

Shifting concepts, changing contexts: the new schools' drive for change

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Abstract Seventeen new medical schools were founded in the US and Canada in the decade prior to 2014. These new medical schools continue the tradition of utilizing mission statements (MSs) to convey goals and ideals. The authors aimed to compare these 17 new medical schools' MSs with MSs of previously established medical schools in the US and Canada. The MSs of the 17 newest medical schools were processed and analyzed utilizing network text analysis software that assessed centrality of concepts within new medical schools' MSs. This semantic network data was then compared to existing similar analysis by Grbic et al. (*Acad Med* 88(6):852–860, 2013. doi:10.1097/ACM.0b013e31828f603d). Four concepts were found to be more central in new medical schools' MSs as compared to established medical schools' MSs: “physicians,” “improve,” “diversity,” and “innovation.” Grbic et al. found four concepts to be central to all 132 medical schools “health” or “health_care,” “research,” “education,” and “premier” which are shared top themes of the new medical schools' MSs. The author's analysis has demonstrated that new medical schools, as compared to previously established subsets of medical schools, developed both shared and unique language within their MSs. This unique vocabulary reflected a response to a dynamic healthcare environment during the decade of new medical school development. New medical schools may have responded to environmental challenges including a physician shortage while also recognizing the need for a diverse physician workforce prepared to apply innovative strategies to healthcare.

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Introduction

Seventeen new medical schools have been founded in the US and Canada in the last 10 years. Prior to the establishment of these 17 new schools, a nearly 40 year gap in time existed without the creation of any new medical schools. The late 1970s created a large wave of medical school development due to an influx of federal funding related to passage of the Health Professions Educational Assistance Act in 1963. Following the close of this funding stream, growth in medical education remained largely flat for decades. This more recent wave of 17 medical schools in the last 10 years is due not to new funding sources but to a variety of perceived unmet needs. These needs include, but are not limited to, a projected physician shortage (Christakis 1995; Whitcomb 2013). While developing these new schools, founders have had the unique opportunity to develop mission statements (MSs) reflective of their goals and ideals.

Medical schools have long utilized MSs and were encouraged to do so as of the 1991 conference sponsored by the Royal Society of Medicine Foundation (White and Connelly 1991). MSs are a public statement of purpose and represent a commitment to both an internal and external audience utilized by medical schools, graduate medical education, as well as healthcare institutions (Bhat-Schelbert et al. 2004; Lipsky and Sharp 2006). Rhetorical strategies that produce MSs create meaningful language meant to persuasively define the identity of an organization (Lewis, Carley, and Diesner). These statements include concepts that are solidify a relationship with the external community and medical school environment as well as provide guiding principles for within the institution (Lewkonja 2002; Ramsey and Miller 2009).

Qualitative methods have been long used in the social sciences and are beginning to come to more prominence in medicine as well as medical education (DasGupta and Charon 2004). Qualitative analysis has often been used in mental health and is gaining prominence in other fields (Whitley and Crawford 2005; Bristowe et al. 2015). Qualitative research allows the exploration of shared themes that may be missed with quantitative assessments. Grbic et al. (2013) demonstrated a successful qualitative model of analyzing medical schools' MSs. Using this model Grbic et al. analyzed and compared MSs by thematic categories for 132 published MSs of MD-granting medical schools founded prior to May of 2010 in the US and Puerto Rico. The four thematic categories utilized were: research, community based, private, and public schools. Top research performing schools were identified through comparison of total dollar amount awarded by the National Institutes of Health between 2005 and 2009. Community based medical schools were identified by Mullan et al. by utilizing a social mission score defined by percentage of graduates who work as primary care physicians, percentage of graduates serving in medically underserved areas, and the percentage of graduates who are underrepresented minorities (Mullan et al. 2010). Grbic et al.'s analysis demonstrated distinct differences between the MSs of these four types of medical schools.

Given the unique circumstances that fostered the current cohort of new medical schools their MSs may differ from those of established schools. Many of the new medical schools

were not included in Grbic et al.'s semantic analysis. With this analysis, we aim to examine how these 17 new medical schools' MSs compare with those of previously established institutions.

Methods

The names of the 17 new medical schools, as well as contextual information for their school were gathered from the Association of American Medical Colleges (Sondheimer and Anderson 2008). These medical schools' published MSs were gathered from the schools' individual online public websites. All 17 schools listed a clearly defined MS on their website, often within a biographical section.

