholar 12 blog forum. Each student also completed a self-assessment of their research skills in the beginning and once more at the conclusion of the units (*Appendix 1*). The survey was adapted from a research competency scale for nursing students and evaluated 12 skills based on learning objectives for each Scholar 12 unit.¹⁴ Pre- and post-Scholar 12 responses to items were graded on a five-point Likert scale ranging from 1 (very unfamiliar) to 5 (very familiar) and totaled per skill and level of competency.

Scholar 12 Units

Unit 1: Mentorship. The first session establishes a ladder mentorship culture of students, residents, fellows, and attendings. The interested parties are tasked with gathering as a team and identifying opportunities for scholarship. The team members are encouraged to discuss obstructions to ladder mentorship experienced in former groups and propose solutions.

Unit 2: Fun of Scholarship. The second session aims to add enjoyment and collaboration to scholarship. The groups are instructed to practice developing a mock scholarly document with a query focused on a toy.

Unit 3: The Query. The hypothesis formation is guided with an exercise involving identification of myths, pearls, questions, and queries regarding disorders commonly treated within an institution. A literature search is encouraged to verify that the query would uniquely contribute to relevant studies.

Unit 4: The IRB. The students pursuing research involving human subjects are directed to complete the virtual Collaborative Institutional Training Initiative (CITI) program and review university policies regarding the Institutional Review Board (IRB).

Unit 5: Grant Development. The fifth unit applies the hypothesis to create a grant document, including an introduction, specific aims, preliminary data, material and methods, and conclusions. The students are encouraged to reflect how the grant process organized the project.

Unit 6: IRB Submission. Students are led through the IRB submission process specific to their institution. The students identify means of addressing challenges with the IRB application.

Unit 7: IRB Approval. Students are recommended to secure a data collection system and identify required statistical support. The team members then evaluate if their hypothesis was supported.

Unit 8: Abstract Development. Teams decide how to disseminate their project findings to the osteopathic community. The abstract design is catered toward the type of project and venue for communication.

Unit 9: Poster Development. A poster may be decided as the most appropriate method to showcase research efforts and findings. The teams determine a professional style adhering to conference specifications.

(continued on page 29)

(continued from page 28)

Unit 10: Manuscript Development. Scholar 12 enables its research teams to promote their scholarly work through publication. The teams are guided through the process of writing a manuscript that appropriately conveys the data and meets publication criteria. This process extends to revisions on the basis of reviewers' feedback, in an effort to effectively communicate results.

Unit 11: Oral Presentation. The final units of Scholar 12 facilitate the dissemination of results through development of oral and case presentations. The teams are encouraged to share and refine presentation skills.

Unit 12: Case Presentation. Scholar 12 last reviews key components of case presentations to showcase scholarly work. If a case study is the project of focus, case report writing and feedback by several instructors is encouraged.

Results

The unblinded prospective cohort beta trial by OU-HCOM students measured difference in competency of research skills from the start of Unit 1: Laddered Mentorship to the conclusion of Unit 12: Case Presentation. Students self-assessed their competency level for 12 skills according to a 5-point Likert scale, ranging from "very unfamiliar" to "very familiar." The 12 skills in the Research Competency Scale correspond to the learning objectives for each unit. Survey responses to the pre- and post-Scholar 12 self-assessments were communicated to the research group via the Scholar 12 blog forum, in November 2019 and January 2020, respectively. A 2-sided t test indicated a statistically significant improvement in research skill familiarity by the completion of Scholar 12, $p = 1.18E-08$.

The average, self-reported research skill competency started between "very unfamiliar" and "know little" and progressed to between "familiar" and "very familiar," by the conclusion of Scholar 12 (Figures 1.a, 1.c). Unit 5: IRB Application, Unit 6: Grant Development, and Unit 10: Manuscript Development demonstrated the greatest increase in self-reported research skill competency. Figure 1.b indicates a lack of trend between individual students from before to after Scholar 12 but predominantly demonstrates improvement. No decrease in research skill competency was reported. Figures 1.a and 1.c exhibit the average scoring in competency level before and after completing Scholar 12.

At the conclusion of Unit 12, students offered general suggestions for improvement of Scholar 12 technology and course content (Table 1). These recommendations have been forwarded and are under construction by the website developer. Remarks regarding content, such as generalizing IRB instruction to be more applicable to all

institutions, have been communicated to the editorial board and are being actively reconstructed or minimally considered.

