UNIVERSITY OF CALIFORNIA,
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# Role of Digital Scholarship on Promotion and Tenure Guidelines of LCME Accredited Medical Schools

THESIS

submitted in partial satisfaction of the requirements
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by

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# DEDICATION

Para mi papás,

Antonio Barajas y Graciela Espinoza.

Gracias por todos sus sacrificios y esfuerzo.

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# ABSTRACT OF THE THESIS

Role of Digital Scholarship on Promotion and Tenure Guidelines of LCME Medical Schools

By

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Master of Science in Biomedical and Translational Science

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In academic medicine, it is common practice for faculty to be evaluated for promotions and tenure using multiple factors including their scholarly works, as well as other contributions to their fields. In the digital age however, it is unclear how these methods of promotions and tenure align with the demands of the current health care system to accommodate rapid improvements in science and technology that could enhance clinical practice. Social Media and Digital Scholarship (SMADS), is used in various aspects of academic medicine but the impact that such scholarship plays in Promotions and Tenure (PT) has not been universally defined. We studied the role of SMADS in the PT process by quantifying the presence of SMADS associated text in the PT guidelines for the Liaison Committee on Medical Education (LCME) accredited medical schools' in the United States and Puerto Rico. We analyzed PT guidelines for 138 of the 151 eligible medical schools for the presence of SMADS associated keywords. We found that 126 of the PT guidelines included SMADS associated text, with only 83 schools implementing them in the context of Social Media and Digital Scholarship for Promotions and Tenure as judged by two study team members, but none offered well defined criteria for evaluation of SMADS or guidelines on its role in promotion and tenure. We found that social media and digital scholarship may have a role in the current inner-workings of the programs studied, but that role is not detailed and no universally accepted criteria exist.

## INTRODUCTION

Across academic clinical institutions, it is common practice for faculty to be evaluated for promotions and tenure using a combination of factors. Typically, this includes evaluating their scholarly works and the scientific rigor that produced them, in addition to reviewing other contributions to their fields, impact of their work, service to the community and their commitment to teaching and mentorship. This comprehensive and scientifically rigorous review is conducted because their work will influence the practice of medicine, medical education and patient outcomes. Improved health outcomes in relationship to quality of medical school faculty is also of interest to the American Medical Association and studied by its Council on Medical Education [1]. Over time, publications of the National Academy of Medicine have fueled various innovative efforts that have shaped modern medicine, research, and medical education as we know it today [2] [3] [4] [5]. In the digital age however, it is unclear how these century old methods of promotions and tenure align with the demands of the current health care system to accommodate rapid improvements in science and technology that could enhance clinical practice. Social Media and Digital Scholarship (SMADS), are being used in various aspects of academic medicine but the role such scholarship plays has not been universally defined. Therefore, it is important to understand the potential role of SMADS on promotions and tenure procedures today as it may offer insight that can shape the evolution of future guidelines and facilitate innovative use of SMADS.

## Previous Literature

In 1904 the American Medical Association established the Council on Medical Education (CME). The goals of the CME were to restructure medical education in the United States, offer recommendations on educational policies and appointments of representatives to medical education organizations, accrediting bodies and certification boards [1]. To accomplish these goals, the Carnegie Foundation for the Advancement of Teaching, commissioned by the CME, chose Abraham Flexner to evaluate medical education in the United States and Canada. From the early 1900's, when Flexner published his findings, through the end of the last century when the Institute of Medicine published various recommendations for medical education, and up until the most recent studies by the new Health and Medicine Division of the National Academies of Medicine, various publications have outlined how we arrived at the current state of our healthcare system, the evolution of medical education, and the demands on the faculty that make the system run[6-9].

Over a century ago, Flexner recognized the importance of standardized medical education, adherence to mainstream science in teaching and research, the need to revamp medical institutions, and appoint full-time clinical faculty [6]. He described the varied infrastructures within medical colleges (some incorporated into universities, others free-standing) and expressed concerns about how variation in the standards of education led to differences in clinical skills among physicians. To evaluate variation in clinical abilities, he called for public opinion to discriminate between ill and rightly trained physicians and additionally spoke on two factors of morality: Educational and professional patriotism. He defined education patriotism as a university's "duty of loyalty to the standards of common

honesty, of intellectual sincerity, of scientific accuracy" [6]. To define professional patriotism, he talked about "the honor of the profession and that sense of responsibility for its efficiency." He additionally quoted Lord Bacon, "Every man owes a duty to his profession" to document what he described as the burdensome obligation of medical education by self-sacrificing physicians and surgeons. His findings promoted the importance of scientific excellence as a way of being recognized relative to ones' peers. Thus public opinion and informal comparison of abilities among colleagues became standard practice for evaluation of morality at the time.

Duty to profession was then fulfilled through teaching, mentorship, service to community or to the field, and contributions to research. In order to include research and scholarship, it became equally important to evaluate scientific excellence. This was accomplished by proposing that it be quantified, including the type of publication, quality and impact, citations and grants. A century later, not much has changed in the demands for scientific accuracy, or has the sense of duty to provide high quality medical education. Science continues to provide the data needed to practice evidence based medicine taught to aspiring physicians, in order to improve clinical practice and health outcomes as it has done for 100 years.

In 1999 however, the Institute of Medicine (IOM) published "To Err is Human: Building a safer health system" and reinforced the correlation between education, research, and the quality and safety of our healthcare system [7]. While the focus of this publication was to highlight the abundance of medical errors in order to "build a safer health system", it also suggested that this safer system is to be built in part by improved medical education. It celebrated progress made in increased funding for researchers and organizations that

can develop new approaches for improved provider education as a method of error reduction. It called on professional societies to set higher standards, values and norms to improve training and decrease medical errors. Like Flexner, the IOM recognized the importance of producing high quality research and medical education, unified standards, and the direct impact these can have on health outcomes.

Two years later, the IOM published their call for a "new heath system for the 21st century" [8]. This publication outlined the gaps between the healthcare system of 2001 and the one that was actually needed at the time. In large part, the report documented that "Medical science and technology have advanced at an unprecedented rate during the past half-century…[and the] growing complexity of health care" [8]. It highlighted that the system was not keeping up with the intricacies of healthcare and was not maximizing the technology available. The Strategy for Reinventing the System, as outlined in the report, called for innovation and six aims for improvement. One of the six aims for improvement was for healthcare to be "Effective" using evidence-based medicine. Additionally, the IOM's Ten Rules of Redesign included the importance for clinical decision making to be evidence-based as well. While innovation and efficacy were intended to improve the way healthcare professionals heal patients, the Institute also cited the need to change health care delivery.

To accomplish this change, information technology and the internet as a whole were lauded for their great potential which they noted had touched every aspect of society, except medicine. At the time, the committee did not grasp the true magnitude of the internet's potential as demonstrated by their goals. They called for a "nationwide commitment of all stakeholders to building an information infrastructure to support health

care delivery, consumer health, quality measurement and improvement, public accountability, clinical and health services research, and clinical education. This commitment should lead to the elimination of most handwritten clinical data by the end of the decade" [8]. This healthcare system objective was quickly met, and innovative faculty that carry out medical education for aspiring clinicians surpassed the expectations. They have taken technology and applied it in unanticipated revolutionary ways.

Today, a driving force behind many of the efforts for improved health outcomes is the Learning Health Care System [9]. A committee assembled by the IOM in 2012 identified past problematic issues in health care, including over and under treatment, drawing parallels with current issues of "learning and adoption that are maddeningly slow…coexisting with overly rapid adoption of some new techniques, devices, and drugs, with harmful results" [9]. In this model, focus is moved from trainees and professors to one that recognizes the system as an entity that can learn, adopt, revamp faster and spread that knowledge in ways that allow adaptation and adoption by others. Learning health care systems require real-time feedback, digital capture of experiences for discovery and learning, allowing a faster connection between bench research, education and bedside application, timely modifications of medical processes, and improved health outcomes. The Learning Health Care System is to be carried out by faculty that can also adapt, develop rapid-cycle studies, adopt new techniques, and learn to adjust for the benefit of the system as a whole. While the report called for this fast paced type of frequently reassessed work, it does not resemble traditional scientific methods and procedures.

