INCORPORATING THE HUMANITIES AND ARTS INTO STEMM EDUCATION: CHALLENGES AND OPPORTUNITIES

KRYSTYNA U. GOLKOWSKA

Weill Cornell Medicine - Qatar, Doha, Qatar
E-mail: krg2005@qatar-med.cornell.edu

Abstract - Although the value of incorporating the arts and humanities into STEMM (Science, Technology, Engineering, Mathematics. and Medicine) education has recently been gaining recognition, more research is needed to establish a conceptual framework for such disciplinary integration and to identify appropriate pedagogical practices to achieve its goals. To give an example of challenges and opportunities of this approach, the present article focuses on medical education, where the need for values traditionally associated with liberal arts education such as critical thinking, empathy or civic engagement is most evident.

Keywords - Medical Education, Integration, Humanities, Skills

I. INTRODUCTION

Recent years have seen repeated calls for a more holistic approach to education. It has been acknowledged that in the age of globalization and rapid technological advances graduates need a broad set of transferrable skills that result from interdisciplinary approaches to teaching and learning. The report The Integration of the Humanities and Arts With Sciences, Engineering, and Medicine in Higher Education: Branches From the Same Tree, prepared jointly by representatives of industry and academic faculty, states clearly that "while further research is needed, there's enough evidence that integrating STEMM with the arts and humanities is beneficial … [and] colleges ought to explore, and study, ways to do so" (Board of Higher Education, 2016). The emphasis on helping students to become well-rounded individuals is certainly not a new idea. After all, the breadth requirements of undergraduate education were designed with this specific goal in mind. Yet, there are reasons why this approach has not always been effective. The case of science majors taking a traditional art elective can be used here as an example. Formal and informal surveys confirm that overall, the liberal arts courses selected by science students provide them with valuable and pleasurable experiences. However, quite a few learners admit that their choice of electives is determined by scheduling demands and avoidance of rigorous courses that might negatively impact their GPA. Thus, they can end up sampling unrelated courses, not all of them felt to be relevant or engaging. From this point of view, integration of the arts and humanities with STEMM, both at the course and program level, seems to offer a better approach. To quote from the 2016 report "Integration promises to deliver improved learning of disciplinary content within a broader goal of strengthening ideals of citizenship, mindfulness, and empathetic engagement with the world" (Board of Higher Education, 2016). It is important to begin by clarifying what is meant by integration in this context. Simply including writing or artistic assignments in science courses is not enough, just like merely using technological tools to teach a liberal arts course does not provide learners with access to "technological citizenship." Instead, integration means using the skills and ways of thinking from one discipline to improve learning and performance in another. Thus, the first question to be answered is how STEMM students can benefit from exposure to arts and humanities.

Proponents of incorporating the arts and humanities into science curricula usually point to gains in three areas: cognitive, ethical and affective. It is hoped that this approach will allow learners to hone their analytical skills, nourish values needed for "wise and ethical stewardship of their world" (Thomas, 2002, p.31), and find enjoyment in aesthetic experience. To provide a more specific list, outcomes in terms of skills falling under these categories would include critical thinking and interpretative skills (i.e. ability to analyze, synthesize, establish links between ideas as well as understand the importance of context and positioning), communicative competence skills (i.e. ability to listen, argue, and present ideas with clarity, both verbally and in writing). In addition, the desired dispositions or ways of thinking to be taught would comprise openness, creativity and reflexivity, intercultural communication competence (i.e. understanding and appreciating the role of culture and ability to interact with people from other cultures), empathy, and enjoyment and appreciation of intellectual and aesthetic experiences. Doubtless, teaching and assessing these skills and dispositions presents numerous challenges. To complicate matters, "one approach fits all" does not work in this case and teaching tools need to be tailored to the nature of the discipline, classroom ecology, and learners' professional goals. There is an obvious need for more research on theoretical articulation and pedagogical

practices related to cross-disciplinary integration. The following observations focus on medicine as an example of both the opportunities and challenges inherent in interdisciplinary teaching.

MEDICAL HUMANITIES

As stated by the authors of the aforementioned report, so far, the integration efforts that were most numerous, successful and thoroughly assessed were those involving engineering and medical education. The push for incorporating the arts and humanities into medical education comes as no surprise. After all, the need for values traditionally associated with the liberal arts is clearly evident in medicine. Illness, death, suffering and healing as essential part of the human experience have always been the center of preoccupation in art and literature. In addition to their therapeutic value, such works offer rich material for exploring sociological and cultural understanding of illness as well as moral and ethical dilemmas related to its treatment. Thus far, teaching the humanities to medical students has been promoted as a means of viewing medical progress from a historical perspective (Kuhn, 1970), developing ethical awareness (Arawi, 2010; Russell, Searight & Allmayer, 2014), facilitating personal growth, expanding empathy, self-awareness and sensitivity (Wolters & Wijnen-Meijer, 2012) and helping students to live with ambivalence and uncertainty (Klugman, Peel & Beckmann-Mendez, 2011). Art practice and appreciation training have been shown to increase observational and communication skills (Shapiro, Rucker & Beck, 2006) as well as improve hand-eye coordination and emotional awareness (Potash, Chen, Lam C et al, 2014). The growing popularity of narrative medicine has perhaps been the most noticeable development in recent years (Charon, 2006; Hunter, 1991; Carson, 2003), but there is also interest in emphasizing the link between drama and medicine, and looking at medical practice from a theatrical perspective (Kohn, 2011; McCulough, 2012; Case 2010; Shapiro &Hunt 2003; Walsh & Murphy, 2017).