Figure 1.a. Total scoring in competency level before and after completing Scholar 12

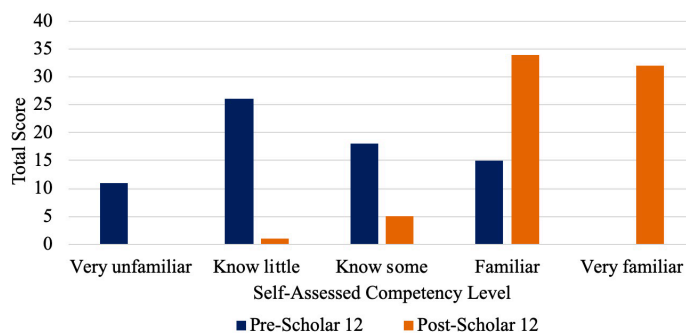


Figure 1.b. Score improvement level before and after completing Scholar 12

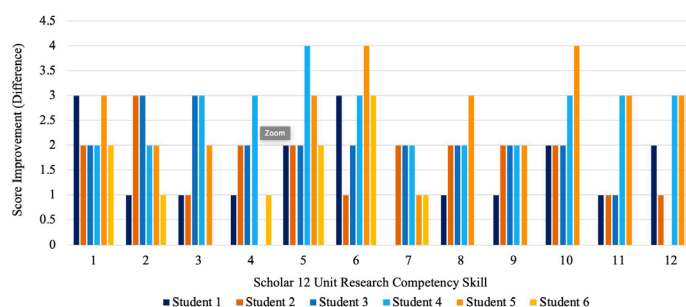


Figure 1.c. Average competency level score before and after completing Scholar 12

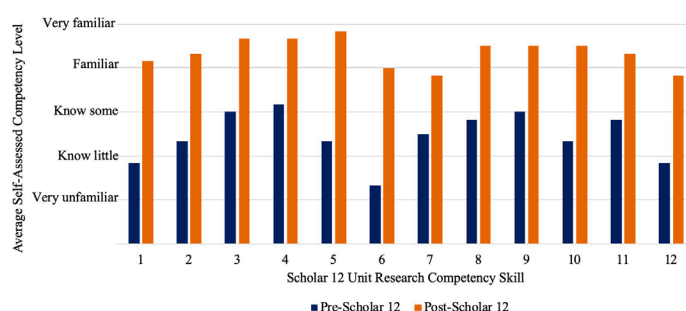


Table 1. General Feedback for Improvement Measures

Technology	Context
Improve registration process (decrease steps)	Allow access to previous units or add side panel/menu of key components of prior units
Add speed and playback options for videos	Add sneak previews of upcoming unit(s)
Increase timeout length for editing blog posts	Generalize IRB video to all institutions
Increase size capacity of blog post attachments	Add journal articles on how millennials can relate to other generations
Enable group email messaging from any member	Improve versatility of journal articles
Send notifications to administrators about resetting units	Add list of funding resources

(continued on page 30)

Discussion

Scholarly work has been a ubiquitous goal of teaching institutions with varied importance and implementation. The 2014 single accreditation agreements of the American Osteopathic Association (AOA), American Association of Colleges of Osteopathic Medicine (AACOM), and ACGME underline research and scholarly work among common and program-specific residency requirements.¹⁵ ACGME specialty-specific requirements for previously AOA-accredited programs are mandated to demonstrate research competence by 2020 for pre-accreditation standards.¹⁶ Osteopathic medical schools further acknowledge the imperativeness of research in fostering understanding of the human body, new therapy efficacy, and creative clinical problem solving to manage all aspects of health.³ Structured research electives in medical school facilitate opportunities for future physicians to investigate and advance in medical science and, thus, positively correlate with long-term interests in scholarly activity.⁴ Clark and Blazyk³ stress swift action for the osteopathic profession to enhance its credibility, relevance, and engagement in scientific inquiry through development of joint evidence-based outcome research programs. They propose a strategic roadmap to recovery of the profession by means of increased research productivity and scholarly activity at colleges: (1) higher investment in faculty with structured expectations for research productivity; (2) more training and funding to support research culture change; (3) improved mentorship and research methodology instruction for students; and (4) rigorous implementation of research accreditation standards.³ Mayo et al⁵ further contributed to this call to build a foundation for osteopathic scholarly culture with recommendations to communicate expectations, dedicate protected time, provide programmatic support, mentorship, and oversight, and track accomplishments. The advancement and reputation of osteopathic recognition within the ACGME framework is dependent on a leading scholarly culture, among its criteria for accreditation.