Traditionally, evidence of career achievements in academic medicine includes research, grants, publications, conference presentations, and recognition within a faculty member's field at the regional, national, and international level. Scholarship and publications includes publication in peer reviewed journals, textbooks, abstracts and research presentations. These are evaluated by the rigor of the science behind them, and the quality, impact and reach of the publication. The process of publishing work is typically regulated by the journal and quality is enforced by expert peer reviewers within that field. The caliber of these publications is then quantified by the impact or reach of the journal as well as the reputation and place it holds within that field. While these procedures are functional and uphold standards of research, they are not always timely. Public scrutiny during abstract presentations at academic conferences is a way to receive feedback to adjust the research but these forums historically take place annually. It can be years from the time the research is started until it is completed and even longer to time of publication. From there, it can be months to years before the work is disseminated broadly enough to affect medical education and clinical practice. The current way we evaluate methodology and publish in academic medicine does not promote rapid cycle methodology or adaptive scholarship when warranted.

A rapidly growing component of medical education is the use of social media and digital scholarship (SMADS). SMADS in this context is defined as non-traditional forms of scholarship including a wide variety of social media platforms, online forums, video content development, blogs, podcasts/webcasts/vodcasts, and other digital or web-based content development. SMADS is as a means of fast-paced production, publication and dissemination of preliminary and conclusive scientific content that can influence evidence

based medicine and medical education. The inherent characteristics of SMADS, have the potential to achieve and improve on many of the goals of traditional scholarship and those of the IOM aimed at using technology for improve health outcomes. The reach of the internet allows dissemination of knowledge and faculty exposure within their professional fields at the local, national and international levels. Because the work is digital, it lends itself to platforms that not only allow wide reach, but also real-time feedback from peers. This access potentially creates opportunities to adjust and improve the work in a timely manner, and promotes fast paced dissemination of revised work, at a pace unmatched by traditional scholarship. Unfortunately, this work may go unrecognized by governing bodies of their respective institutions [9] [10].

While there are numerous benefits to SMADS, it is not without fault. SMADS production varies widely in form and quality. While there are digital journals that attempt to implement similar guidelines to those of traditional scholarship, publication in the digital world is for the most part unregulated. There is no governing body that oversees all the work published or evaluates digital content before publication and there is not a system in place to verify the identity of the author, or criteria used to produce the work.

Given the various downfalls and benefits of traditional scholarship and SMADS, academic clinical faculty are left to decide for themselves how they will implement technology into their work. To decide how to invest their time, faculty turn to reference materials available for medical education. Currently, promotions and tenure (P&T) committees, or similar bodies, in medical schools accredited by the Liaison Committee on Medical Education (LCME) have individual guidelines for their institution. Standardization of

medical education takes place according to the LCME Function and Structure of a Medical School Standards for Accreditation of Medical Education Programs Leading to the MD Degree [11]. The document outlines that programs are required to create and follow their own procedures using the following parameters:

> **"4.3 Faculty Appointment Policies**
>
> A medical school has clear policies and procedures in place for faculty appointment, renewal of appointment, promotion, granting of tenure, remediation, and dismissal that involve the faculty, the appropriate department heads, and the dean and provides each faculty member with written information about his or her term of appointment, responsibilities, lines of communication, privileges and benefits, performance evaluation and remediation, terms of dismissal, and, if relevant, the policy on practice earnings."

It is therefore, up to each individual program to define their own guidelines for promotion and tenure. While this is a unifying reference document from the LCME for all schools, it is not detailed enough to standardize PT practices among all schools. In addition to the lack of standardization of general promotion and tenure guidelines, the LCME does not specify a role or need for SMADS. However, even if SMADS work were listed as acceptable evidence of achievement within PT guidelines, the LCME does not offer criteria to quantify or evaluate the merit of SMADS work or the platform it is published on.

In order to address evaluation of SMADS content, to date, various efforts have been made to develop guidelines and criteria that can be applied in different ways. The issue of SMADS evaluation is not unique to the medical field. Other disciplines are also investing in finding solutions. Developers have attempted to meet the demand for quantitative and qualitative tools for SMADS. One example is products like Altmetric, whose mission is to "track and analyze activity around scholarly research outputs" [12]. Altmetrics measure the

reach of a digital work and provides a score that represents the attention a specific research article received. Additionally, it counts of times a publication was cited, mentioned or shared on social media such as Twitter, among other metrics of interest. Another developer, Plum Analytics, offers a product called PlumX Metrics. It also quantifies and tracks how people are interacting with specific digital work such as articles, conference proceedings, or book chapters, using a wide variety of metrics [13].

Other fields have made their own efforts to address the need for guidelines to evaluate SMADS and how it fits into PT proceedings. In 2015, the American Historical Association (AHA) published what they called "Guidelines for the Professional Evaluation of Digital Scholarship by Historians [14]. It is a document developed by the Ad Hoc Committee on the Evaluation of Digital Scholarship by Historians, approved by the AHA Council. They recognize a challenge similar to the one the medical community is facing when it comes to the evaluation SMADS. The committee outlined roles and responsibilities of both the departments of history and scholars alike when it comes to use of digital scholarship. Additionally, the document highlighted the role that the AHA will play in advancing the opportunities afforded by the technology while upholding the principal values of scholarship and offers further recommendations for updating guidelines moving forward.

In the fields of Architecture and Art, the Society of Architectural Historians and the College Art Association have also developed reference resources to standardize the way SMADS is integrated in their fields. With funding from the Andrew W. Mellon Foundation, a Task Force was assembled to Develop Guidelines for Evaluating Digital Art and Architectural History for Promotion and Tenure [15]. This document emphasizes the fact

that digital technology is not static. Because it is constantly evolving, the Task Force identified the need for flexible but concrete reference parameters and called on every institution to develop their own guidelines for excellence in digital scholarship. It then offered definitions and criteria for their members to become better informed on the subject of digital scholarship and technology, digital publication, and how to evaluate the work. In 2012, the Modern Language Association also released "Guidelines for Evaluating Work in Digital Humanities and Digital Media" [16]. These extend beyond just evaluation of digital media quality but are also intended for the purpose of promotions and tenure

> "designed to help departments and faculty members implement effective evaluation procedures for hiring, reappointment, tenure, and promotion. They apply to scholars working with digital media as their subject matter and to those who use digital methods or whose work takes digital form."

These guidelines are not specific in the way digital scholarship is evaluated or quantified, but it offers definitions and parameters for the corresponding departments to adapt.

In the field of medical education, no task force, committee, medical association or governing body has published concrete guidelines for SMADS use, evaluation or for PT procedures. In an attempt to fill this gap, academicians have explored and offered their own solutions. Digital scholarship is vastly different from traditional scholarship but a lot of the same principles apply. As Sherbino, et al. put it, SMADS must be judged through a different but equally legitimate lens [17]. As a result of this need, several publications have suggested criteria for use and evaluation of digital scholarship. Gruzd et al. conceded that the use of social media is not currently widely recognized at most research institutions as part of the P&T review process but will likely change as institutions become more open-minded in terms of qualifying 'scholarly publications' and activities on social media sites under the "research or service component" [10]. Most recently, Cabrera, Roy, and Chisolm,

identified some of the challenges associated with use of social media and proposed strategies to evaluate quality and impact of these works for academic promotion and tenure [18]. Despite these efforts and increased use of digital scholarship by faculty, universal evaluation of SMADS in medical education is undefined and it is still unclear how and to what extent the amount of time faculty invest in these types of works will impact their achievements for promotion and tenure.

The various publications above span over a century's worth of history of the medical profession, the science that supports evidence based medicine and the learning healthcare system currently developing. Among them, reoccurring themes persist: improved patient outcome is the number one goal, the quality of clinician is still considered a direct result of their training, medical education is shaped by the scientific works of the faculty, and standardizing all of these elements will improve patient outcomes. All of these key components can transform the way the learning health care system is implemented but without standard unified guidelines for use and evaluation of digital work, the current state of how faculty will be evaluated is in the hands of the individual universities. Thus it is key to have a better understanding of the evaluation criteria, incentives, and current reward system for medical education faculty to engage in these non-traditional forms of scholarly works that aim to meet the pace and demands of the learning health care system in the digital age.

## Research Aims

As faculty around the country strive to contribute to the Learning Healthcare

System and improve healthcare outcomes through innovative research, technology is being integrated into academic medicine and medical education at an unprecedented pace. Some faculty spend valuable time creating digital scholarship that advances their fields, benefits the community at large, and gains them local, national, and international recognition. The work of such faculty is being disseminated via non-traditional platforms. At this point it is important to understand how their efforts and creative works will be systematically and rigorously evaluated, recognized and translated into academic advancement toward promotion and tenure, if at all. It is unclear if as a result of the trending use of digital scholarship, individual Academic Promotion and Tenure Committees (APTCs) at various institutions are incorporating SMADS into their guidelines and broadening their definition of scholarship to be more flexible and inclusive. This research aims to study the role of SMADS in the process of promotion and tenure of faculty by quantifying how it is currently outlined in each LCME accredited medical school's PT guidelines.