These directly quoted MSs were then analyzed with network text analysis (Lewis, Carley, and Diesner). Two software programs utilized were AutoMap (version 3.0.10) and Organizational Risk Analyzer, ORA (version 3.0.9.3). This process identifies concepts within MSs and the relationship between these concepts. We utilized the same text analysis software used by Grbic et al. and based our process around the same concept thesaurus.

The MSs were stored as .txt files and imported individually into AutoMap. Each MS was then processed to remove all punctuation, extra spaces, articles, prepositions, conjunctions within the text. All words were converted to lowercase. Proper nouns were transitioned into the common themes such as "[Proper Noun] College of Medicine" was changed to the more universal concept "medical_school."

The text was then treated with a Thesaurus through Automap which searches the text for words or phrases and converts similar themes into a common singular concept. For example, the words "building" and "built" were transformed into the concept "build." Similarly, themes such as "abroad" and "world" were translated to the common concept word "global." The text could then be compared by analyzing similar words as well as similar themes. Furthermore, some concepts are represented by a multiple word phrase such as "patient care" which was in turn translated to a single concept "patient_care." For this paper, the thesaurus used was based on the thesaurus made by Grbic et al. This thesaurus was used for the sake of compiling our concepts to be compared to Grbic et al.'s existing published data.

An example of text processing of the mission of Texas Tech University School of Medicine is shown below:

The mission of [medical school] is to improve the health of people by providing high quality education opportunities to students and healthcare professionals, advancing knowledge through scholarship and research, and providing patient care and service.

After removing prepositions, conjunctions, punctuation, and applying the thesaurus, the text appears thus:

mission medical_school improve health people provide premier education opportunities students health_care_professional advance knowledge scholarship research provide patient_care serve

The vocabulary is distilled, concepts that have been presented within a MS are retained and their contextual presence remains meaningful. This MS is then mapped using the ORA program to create a visual map of these concepts and their contextual connections. We used a window size of three, meaning we defined concepts as connected if within three

units of one another within the MS. The number of unique connections to a concept provided a numerical density score. Concepts were also given a value of frequency within the map by size of their representative node. Please see Fig. 1 to see the semantic network of the above example MS.

We applied this method to all 17 new medical schools' MSs to evaluate for frequency and centrality of thematic concepts. The separate MS .txt files were then compiled in AutoMap to form a union semantic network with a window size of 3. Based on Grbic et al.'s prior publication, we were then able to compare these 17 newest schools with their four previously established types of medical schools: public, private, top research and top social mission based schools.

Results

These new medical schools' MSs were found to have 181 unique concepts in total. Table 1 lists concepts with the highest level of network density as defined by the number of unique connections between concepts.

Figure 2 presents the semantic network for the most central concepts within the 17 new medical schools' MSs. These words were found to have the highest density score based on connectivity to other words within the 17 MSs. These connections within a MS are displayed as the arrows between concepts.

Grbic et al. previously demonstrated significant variance in MS concepts between pre-defined medical school types: research, community based, private, and public schools (Table 2). Utilizing the same concepts, we demonstrated significant variance between new medical schools and any of Grbic et al.'s previously defined medical school types (Table 3). We found new central concepts within new medical schools' MSs that were not seen in any of the other four types of medical schools: "improve," "physicians," "patient_centered," and "diversity." Also of note, several concepts present in established medical schools were significantly less frequent in new medical schools' MSs. These concepts include "people," "leader," "patient_care," and "knowledge."

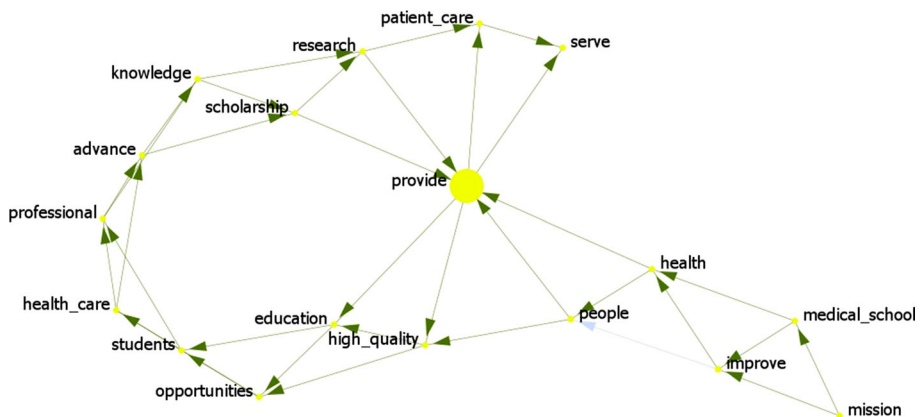


Fig. 1 Semantic network of Texas Tech University SOM MS

Table 1 This table represents the concepts with the highest amount of connections within the 17 newest medical schools