These initiatives to enhance scholarly activity are of particular significance for the osteopathic profession that is often disparate from other health professions' high research activity.³ The balance between clinical obligations and research, limited interest in scholarly activity, and lack of protected time, research skills, and adequate mentorship and funding commonly contribute to this disparity.⁶ Less interest to pursue DO/PhD programs (0.2%) or research electives, beginning in osteopathic medical school, may be indicative of less involvement in clinical years of training and beyond.⁶ Increased research funding is frequently awarded to PhD faculty and conducted in the basic biomedical sciences, rather than supporting clinical research integrating OPP at osteopathic medical centers.⁷ These logistical and motivational obstacles must be removed in order for a scholarly culture to thrive.⁶⁻⁷

Since the first initiative to develop osteopathic research with the establishment of the AOA Committee on Research in 1939, steps to enhance osteopathic research activities nationally were not outlined until the Osteopathic Collaborative Clinical Trials Initiative Conference in 1999.⁷ Although several reports have proposed further strategic goals for research or have launched research support programs at the medical school and GME levels,^{2,3,5-6,8} these efforts did not produce the cultural change needed to transform an entire institution, let alone the osteopathic medical education community in general.

The Scholar Series was first outlined in 2007 and later set in motion with Scholar 7 in 2015, in an effort to demystify and propagate these strategic plans for scholarly work.² Peppers et al² describes the successful pilot launch of Scholar 7 in a community hospital setting during the 2015-2016 academic year, quantified by scholarly products, IRB submissions, and grant awards.² Directors of medical education, program directors, faculty members, and residents of various specialties participated in 7 sessions lasting 2 hours each: demystifying scholarly work, development of a hypothesis, introduction, materials, methods, conclusion, and IRB submission.² Since this local trial, Scholar 7 has been utilized through free online access (<https://scholarcomplete.com>) by over 100 individuals on a monthly basis and adapted for multiple presentations and workshops.² The Scholar Series has expanded its lectures to include abstract, poster, oral presentation, and manuscript development in Scholar 4; case presentation, capstones for osteopathic-focused scholarly activity, and osteopathic recognition curricula in Scholar Specific; and osteopathic faculty development with thoracic osteopathic manipulative treatment modules via Scholar Teacher. The *Scholar: Pilot and Validation Studies* journal fosters the application of the Scholar Series through a peer-reviewed platform based on the Scholar Series model and seeks preliminary studies and special interest topics. These widely available, cost-effective resources continue to address immediate scholarly needs but have not yet instituted cultural change in ACGME OR programs.

Scholar 12 has been designed as a culmination of the Scholar Series and a website-based application to instigate this cultural change. Initially the product of a MSMed for LECOM, this course has developed into a programmatic computer application in the systematic approach to scholarly work. Students are invited to not only independently learn each step of the research process through watching the professional lectures and supplemental videos and read relevant journal articles but, further, partake in the process with a research team. Participating faculty are granted administrative access to the Scholar 12 blog forum and may offer guidance throughout the project development and team discussion. This team approach is essential for the development of a scholarly culture within the institution,

(continued on page 31)

(continued from page 30)

which has been verified by previous publications.^{1,3-4,6,9} Scholar 12 provides a secure blog forum and platform for communicating an agreed upon query until the subsequent production of a scholarly product. The entire application allows for individuals and teams to participate in scholarly work, while addressing barriers, such as lack of time, meeting space availability, skill, and mentorship,⁶ to accommodate the millennial and future generations.

The Scholar 12 beta trial academic year of 2019-2020 was initiated to identify opportunities for technical and content improvement, prior to the 2020-2021 national launch to osteopathic medical institutions. The average self-reported competency level improved for every research skill. A transition from unfamiliarity or minimal knowledge base to more familiarity was indicated across all research skills and among all participants. The feedback from the students addresses the remaining gaps in knowledge that may be addressed by content improvement, as well as design and user experience enhancement.

The fear of starting a novel research development process/culture, and lack of reliable resources and knowledge about research pathways among students have prevented previous scholarly development plans. Scholar 12 resolves these concerns by providing a free, time-table driven resource, all in one place, online with feedback and assessments while team members simultaneously learn. We acknowledge the limited sampling of this beta trial, but the indication for official implementation and long-term analysis of Scholar 12 required a pilot study of promising outcomes. The official launch of Scholar 12 during the 2020-21 academic year through LECOM curricular requirements, in addition to enhanced national advertising of this resource since this study, will offer feedback and indicators of research learning and scholarly achievement through a large-scale, longitudinal perspective of hundreds of osteopathic medical students across multiple campuses and clinical rotation sites. We envision Scholar 12 will collectively serve as a valuable tool to advance osteopathic scholarly culture throughout the nation.