## METHODS

*Data:*

In order to study the role of SMADS in current PT procedures for LCME accredited medical schools, the presence of keywords associated to SMADS was quantified for each schools' PT guidelines. The population of interest was defined as all LCME accredited medical schools in the United States according to the October, 2017 LCME website list of

"Accredited U.S. Programs" and it was revised on April 13, 2018 using the most current updates made on March 20, 2018 [19]. All schools were included in study sample unless they met any one of the exclusion criteria: 1. No guidelines were found, 2. guidelines specific to medical education were not found or 3. guidelines were password protected or otherwise no accessible to the public.

To find documents that outline PT procedures, web-searches were conducted using the search engine www.google.com. All queries were initiated using the words "promotion tenure guideline* advancement" based on the content in the documents of interest. The asterisk (*) was added to search both singular and plural, guideline and guidelines. These words were followed by the individual name of the institution as it appears on the LCME Accredited U.S. Programs list [19] to ensure identifying the correct school. Every query ended with "domain: .edu" to narrow the results down to websites and documents that originate from educational websites. If unsuccessful, a second, unstructured query was conducted to locate the school's direct website and the section for faculty affairs or equivalent that housed PT guidelines. When necessary third queries were made using terms identified as relevant during the first two queries. For example, if the initial results indicated that a school uses the word "personnel" instead of "faculty" or "criteria" instead of "guidelines," subsequent free-form searches were conducted including these new terms.

The results of these queries were reviewed with the goal of finding documents that outlined promotions and tenure procedures for each school in a ".pdf" format that would allow keyword searches, but other formats were collected including ".word" and ".jif". Alternatively, when no document was available for download, but web-content that outlined PT procedures was identified, it was copied, pasted into a word document and

saved as a ".pdf" file to facilitate the keyword search without allowing future editing of the document.

In order to identify social media and digital scholarship text outlined within PT procedure documents, keywords associated to SMADS were used as a marker of presence and evaluated as outlined below. The SMADS keyword bank was composed using words commonly found in relevant literature, discussions with a research librarian who is well versed in digital scholarship, and brainstorming with thesis committee members. Keyword bank was updated to adopt words found within PT documents in the process of carrying out these methods.

Keyword identification was conducted by opening all .pdf documents in Preview software on a MacBook Pro, using the 'command + F' find feature followed by entering one of the keywords. Presence of each word was quantified and documented by school. Preview results did not discriminate the context, it only located the presence of the collection of letters. Any time the string of letters was identified, it was included in the results. This showed which documents contained the word and how many pages within each document had the word of interest. These numbers were recorded under the "ALL" category.

For every term identified, review was conducted for accuracy and context. First each appearance identified was individually verified for accuracy of the word of interest. This determined if the finding was the correct word. Verification for accuracy was key because when searching the word "form" results included the words in**form**ation, in**form**ed, and other variations that include that string of letters. Verification of each word was conducted any time the string of words was identified by Preview. Context evaluation ensured that the keyword identified was being used in the context of interest. That is, finding the correct

word such as “social” but distinguishing between relevant use such as “social media” versus when it is used in the context of “social work” or “social sciences.” Once the word identified was verified as used in the correct context, it was classified into one of two categories: Promotions and Tenure category or Basic Principles category. Promotions and Tenure (PT) category included every time a word was used to describe anything related to crediting faculty for SMADS in the context of PT procedures according to the rater reading the document. Basic Principles (BP) category included every time a word was used to describe university’s basic principles of regulating faculty as they pertain to conduct, rules, and regulations for use of social media, internet platforms, and other digital tools. In order to classify the word into the proper category, the headings, sub-headings and text preceding and following each work were read for context. Each keyword’s presence and classification was recorded by school. Any time the word was used in any other form not fitting of these two categories, it was excluded.

Documents that had inaccessible text that could not be searched as described above were reviewed using different methods. These .pdf formatted pictures or scanned copies of PT documents were manually reviewed. The PT sections of these documents were read, searching for all keywords, and applying the same criteria as that used to classify and document their use.

Data was collected on the “PT Thesis” database created using IMB SPSS Statistical Software, Version 25 to document use of keywords. Each school was entered as a case number and assigned a study ID, to document known categorical variables such as school location (state), accreditation status (Full, Full, on probation, preliminary, provisional), and type of document found if any was classified using numbers: 1=medical education

guidelines found, 2= medical education guidelines found but it is a picture .pdf that cannot be search, 3= medical education guidelines inaccessible/password protected, 4=only found non-medical education guidelines, 5=no guidelines found. Numerical-continuous variables included year the school was initially accredited by the LCME and the year the guidelines were last updated. Dependent variables tracked included each keyword occurrence entered as a numerical-continuous value as a variable for each of the three categories: All_*(keyword)* for any time a keyword was found, PT_*(Keyword)* to document use of the keyword that qualified for the PT category, and BP_*(Keyword)* for those that fell into the BP category. Given the fact that all keyword presence would vary by length and type of document, all keyword data were converted into dichotomous variables (0=0 and anything above 0=1). This converted the data to track if a term was present at least once within each category.

Interrater reliability testing for the classification of keywords into the PT and BP categories was conducted. A blinded second rater received a randomized sample of 20 guidelines and was given the instructions on keyword identification, verification, and classification. Every time a keyword was identified within the 20 guidelines, the second rate, an emergency medicine physician with experience in medical education categorized the words into either PT, BP, or neither. These results were recorded. Data was entered into the SPSS database and kappa was calculated for reliability between raters. Interrater reliabilities (k) for classification of keywords used for PT procedures and BP rules and regulations varied slightly. For PT, there was Almost Perfect level of agreement with a kappa of 0.913. The BP rules and regulations kappa was strong with a kappa of 0.87.

*Statistical Analysis:*

The PT Thesis data was verified twice and missing values of excluded schools were excluded from analysis as the true data they contain is unknown. From the information about each school, distribution of key variables was calculated including type of LCME accreditation, and range, mean, and median values for year of initial accreditation and year of most recent guideline update. Primary outcome measures included dichotomous presence or absence of SMADS associated language by school and number of terms used by each school, with a range, mean, and median was calculated for all schools. Additionally, keyword distribution was analyzed to see total number of guidelines that contained each keyword and it's use within each of the three categories, calculating range, mean and median.

Secondary outcomes of this research were documentation of qualitative findings adding to the understanding of the role of SMADS in PT guidelines. These were recorded in a notebook while carrying out the methods. These focused on observations about the content within guidelines, relationships and differences between guidelines, findings regarding the general state of the PT process and how it relates to SMADS, as well as public opinions encountered in the process.

## RESULTS

*Schools:*

Study population consisted of all LCME accredited M.D. programs in the United States and Puerto Rico which according their website, as of October, 2017 this included 149 programs; by April, 2018 that was updated for a total n=151 programs of various accreditation types and years as outlined in Table 1. Of these 147 (93.4%) are found across 45 states in the United States and 4 (2.6%) in Puerto Rico. Initial accreditation year among these programs ranged from as far back as before 1942 when the LCME was founded, up until 2018 when the most recent programs were accredited. Of all the programs, 73 (48%) were accredited M.D. programs before 1942, with mean and median years of accreditation at 1963 and 1945 respectively. Of the 151 programs, 139 (92%) currently hold Full accreditation, 1 (0.7%) has Full accreditation but is currently on probation, 10 (6.6%) have preliminary accreditation, and 1 (0.7%) has provisional accreditation.

*Table 1: LCME Schools*

| School Information | n=151 | Range | Mean | Median |
|---|---|---|---|---|
| **Initial LCME Accreditation Year** | n=151 | 1942*-2018 | 1963 | 1945 |
| **LCME Accreditation Status** | | | | |
| Full | n=139 | | | |
| Full, on Probation | n=1 | | | |
| Preliminary | n=10 | | | |
| Provisional | n=1 | | | |
| States | 45+PR** | | | |
| | | | | |

*73 schools accredited on or before 1942

**PR: Puerto Rico

*Guidelines:*

After conducting web-searches for each program, 13 programs had to be excluded as outlined in Figure 1. Of the 151 programs, 6 (4%) had to be excluded because no documents or content related to PT procedures were found and 2 (1.3%) were excluded because only school-wide PT guidelines were located, not ones specific to the medical program. Of the 143 (94.7%) schools that had medical school PT guidelines available, 5 (3.5%) were inaccessible because they were password protected and thus had to be excluded. In total, of the 151 programs, medical program guidelines were located for 138 (91.4%) of schools. There were 4 (2.9%) guidelines that were formatted as photographs and thus text could not be searched using Preview. These were excluded from the digital search, but a manual search of the text was conducted and documented with the rest of the data. Of the included guidelines, date they were most recently updated was available for

129 of the programs. All 129 guidelines have been updated between 2002 and April, 2018, with 2014 and 2016 as the mean and median years of last update respectively. The distribution of the year of most recent update in Figure 2 also demonstrates that 125 (96.9%) schools have updated their guidelines in the last ten years (between 2008-2018) and 105 (81.4%) schools have updated in the last five years (2013-2018).