Rank	network density	Concept	Density score
1		Physicians	41
1		Health_care	41
2		Community	34
3		Research	33
3		Premier	33
4		Education	30
5		Medical_school	28
6		Innovation	25
7		Improve	24
8		Diversity	23
8		State	23
8		Provide	23
9		Students	22
9		Patient_centered	22

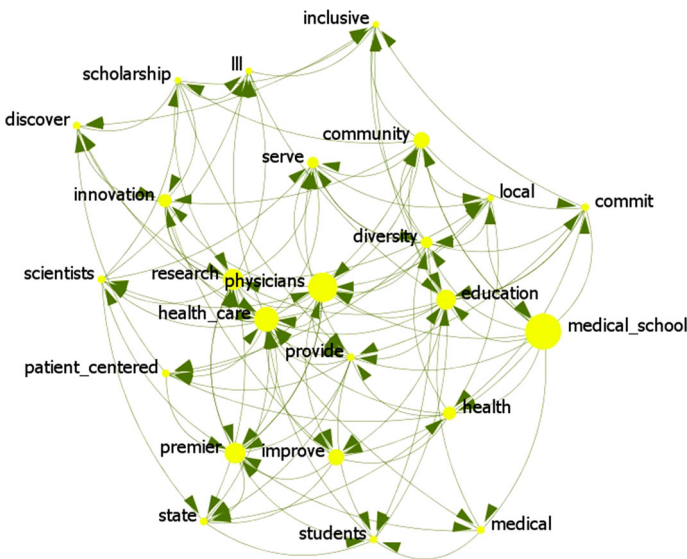


Fig. 2 Semantic network for the most central concepts within the 17 new medical school mission statements

Discussion

This study built upon the work of Grbic et al. (2013) which illustrates how the MSs of US medical schools are used as written statements of the schools' values and intended direction. Grbic et al. demonstrated the value of semantic analysis to characterize shared vs unique language for each subset of medical schools. Our analysis demonstrates that new

Table 2 Table from Grbic et al. showing the top concepts by centrality of all US MD-granting schools and four subsets of schools as described below. All references as per Grbic et al.'s (2013) publication

Concept	All schools (n = 132)	Private schools (n = 54)	Public schools (n = 78)	Top 20 research schools ^b	Top 19 social mission schools ^c
Top 10 concepts for mission statements (MSs) of all US MD granting schools and of four subsets of schools ^a					
Medical_school	1	1	3	1	6
Health	2	2	1	3	1
Health_care	3	5	2	9	2
Research	4	3	5	3	3
Education	5	6	4	6	5
Premier	6	4	6	3	7
Medical	7	9	6	19	11
Community	8	8	10	26	10
Student	9	7	14	15	8
People	10	18	8	12	4
Leader	19	10	33	2	27
Knowledge	11	24	8	15	14
State	27	181	10	72	13
Medicine	33	30	35	7	69
Biomedical	17	18	17	7	27
Patient_care	32	28	29	10	49
Provide	13	14	12	22	9

^a For this context, the word “concept” signifies a single idea represented by a word or a phrase, such as medical school or health care. The top 10 concepts (in boldface type) are those with the highest network density (or those with the most connections to other concepts). Column 1 presents the 10 highest-ranking concepts for all MSs. Subsequent columns show where these same 10 concepts rank in terms of their density for each subset of MSs. The authors have added any top 10 concept for an individual subset that does not also appear in the top 10 for all schools to the list in a stepwise fashion. For example, the top 9 concepts for private schools are the same, albeit in different order for all schools. However, the concept with the 10th-highest density score for private schools is “leader” and thus appears as the 11th concept in Column 1. For all schools, “leader” was found to have the 19th-highest density score. An equal sign indicates that the concept has the same rank order (i.e., the same density score) as another concept

^b As defined by the total dollar amount in awards received by the National Institutes of Health between 2005 and 2009

^c As defined by the percentage of graduates who work as primary care physicians, the percentage of graduates serving in medically underserved areas, and the number of graduates who are underrepresented minorities²⁹

medical schools, as an additional subset, have developed both shared and unique language within their MSs.