Conclusion

The recent single accreditation system between the AOA and ACGME inspired desire and need to create a scholarly culture.^{1-2,15-16} Programs with ACGME OR have opportunity to advance clinical practice and fulfill academic initiatives with evidence-based medical research.^{1,3,6,10} The Scholar Series aim to support the growth of osteopathic research by providing a free, easily accessible resource to learn the process of scholarly work. The final component, Scholar 12, is a foundational educational tool and aims to engage clinicians and trainees with scholarly work, regardless of experience level. The present survey demonstrates a preliminary measure of efficacy of Scholar

12 in improving medical students' knowledge of creating new scholarly work. Despite the statistical significance of these students' self-reported progress, additional beta trials; blinded, long-term evaluation of students' and mentors' productivity as a result of this research learning tool; and controlled comparison to other research development programs are warranted. Scholar 12 offers the tools to not only guide students' learning of research standards, but also improve their confidence in completing their own research projects. The collective scholarly achievements of undergraduate and graduate medical students through Scholar 12 may initiate a scholarly culture among colleges of osteopathic medicine (COMs) and ACGME OR programs. Scholar 12 is designed to accommodate students' academic obligations with a convenient, virtual tool to learn the research process on a flexible schedule, in order to meet generational needs.

References

1. Accreditation Council for Graduate Medical Education. ACGME Osteopathic Recognition Requirements ACGME approved focused revision: February 4, 2018; effective July 1, 2018.
2. Peppers BP, Varma P, Kim YM, Hostoffer RW, Rowane MP. Scholar 7: The Development of Regional Community Hospitals' Scholastic Environment. *J Am Osteopath Assoc.* 2017; 117:643-650.
3. Clark BC and Blazyk J. Research in the osteopathic medical profession: Roadmap to recovery. *J Am Osteopath Assoc.* 2014; 114(8):608-614.
4. Pheley AM, Lois H, Strobl J. Interests in Research Electives Among Osteopathic Medical Students. *J Am Osteopath Assoc.* 2006;106(11):668-670.
5. Mayo MJ and Rockey DC. Development of a Successful Scholarly Activity and Research Program for Subspecialty Trainees. *Am J Med Sci.* 2015; 350(3):222-227.
6. Brannan GD. Growing Research Among Osteopathic Residents and Medical Students: Consortium-Based Research Education Continuum Model. *J Am Osteopath Assoc.* 2016;116(5):310-315.
7. Guillory VJ. Research at US Colleges of Osteopathic Medicine: A Decade of Growth. *J Am Osteopath Assoc.* 2003;103(4):176-181.
8. Smith-Barbaro P, Fulda KG, Coleridge ST. A Divisional Approach to Enhancing Research Among Osteopathic Family Practice Residents. *J Am Osteopath Assoc.* 2004;104(4):177-179.
9. Nottingham KL, Rush LJ, Beverly EA. Building Primary Care Research Capacity in a College of Osteopathic Medicine. *J Am Osteopath Assoc.* 2016; 116(5):278-279.
10. Degenhardt BF and Standley PR. 2013-2022 Strategic Plan for Research: A Role for Everyone in Promoting Research in the Osteopathic Medical Profession. *J Am Osteopath Assoc.* 2013;113(9):654-659.
11. Gevitz N. *The DOs: Osteopathic Medicine in America* (2nd ed.). Baltimore, MD: John Hopkins University Press. 2004.
12. Maurice CG. From distinct to indistinct, the life cycle of a medical heresy. Is osteopathic distinctiveness an anachronism? *IJOM.* 2013;16:54-61.
13. Orenstein R. ENGAGE Initiative: Showcasing Osteopathic Scholarly Activity. *J Am Osteopath Assoc.* 2016;116(5).
14. Qui C, Feng X, Reinhardt J, Li Jialing. Development and psychometric testing of the Research Competency Scale for Nursing Students: An instrument design study. *Nurse Educ Today.* 2019; 79:198-203.

(continued on page 32)

(continued from page 31)

15. The Accreditation Council for Graduate Medical Education. Executive summary of the agreement among ACGME, AOA, and AACOM. Chicago, IL: Accreditation Council for Graduate Medical Education; 2014.
16. Specialty-specific References for DIOs: Resident/Fellow Scholarly Activity. Chicago, IL: Accreditation Council for Graduate Medical Education. https://www.acgme.org/Portals/0/PDFs/Specialty-specific%20Requirement%20Topics/DIO-Scholarly_Activity_Resident-Fellow.pdf. Updated July 1, 2019. Accessed December 1, 2019. ■

Appendix 1.

Pre-/Post-Scholar 12 Self-Assessment: The Research Competency Scale for Osteopathic Medical Students

Competency	Very unfamiliar	Know little	Know some	Familiar	Very familiar
Engagement in a ladderized mentoring culture					
Enjoyment of scholarly work					
Research question(s) and hypothesis formulation					
CITI Program requirements					
IRB application					
Grant development					
Data collection systems and statistical analysis					
Abstract development					
Poster development					
Manuscript development					
Oral presentations at meetings/conferences					
Case presentations and reports					
Total					

Abbreviations: CITI, Collaborative Institutional Training Initiative; IRB, Institutional Review Board