*Figure 1: School Inclusion-Exclusion Break Down*

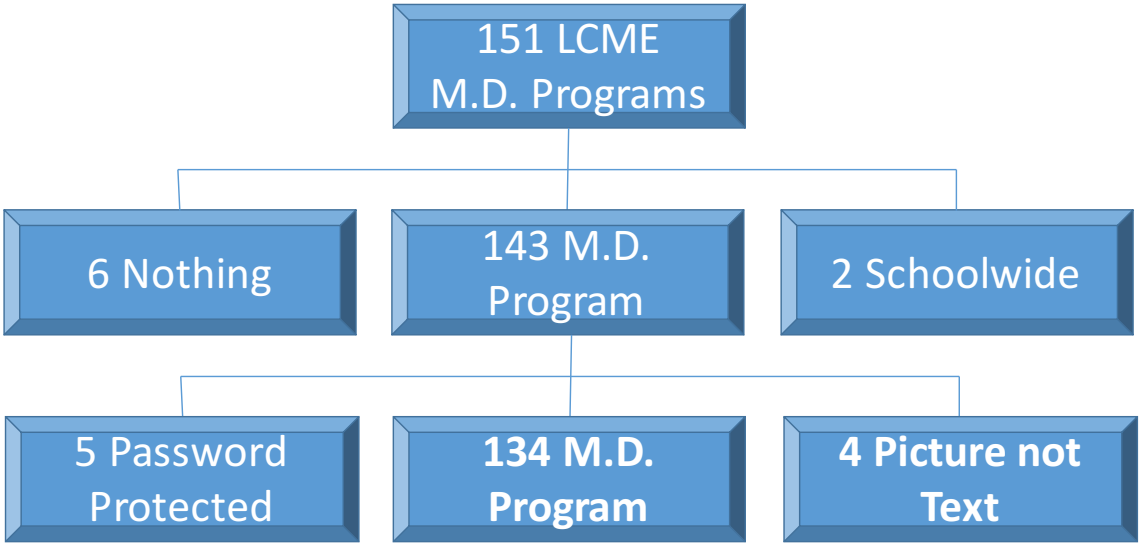
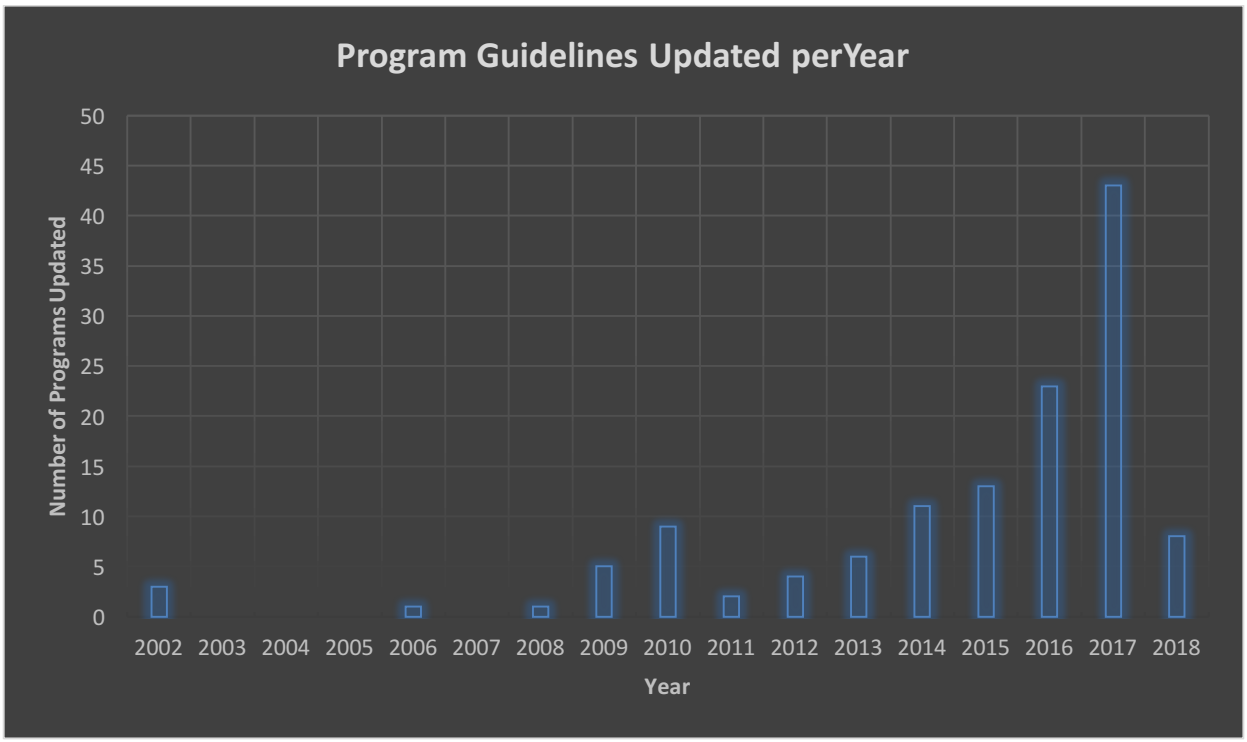


*Figure 2: Distribution of Number of Program Guidelines Updated per Year (n=129)*




*Keywords:*

Keywords associated with SMADS were the markers used to determine presence of associated language within PT guidelines. The list of words, outlined in Table 2, was compiled through literature searches, discussions with faculty, and in the process of reviewing guidelines. Words included broad terms used to describe various types of modalities (i.e. media), functional components used for SMADS (i.e. website, blog, platform), adjectives used to describe the work (i.e. electronic, digital, virtual), measures of reach (i.e. follower, subscriber), and specific names of products used (i.e. PlumX, Twitter, Facebook). Of the 37 words identified, 12 (32.4%) were not found in any of the guidelines, these were recorded as zeros in the database. Analysis was conducted on data collected using the remaining 25 SMADS associated Keywords.

*Table 2: SMADS Keyword Bank*

| Found in PT Guidelines | | Not Found |
|---|---|---|
| Blog | Podcast | Alt-metrics |
| Chat | Snap | Altmetrics |
| Digital | Social | Cache |
| Electronic | Tumblr | FOAM |
| Facebook | Twitter | FOAMEd* |
| Flickr | Video | Permalink |
| Follower | Viral | PlumX |
| Forum | Virtual | Subscriber |
| Instagram | Web-based | Tweet |
| LinkedIn | Webinar | Vlog |
| Media | Website | Vodcast |
| Network | Youtube | Winnower |
| Platform | | |