Grbic et al. found four concepts to be central to all 132 medical schools: (1) “health” or “health_care,” (2) “research,” (3) “education,” and (4) “premier.” The newest medical schools’ MSs appear to agree that these four concepts reflect goals that are of central importance to medical education. Each of these four concepts appeared among the ten most central concepts within new medical schools’ MSs.

Table 3 This table shows the rankings of top concepts by centrality from Table 2 in comparison to the 17 newest schools ranking of the concepts

All US MD-granting schools most central concepts by Grbic et al.	17 Newest schools ranking of concept
Medical_school	5
Health	10
Health_care	1
Research	3
Education	4
Premier	3
Medical	12
Community	2
Student	9
People	18
Leader	18
Knowledge	22
State	8
medicine	19
Biomedical	16
Patient_care	23
Provide	8

New medical schools demonstrate shared attributes with individual subsets of schools. A regional commitment is central to several subsets of established medical schools' MSs and is also central to new medical schools' MSs. Like public medical schools, new medical schools identify "state" as a central concept. Similarly, new medical schools identify "community" as central to their mission as do all non-research based schools. Like social mission focused schools, new schools identified "provide" as a central concept in their MSs.

While sharing core concepts with established medical schools, our analysis demonstrates several unique concepts within MSs of new medical schools. In the interval since the last wave of new medical schools opened, the healthcare environment has changed dramatically. New schools have entered a medical world with a predicted physician shortage, limited resources, far more diverse learners and patients and with a strong sense that despite many successes, medical education needs to change to meet these new challenges (US 2012). While these challenges face all medical schools, new medical schools have had the opportunity to explicitly develop a mission to address them. New medical schools' MSs include four concepts not previously represented among the most central concepts for all established medical schools or any subset. These four new concepts are: "physicians," "improve," "diversity," and "innovation."

While medical schools have always produced physicians, the centrality of the word "physician" in MSs is new and unique. It is of interest to note that the current wave of new medical schools were conceived and developed in response to a national conversation concerning physician workforce shortages.

Diversity is, likewise, a new central concept in MSs. This may reflect recognition of an increasingly diverse population and the need for an equally diverse healthcare workforce. Between 1978 and 2008, 75 % of all medical school graduates practicing medicine were White (Nivet and Castillo-Page 2010). Over the last decade in which new medical schools

developed, graduates have become increasingly diverse. In 2011, compared with 2002, the number of Hispanic or Latino graduates increased by 39.3 % (Castillo-Page and Nivet 2012). Our analysis confirms that diversity is an increasingly important topic within the newest medical schools' values.

The newly emerged centrality of "improve" may also reflect the healthcare environment during the decade of new medical school development. This time period gave rise to evaluation of a flawed healthcare system and inspired a broad sense of the need for change (Berwick et al. 2015). New medical schools' inclusion of the concept "improve" in their MSs demonstrates their commitment to a strong partnership towards bettering the health of our nation. The concept "innovation" has also risen in centrality in new medical schools' MSs and is likely a contribution to the goal of improvement of medical education. Faced with the changing landscape of healthcare, improvement strategies require innovation. Further research may demonstrate that institutional policies of new medical schools, such as the admissions process, have changed to reflect their stated mission to improve their local healthcare environment.

Our analysis identified several potentially important concepts that were less frequently included in new medical schools' MSs. For example, "patient_care" and "knowledge," both critical concepts in medicine, were significantly less central in new medical schools' MSs. Although these concepts were present, they were less central in new medical schools' MSs compared with established medical schools' MSs.

Conclusion

Medical school MSs serve as a persuasive statement of identity and purpose. While our method of semantic analysis cannot presume to uncover the full motivation behind these statements, it is a salient point that new concepts exist within new medical schools' MSs. Current vocabulary fashion represents landscapes and trends that are founded in meaningful geographic and period context. Word choice has meaning.

Utilizing the well-established methodology of semantic analysis, our study extends Grbic et al.'s findings that MSs reflect unique attributes of medical school types. Our analysis of new medical schools' MSs demonstrates the emergence of concepts not previously included in medical schools' MSs, potentially reflecting the unique circumstances in which these medical schools were formed.

While our semantic analysis demonstrates new concepts in new schools' MSs, there are limitations to the interpretation of the significance of these concepts. Semantic analysis does not explain motivation for inclusion of concepts nor the degree to which medical schools have operationalized these new concepts.

Further study that explores the full conceptual meaning, motivation for inclusion, and the extent to which medical school function is informed by these new concepts would be an important next step.

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