It is useful to think of incorporating the humanities into medical curricula in terms of concrete skills and competencies. The success of narrative medicine can to a great extent be attributed to careful articulation of its guiding principles with reference to competencies relevant to medical practice. In a nutshell, narrative medicine combines the techniques of close reading with semiotic analysis to extend the notion of text and interpretative space. This kind of attentive reading develops medical practitioner's ability to elicit and interpret the patient's story based on the technique of close reading of texts combined with semiotic awareness. Similarly, to give an example from drama, exposure to theatre and awareness of performance techniques can greatly improve communication in healthcare delivery. Deliberate movement, mindful use of space, voice modulation and projection, appropriate eye contact, effective listening, ability to improvise and work with a team enhance doctor-patient encounters and can result in better clinical outcomes.

In the end, building narrative competence and familiarity with acting skills help one enact of the role of a medical practitioner and assure person centeredness in a medical encounter.

Whether it is a work of art or literature or a patient, Charon teaches giving full attention to what we read, treating the text with respect and viewing it in all its complexity, not just as a repository of topics or thematic concerns ready for harvesting or a collection of disease symptoms. This is a holistic approach. Narrative medicine does not try to minimize complexity and ambiguity; on the contrary, it uses it as a resource, trying to prepare students and practitioners to deal with uncertainty and complexity.

The emphasis applying the skills that are distinctly developed through the study of the humanities in other disciplines should never result in simplification or reductionism. Staging and rehearsing will not in and of themselves make a great performance if the actors do not make an effort to fully understand the characters they are to enact. No patient will be fooled by canned, formulaic expressions of sympathy and engagement. What is needed is empathy and that in turn requires imagination. This is where the dispositions or habits of mind come into play. The greatest value of the liberal arts is their ability to nourish empathetic imagination and self-knowledge. Narrative and drama serve as a lens into the real and imagined worlds of others. Whether we are reading fictional minds or experiencing catharsis we are developing empathetic imagination and gaining self-knowledge. When we learn to think with or as the other, empathy replaces indifference or Foucault's "medical gaze." This is what the modern world of healthcare needs the most.

CONCLUDING THOUGHTS

Based on the available studies as well as on formal and informal input, advantages of incorporating the liberal arts into STEMM education are easily identifiable. Integration prevents burnout, sensitizes students and practitioners to people’s needs, nourishes empathy and interpersonal communication, offers therapeutic relief, and helps professional identity development.

Opposition to integration comes mainly from those who say that there is no room in the curriculum for additional courses or modules or question the value of such interventions. For example, in the case of medicine there are those who claim that empathy

cannot be taught and assessed and that everyday reality of medical practice does not allow for the type of the doctor-patient intervention recommended by humanists. Then there is the legitimate question of who should be teaching such interdisciplinary courses/modules. Not all faculty are ready or willing to engage in this way. Occasionally, liberal arts faculty voice fears of appropriation; they feel that the importance of their discipline is being diminished by making it subservient to the needs of another, and that their expertise undervalued and undermined. It is important to address these and similar concerns. Above all, it is crucial to remember that the success of integration success must be seen as rooted in collaboration not competition between different instructional foci. At its heart lies a dynamic relationship that should result in creative enrichment.
Last but not least, whether integration happens at the course or at the program level, it is essential to make its goals explicit and transparent to all the stake holders as well as to emphasize its value for students' academic and future professional identity development. This is especially crucial in the context of transnational education, where the idea of integrating the humanistic perspective into STEMM courses can encounter considerable obstacles. For example, the Middle East and Asia, regions with an impressive number of TNE campuses, have traditionally prioritized narrowly specialized professional preparation over the liberal arts education. and where fear of "academic imperialism" and potential Westernization constitutes an additional challenge.

With the number of medical schools incorporating the humanistic perspective into their curriculum continuing to grow, there seems to be a need for a comprehensive effort to assess different models that are being used and identify the most successful methodological principles and pedagogical practices. Clearly, more research is needed to conceptualize and inform pedagogical practice and provide evidence of the positive impact of educational experiences that integrate the arts, humanities, and STEMM education. In the meantime, narratives of teaching and case studies can prove useful in establishing guiding principles of classroom practice. Skills and competencies that are distinctly developed through the study of the arts and humanities.

The best framework for integration seems to be the experiential learning theory that emphasizes the overlap of experiencing, thinking, reflecting, and acting and empowers learners to take control of their own learning. The success of integration is predicated on pooling together relevant linguistic, cultural, experiential, affective, and ideological resources from disciplines that are sometimes seen as at odds in order to create new modes of thinking and being.In the end the art and humanities and the sciences have the same goal, "they are engaged in the same ultra human tasks – how do we interpret ourselves, our bodies, our minds, our environment, our history and our morality" (Deegan, 2014, 26).

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