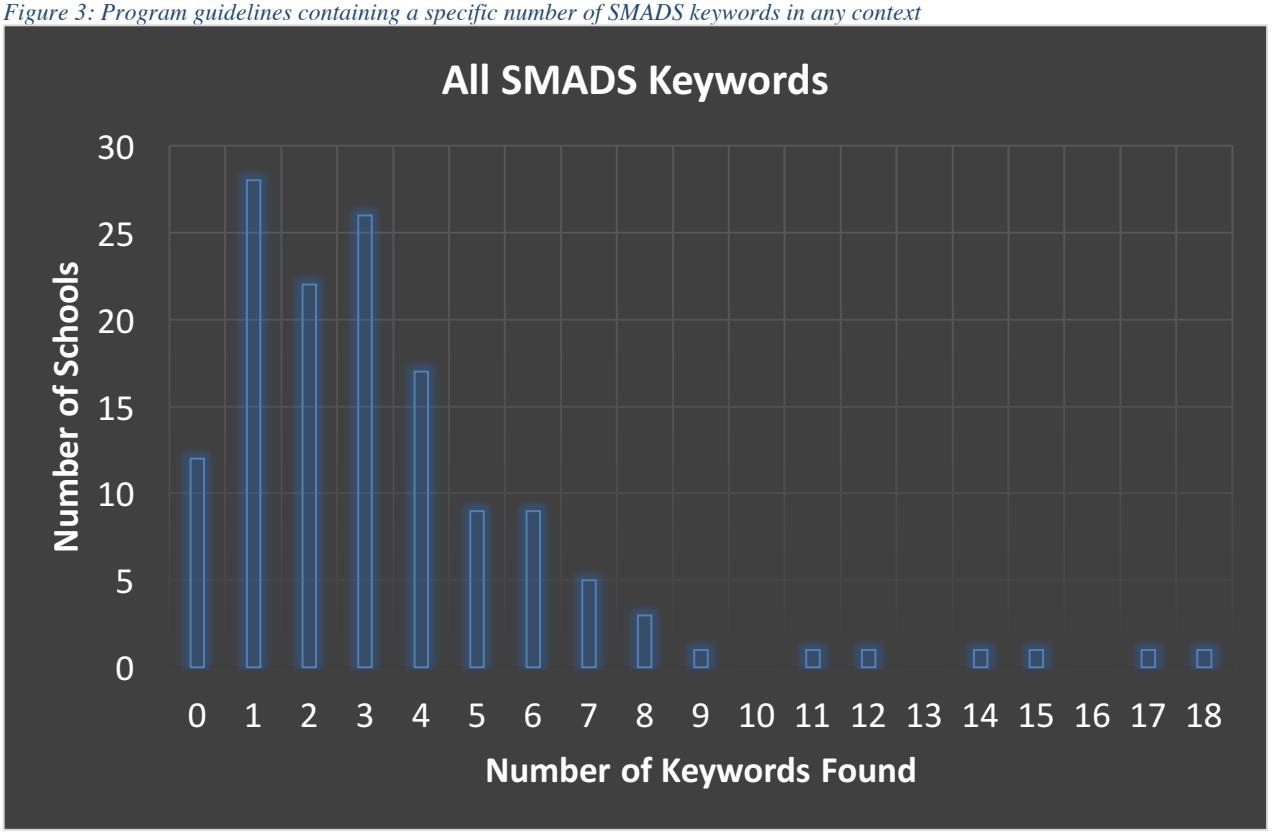
*Free Open Access Medical Education

*Data by Program:*

Findings within guidelines of each program were recorded and the sum of keywords identified per program within each of the three categories (ALL, PT, BP) were recorded, see Appendix A. List of programs are organized by state, with the addition of the two most recently schools listed at the bottom. Programs with no guidelines available for analysis we excluded from database.

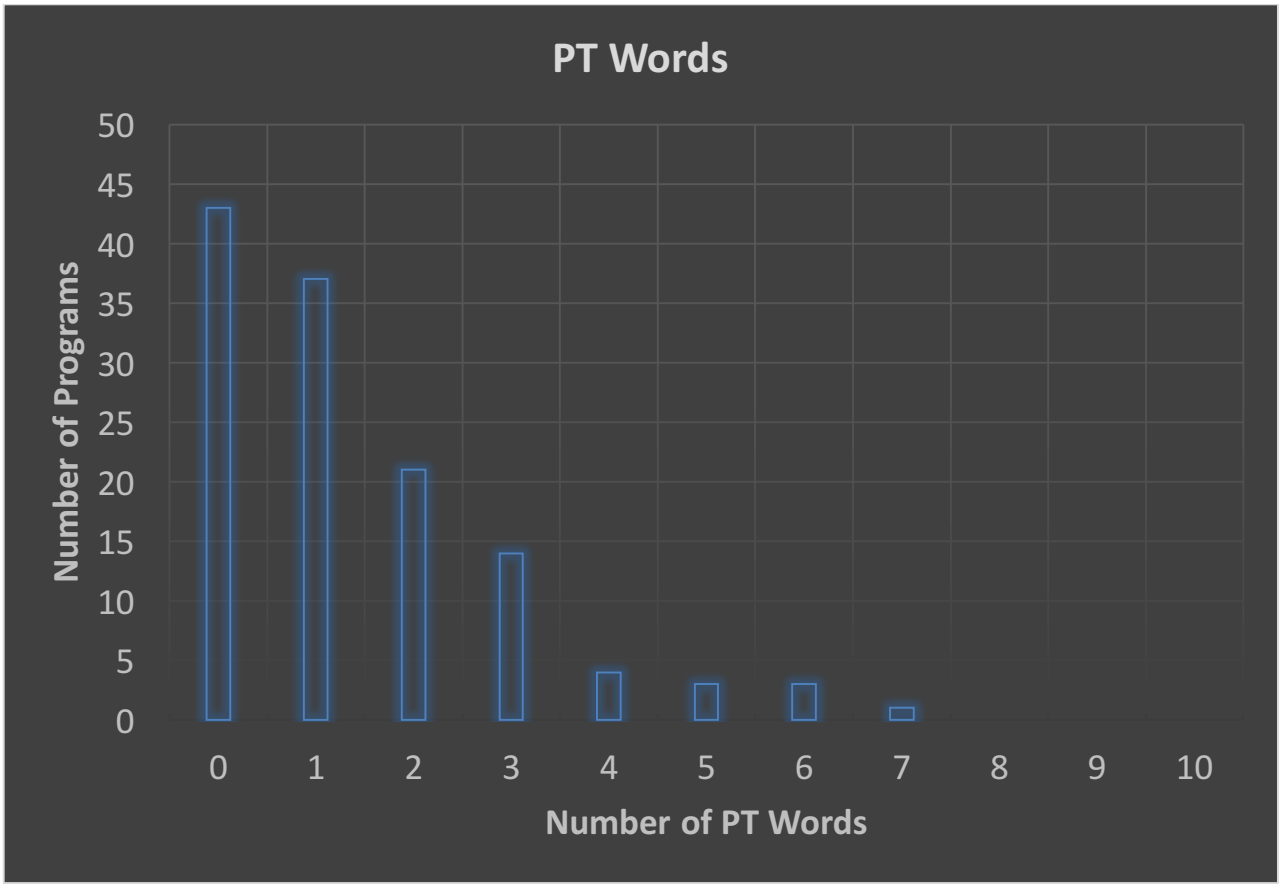
Of the 138 programs, 12 (8.7%) did not contain any of the terms in the SMADS Keyword Bank. The other 126 (91.3%) programs contained at least one of the terms. Number of different words found per document without distinction of its use ranged between 1-18 keywords, with a mean of 3.75 and median of 3. As seen in Figure 3 however, 131(94.5%) of the 138 programs contained less than 9 different keywords.

*Figure 3: Program guidelines containing a specific number of SMADS keywords in any context*



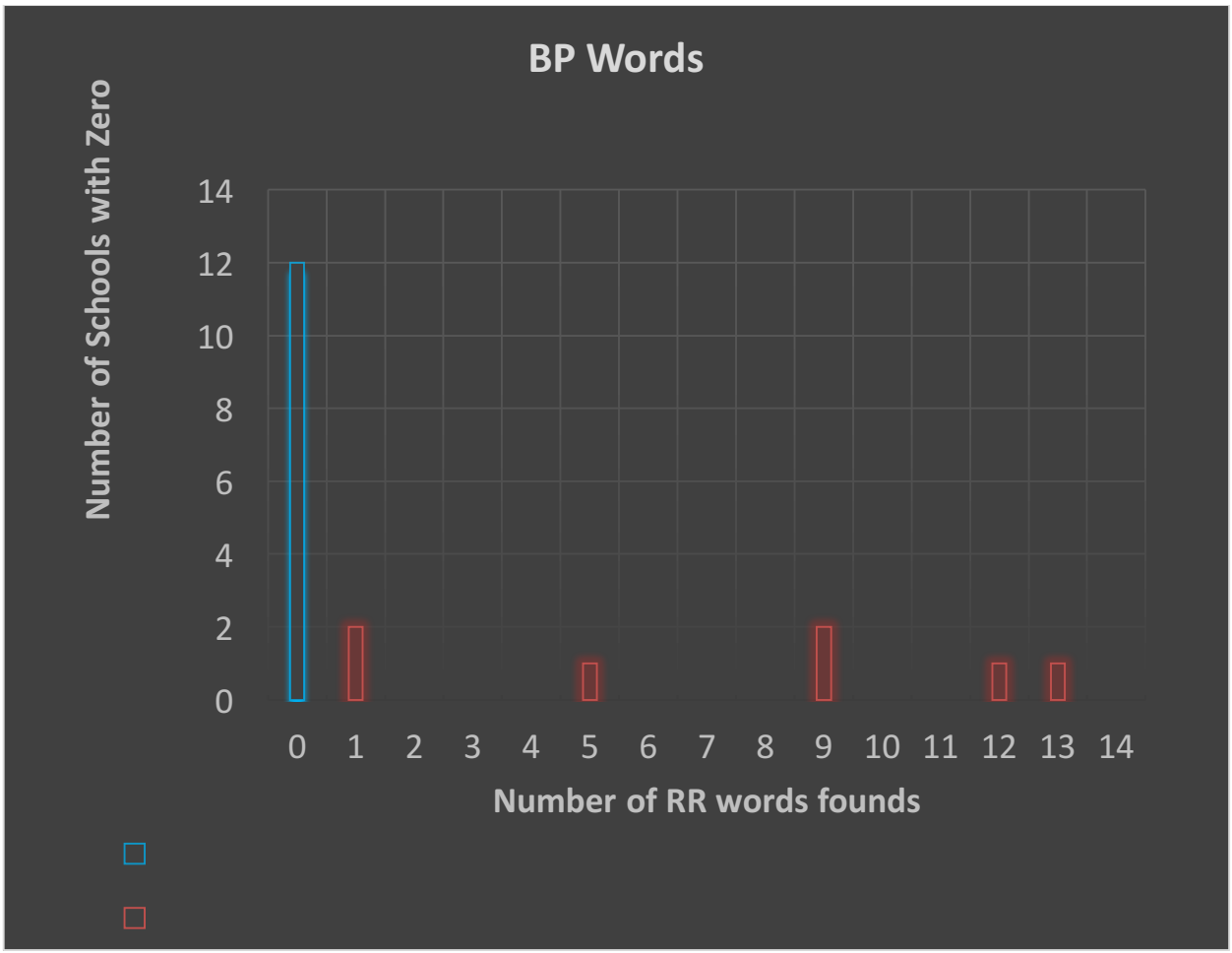
Once SMADS word use was classified into PT and BP, 41 (32.5%) programs did not use SMADS keywords in either context, 5 (4.0 %) contained terms for both PT and BP processes, 2 (1.6%) just for BP and 78 (61.9%) used them only in the context of PT advancement. Of the 126 program guidelines that contained SMADS keywords for classification by PT use, it was determined that 43 (34.1%) of the guidelines did not use any of the terms in the context of promotions and tenure procedures. The remaining 83 (65.9%) guidelines showed presence of at least one SMADS Keyword to credit faculty for advancement of promotions and tenure. The number of different terms found per guideline ranged from 1-7 keywords, with a mean of 2.13 words and a median of 1 term per guideline. The distribution of these findings can be visualized in Figure 4.

*Figure 4: Program guidelines containing a specific number of SMADS keywords associated to Promotions and Tenure*



Of the 126 program guidelines that contained SMADS keywords for classification by BP use, it was determined that 119 (94.4%) of the guidelines did not use any of the terms in the context of basic principles of conduct. The remaining 7 (5.6%) guidelines showed presence of at least one SMADS Keyword to describe basic principles of conduct, rules and regulations for use of social media, internet platforms, and other digital tools. The number of different terms found per guideline ranged from 1-13 keywords, with a mean of 7.14 words and a median of 9, the distribution of these findings is visualized in Figure 5.

*Figure 5: Program guidelines containing a specific number of SMADS keywords associated to Basic Principles of Conduct*



*Data by Keyword:*

In order to evaluate use of keywords, the frequency of SMADS terms found throughout all guidelines was documented. The sum of programs using each keyword was recorded, see Appendix B. The list excluded keywords not found at all and are organized from greatest to lowest frequency of all uses.

Of the 37 SMADS Keywords, 12 (32.4%) were not found in any of the program guidelines. The other 25 (67.6%) keywords were found at least in one document. Number of programs using each keyword without distinction of its use ranged between 1-99 programs, with a mean of 19 programs using each keyword. Word use in the context of PT varied with a range between 1-40 programs using each keyword, and a mean of 11 programs. In comparison, use of words in the context of BP had a range of 1-6 programs per word, with a mean of 3 programs. The distribution of the number of programs using each keyword and the context of use is visualized in Figure 6. In order to better visualize this data, the data was broken down into two graphs. Figure 7 includes all words that were used by 20 or more programs and Figure 8 includes all words that were used by less than 20 programs, but were used at least by 1 program.

*Figure 6: Programs using each SMADS keyword in any context (ALL category)*

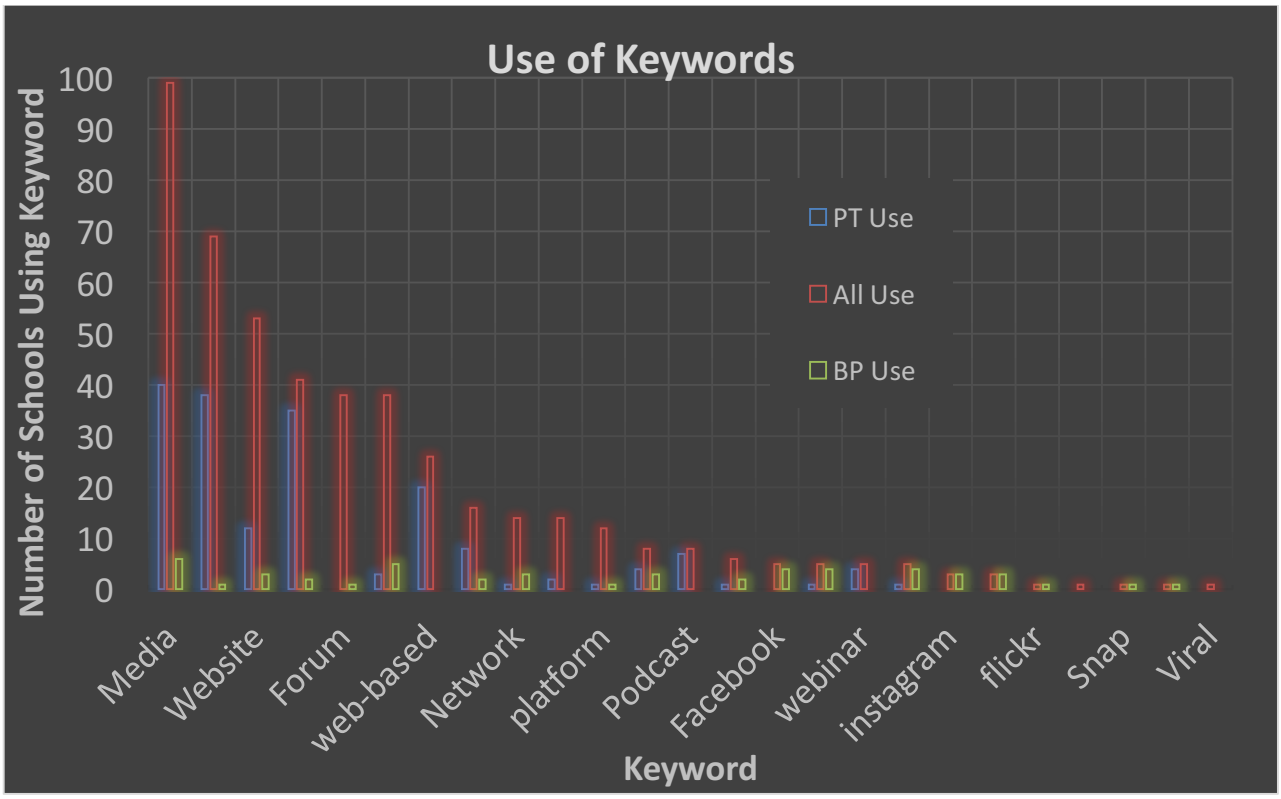


*Figure 7: Programs using each SMADS keyword 20 or more times by category (ALL, PT, or BP)*

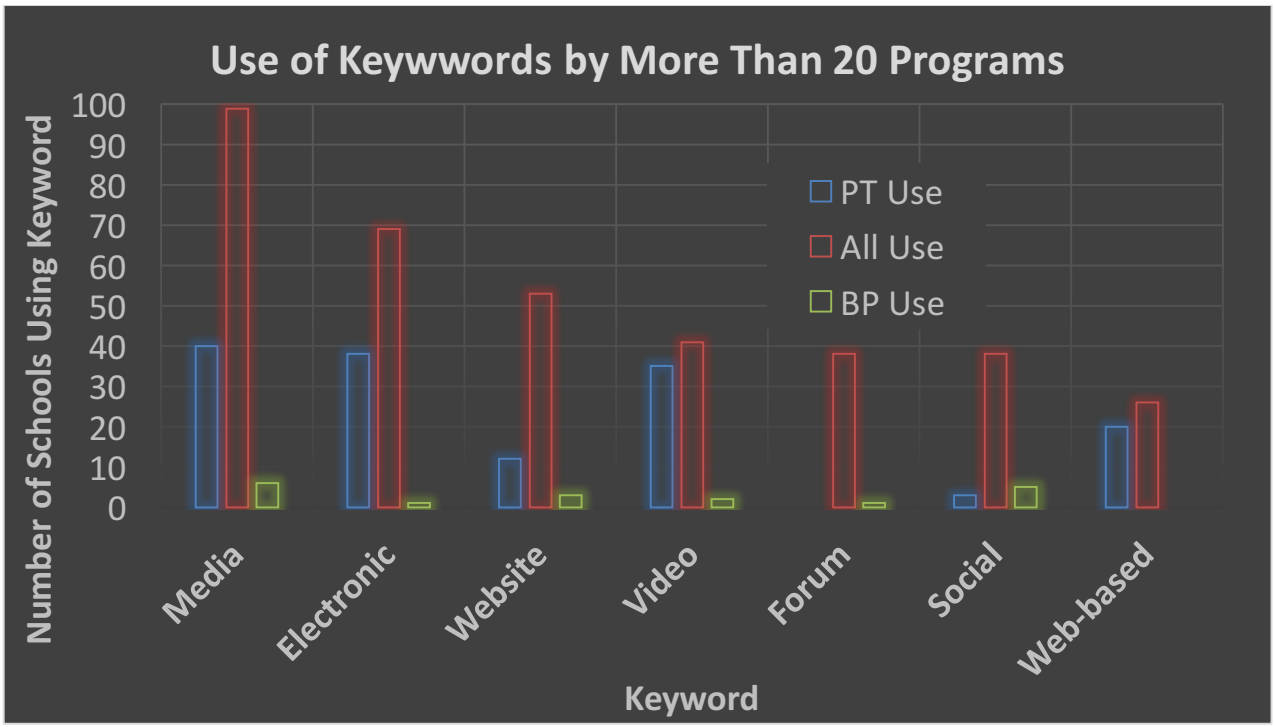
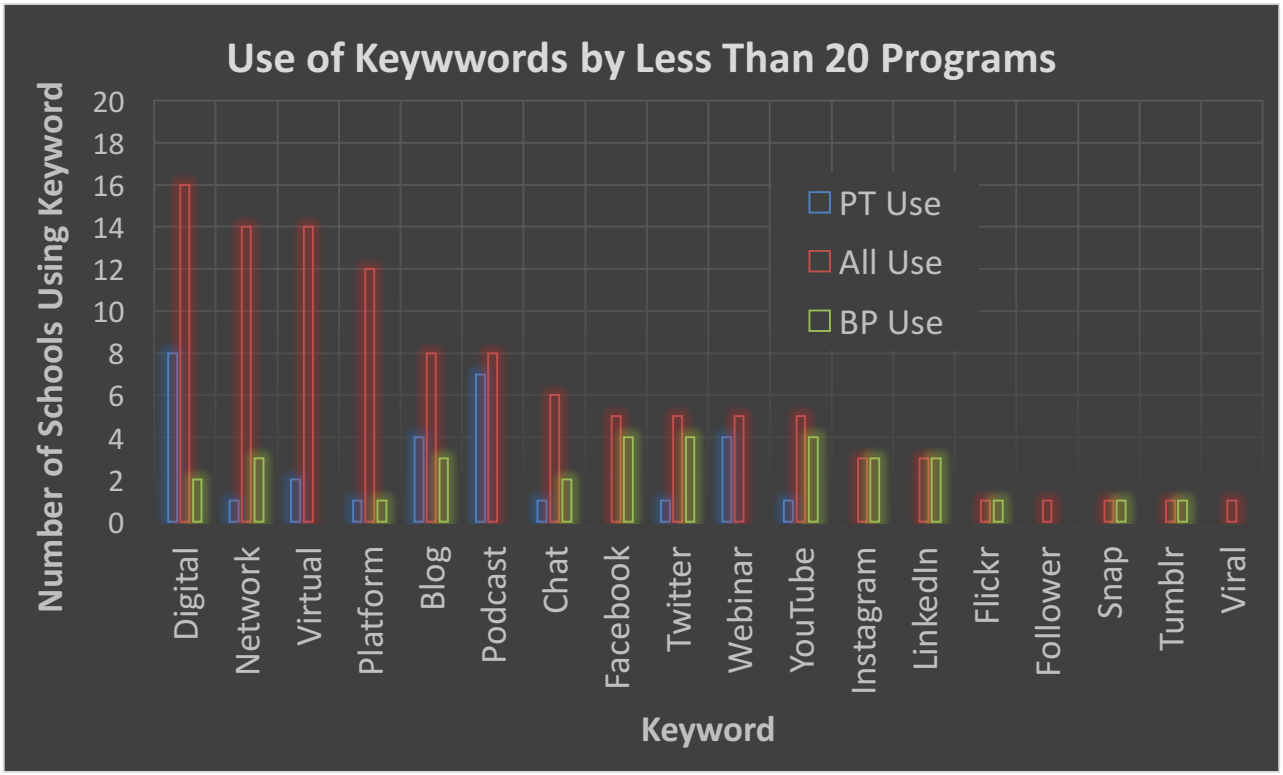



*Figure 8: Programs using each SMADS keyword less than 20 times by category (ALL, PT, or BP)*



*Qualitative Observations*

Findings unique to the qualitative nature of this project include identification of a variety of different uses and contexts of the SMADS keywords. Searching "social media" together resulted in all findings of either word, not just the combination of the word. The word was separated since "media" could be associated with other platforms such as "digital media" or "electronic media". Results for "social" returned all contexts including social work, social sciences, social policy, and social security. Results for "media" highlighted any instance in which that string of letters was present including "im**media**te," "re**media**tion," and typographical errors of the word "Medical" that appeared as "**Media**l Education" or "**Media**l School." With the intent of identifying programs that recognized social media followers as a quantifiable measure of impact, when we searched "follower" only 1 program used the word. The context of its use was "Jesus Christ taught His **followers** to see His Father as wishing only to save and heal the people of this Earth.'' In trying to identify presence of messaging forums, the word "chat" was searched. Among the results were sentences including "resear**ch at"** as well as "**Chat**tanooga".

In addition to keyword search results, observations about the relationship between guidelines were identified. While all programs use similar keywords for PT guidelines, it quickly became clear that there is was no standardization. These varied by length of documents, types of documents (handbooks, guidelines, criteria, forms, checklists), ranks and tracks faculty advance on, where the documents are house and entities of oversight. Universities that have sister-campuses sometimes used the same guidelines such as the University of California system, while others simply developed their own criteria.

In the process of this work, informal discussions with faculty as well as advancement committee members from different institutions shed light on the relationship between SMADS and PT procedures. The informal summary of their opinions and anecdotal experiences are summarized below and reported anonymously:

Summary A-APTC member's opinion: Guidelines should not be concise checklists otherwise there is no need for a committee. If detailed criteria existed with thresholds citing minimum number of publications with a given impact index, number of research grants, or blogs, or podcasts, then that information could be entered into a computer and computer software could decide if the faculty member should advance. One of the goals of the committee is to evaluate the quality of each of the candidate's works. Additionally, the committee takes into account other non-quantifiable contributions to faculty member's field such as service to their community, to teaching and mentorship, local, national, and international recognition. The overall achievement of the candidate as a whole is what is considered for advancement.

Summary B-Faculty Member: Faculty are discouraged from SMADS work. Their department feels that it takes away from traditional scholarship which is the only type recognized for advancement.

Summary C-Faculty Member: There is a huge need to develop guidelines that give credit for SMADS. According to this person, they invest incredible amounts of time developing SMADS content because that is the preferred method of delivery for end users they work with, it is open access, reaches as far as the internet will go, but it does not have the validated 'scientific rigor' of traditional scholarship so it is not credited towards advancement.

Summary D-Faculty Member: Since this [SMADS] is the future of education, it will be interesting to see the impact it will have on recruitment of faculty. Will a candidate choose an academic appointment at one institution over another based on which institution will recognize their SMADS achievements towards advancement of their career?

These opinions are a biased convenience sample of faculty that are familiar with and promote use of SMADS in medical education. It is in no way meant to be representative of any larger body of academicians or anyone associated with this project. They simply illustrate the reactions encountered in the research process.

## Discussion

As evidenced by the quantitative and qualitative findings, social media and digital scholarship may have a role in the inner-workings of the programs studied. The presence at each institution varies in frequency and context, but the majority of it was for the purpose of promotions and tenure. While the presence of SMADS associated text in guidelines was identified, it was poorly defined, it played a limited role, and there were no standardized criteria implemented across medical education. Thus, despite having a presence, the use of SMADS has a poorly-defined role that is insufficient to meet the demands of learners and the Learning Health Care System.

The fact that over 90% of guidelines were open access and digitally available allowed this research to be representative of the majority of programs around the country and is promising for future research as we follow adoption of SMADS for advancement. It is also reassuring that the documents outlining expectations and procedures of promotion

and tenure at these institutions is available to the public. While entities of the study sample were all LCME accredited institutions that have met the minimum requirements for accreditation, the LCME guidelines for advancement is only one sentence long. The LCME dictates the need for guidelines, not clearly defining detailed content to be included. Thus it is no surprise that the various guidelines are not as standardized as would be necessary for regulation of quality of training for physicians and patient care. The lack of uniformity among guidelines is relevant because it makes it difficult to define one set of universally acceptable metrics for SMADS content going forward.

The content of each program's guideline varied greatly in the number and types of words used. As visualized in Graphs 1 and 2 both with a right skew, programs using greater number of keywords are not the norm. Thus, even if over 60% of all programs are using these keywords, not all of them are doing it at the same rate. Interestingly enough however, all programs using more than 10 different SMADS keywords, all included use in the context of Basic Principles of conduct. This sheds light on the fact that we may be in the early stages of adoption for rules and regulations of proper use of social media and digital platforms by faculty, but in the early stages these guidelines are more detailed than those for promotions and tenure.

The keyword searches proved to be a much better marker of presence than expected. The software used had limitations leading to non-specific identification of words of interest as demonstrated in the qualitative observations of keywords. Despite these non-specific identification of words, individual verification of each term ensured more accurate results. Once verified, using digital searches facilitated evaluation of program guidelines with over 90% of guidelines containing keywords associated to SMADS. The findings

however suggest that whatever presence currently exists in program guidelines is over 61.9% in the context of promotions and tenure only, 1.6% to basic principles of conduct only, 4% to both, and 32.5% to neither. Unfortunately, the guidelines that contain this language do so using vague descriptions. This suggests that we are still in the early stages of SMADS adoption and its role is not clearly defined. With over 60% of all guidelines studied demonstrating a role of SMADS associated language without refined metrics, there is a need to focus future energies on developing metric tools and establishing universally accepted criteria to evaluate and credit SMADS work.

While the presence of SMADS is supported by the findings, its role is not clearly defined. Of the various keywords used, it was found that broad terms were used more often than any other terms. This was especially true for keywords used in the context of promotions and tenure. General keywords used describe categories and types of SMADS were the most common terms found (i.e. media, electronic, video). As an example, one program accepts "Novel Channels for Durable Dissemination of Information (Web-based, Social Media)." Programs such as this did not outline specific content or how it would be evaluated.

This general language could be interpreted as further evidence of what Gruzd, et al. described as institutions becoming more open-minded about what constitutes scholarship [10]. By not using specific terminology, they do not limit the qualifying works of faculty and relies heavily on critical thinking and opinions of PT committees. This is congruent with common language of promotions and tenure guidelines of traditional scholarship. It is done to allow individual advancement committee members to evaluate everything on a case-by-case basis instead of creating simple thresholds that need to be met independent of quality

and overall faculty accomplishment. This evaluation strategy is consistent with the assessment of traditional scholarship for which universally accepted metrics exist. Use of broad terminology is supported by qualitative findings of Summary A that suggests that promotions and tenure committees are there to evaluate a candidate's merit for promotion in a way that only a human can achieve, critically evaluating the candidate as a whole making faculty more valuable than the sum of the quantity and quality of the works they produce. For traditional scholarship, broad descriptions such as journal publication, grant, or research are standardized because widely accepted definitions of these works and metrics for them exist. The downside of using broad categories of eligible SMADS work such as digital platforms, video content, or web-based publications is the lack of information on scientific rigor within these categories. The lack of universally accepted metrics to evaluate the value SMADS, further complicates the situation. In order to understand the impact of SMADS on promotion and tenure, faculty must be made fully aware of the evaluation criteria. This would allow them to make informed decisions on how to invest their energies in their work. These uncertainties encourage traditional scholarship, rather than supporting the Learning Health Care System.

Results demonstrating that 12 keywords were not found in any of the guidelines supported the idea that guidelines may not be not keeping up with the current technology or that promotions and tenure committees may slowly be recognizing social media and digital scholarship in less formal ways. Terms that were not found are those associated with more recently developed applications or associated with formal names of specific products (Altmetrics, PlumX). The formal name keywords that were found, such as (Facebook, Instagram, Flickr), were used in the context of basic principles of conduct for how faulty

should behave on social media. This further supports the idea previously introduced that we may be in the early stages of adoption for rules and regulations of social media use as well. Further exploration of regulation of social media as it may contribute to the development of professionalism among faculty is needed.

While this work documents the current state of Promotions and Tenure procedures currently applicable to SMADS within LCME M.D. programs, it has its limitations. Starting with the source of the data, this study was conducted using only publicly available documents. It is possible that the documents used were not the most up-to-date guidelines for each program however over 95% were updated within the last ten years and over 80% within the last five years. In future studies, the accuracy of documents used could be verified with the individual schools directly. Another weakness is the terms in the Keyword Bank, reflected by the lack of a match for 32% of words used. This could be due to the fact that some of the words are associated with newer tools of SMADS, or that the guidelines are not keeping up with technology. While other words such as "informatics," "post," or "share" are associated with SMADS, they were not used because they were believed to be less specific to SMADS and to have greater use in other contexts. In the future it would be beneficial to conduct a survey of prominent SMADS producing faculty members or a public survey on SMADS forums (i.e. Twitter or Facebook) in order to create a more complete Keyword Bank.

Because every guideline was not read comprehensively in search of terms, there is a possibility that SMADS crediting guidelines could have been missed. This is particularly important if they did not use any of the terms in the SMADS Keyword Bank or if they have typographical errors as seen in using "Medial" instead of "Medical". This would mask the

presence of SMADS language. It is reassuring however that only two errors of this sort were identified in reviewing the text before and after every instance of 25 different SMADS keywords throughout almost 6,000 pages of guidelines from 138 schools. In future studies reading each guideline completely for analysis or use of more sophisticated software is recommended as an alternative to avoid some of these pitfalls.

Despite these limitations, this was a novel topic of interest that has been minimally studied despite a growing need not only in academic medicine, but in the field of science as a whole. Other research that touches on some of the goals of this work conduct interviews of a convenient sample of faculty, unsuccessfully attempt surveying APTC members, or offer proposed solutions. By comparison, this work is the first of its kind, in that it is the most complete assessment of SMADS criteria within Promotions and Tenure guidelines of Liaison Committee on Medical Education (LCME) M.D. programs. These findings do not just identify the current recognition of SMADS text in promotions and tenure guidelines, but it also highlights the need for metrics that quantify the scientific merit of Social Media and Digital Scholarship in medical education.

As a result of the learning that took place during the research process, new ideas were developed and next steps were taken for further research. One task that is yet to be accomplished is documented discussions with actual members of APTC's. This can be accomplished through interviews. In an effort to increase recognition of SMADS by APTC's, we need to understand the hesitation to adopt digital work for career achievement. As metrics evolve for SMADS, insight from APTC's will guide software developers. Understanding APTC functions will ensure that the tools developed for SMADS evaluation truly meet APTC needs. Until metrics are universally adopted however, it is recommended

that each governing body ensures APTC members are well versed in SMADS in order to properly evaluate content for themselves.

It is clear that in the progression towards a Learning Health Care System model, technology and innovative scientists have outdistanced APTCs and their guidelines. The Learning Health Care System needs more institutions to develop and adopt SMADS standards for career advancement in order to promote the type of science that will drive it. Scientists need a universally accepted definition of acceptable SMADS and metrics by which their work will be judged. In addition, APTC's need effective methods and strategies to implement these changes. If the Learning Health Care System is to improve patient outcomes as anticipated by IOM, then bridging the gaps identified in this work will put us closer to our goals.

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