



Student Publications

---

2020-01-01

## Art in Medicine: A Powerful Aid to Modern Medical Education

Fenyu Wang  
wangfenyueve@hotmail.com

Follow this and additional works at: <https://scholarsarchive.byu.edu/studentpub>

---

### BYU ScholarsArchive Citation

Wang, Fenyu, "Art in Medicine: A Powerful Aid to Modern Medical Education" (2020). *Student Publications*. 284.

<https://scholarsarchive.byu.edu/studentpub/284>

This Peer-Reviewed Article is brought to you for free and open access by BYU ScholarsArchive. It has been accepted for inclusion in Student Publications by an authorized administrator of BYU ScholarsArchive. For more information, please contact [scholarsarchive@byu.edu](mailto:scholarsarchive@byu.edu), [ellen\\_amatangelo@byu.edu](mailto:ellen_amatangelo@byu.edu).

**Art in Medicine: A Powerful Aid to Modern Medical  
Education**

Fenyu Wang  
Brigham Young University  
December 2019

## **Abstract**

Advances in modern technologies reform medical education in various aspects, and physicians undergo progressively more rigorous and specialized technical training to meet the needs of a modern society that demands cure and longer life-expectancy. However, as we celebrate these advances in modern medicine and medical education, we should not neglect the human aspect of this doctoring profession. Physicians and prevalent medical pedagogies are not impeccable. Many studies discovered mitigated physical exam and observational ability in contemporary physicians. Since 2001, medical schools and residency programs experimented with using art to teach physical examination and observational skills. Participants embraced such programs enthusiastically. Quantitative and qualitative results suggested art is not only a powerful aid to teach observational skills, but also empathy, acceptance of ambiguity, and teambuilding.

## **Introduction**

Although most of us perceive science and art as two mutually exclusive disciplines, history tells us otherwise. Numerous artworks connect art to anatomy and contribute to the exploration of the human body. For example, Leonardo da Vinci produced a dossier of accurate and skillful anatomical drawings that still amaze their audience today; and in 1543, Andrea Vesalius published *De Humani Corporis Fabrica Libri Septum*, a trailblazing masterpiece for modern anatomy<sup>1</sup>. In the past, medical educators commonly use these classic paintings to teach anatomy and foundational skills<sup>2</sup>. However, this trend has diminished due to the advances in modern technology—a double-edged sword in today's medical education and medical practice. The emergence of CT scans, MRI, ultrasound, and other diagnostic tools revolutionized modern medicine tremendously, yet we cannot ignore their negative impact on physician's observational astuteness<sup>3</sup>, as physicians are becoming more reliant on technologies to gather patient information rather than direct observation<sup>4</sup>. Educators seek

alternative teaching methods to remedy this unexpected crisis in medical education.

Integrating art in medical school curriculum first appeared in 2001, and it opened a new era of synergistic cross-discipline teaching and learning. Many medical schools in the U.S and the U.K. tested the efficacy of the novel teaching method, reviving the incorporation of art in medical pedagogy. It has been two decades since the inception of art curriculum in modern medical schools, nonetheless, there is a paucity of rigorous published data of the subject<sup>5</sup>. This review focuses on the significant findings and the adaptation of art classes in medical schools currently, including art's impact on students' diagnostic skills<sup>7, 24</sup>, competence in physical exam ability<sup>6, 9</sup>, empathy<sup>6, 9, 15-19</sup>, teambuilding facilitation<sup>6, 10, 20</sup>, and acceptance of ambiguity<sup>8, 12</sup>; all of which are fundamental in the progression of a good physician.

### **Physical Exam and Observation**

Observation is the cornerstone of a competent physician's clinical sensitivity and empathy. Teaching physical exam and observational ability is not as straight forward as the demonstrations of biological mechanisms in textbooks, which merely requires rote memorization for the purpose of testing; and many studies showed the inadequacy of physical examination skills in medical students, residents, and physicians<sup>6</sup>. Medical educators agree that it is imperative to resuscitate sufficient physical examination teaching. Dr. Irwin Braverman, a professor of dermatology at Yale School of medicine once commented: "doctors in training often do not completely and accurately describe what they saw" in a physical exam, and "instead [jump] to conclusions or rely on technology to make a diagnosis." Together with Dr. Jacqueline Dolev, Dr. Braverman conducted a pioneering research in applying art to medical education<sup>7</sup>. With pretests and post-tests to evaluate observational and descriptive ability, they found that students in the fine art group showed

significant improvement in visual diagnostic skills<sup>7</sup>. Their research intrigued medical educators profoundly and led to more subsequent investigations.

Some may define observation as intuitive, but medical students must overcome the tendency to judge intuitively and cultivate active and cautious observation to formulate logical judgement. Art appreciation requires deep-seeing and interpreting minute details. Applying artful thinking into clinical observation can help trainee physicians to generate more logical judgements. Many specialties such as radiology, dermatology, and ophthalmology rely heavily on direct observation<sup>6</sup>, and comprehension of anatomy buttresses all clinical observation. Students in Brighton and Sussex Medical School responded enthusiastically to an 8-session long “Art in Medicine” course, which offers oral tutorials with visual elements, such as images of paintings and photographs. Students commented that the course improved their ability to construct a three-dimensional understanding of anatomy<sup>2</sup>. Moreover, a randomized controlled study conducted in the Perelman School of Medicine at the University of Pennsylvania compared the pretest and posttest scores of a controlled group and a training group. The art-training group received participated in live museum sessions in front of artworks. Professional art educators from Philadelphia Museum of Art conducted the sessions and taught principles of art, vocabulary in art description, observation, comparison, and interpretation. Specifically, the art educators emphasized on introspection and observation before interpretation. The improvement of participants’ observational ability was statistically significant in the training group<sup>6</sup>. In addition, the sample student description of a presented disease showed significant improvement on detailed observation indicated by inclusion of colors, shapes, and texture (Table 1). Another study noted significant improved mindfulness—the observer’s active state of awareness that helps them to recognize the impact of peripheral milieu on the subject as a whole. A substantial proportion of students linked mindfulness to noticing visual details, sensing peripheral cues, and accurately

verbalizing observations<sup>8</sup>. Increased mindfulness also promotes self-confidence and communication abilities<sup>9</sup>. This connection is not at all surprising—the more one sees, the more confidence one garners.

Research results have unanimously supported the claim that art courses positively facilitate the teaching of observational skills. However, medical educators have to be cautious to conclude that one art course in medical school can drastically change a medical student’s observational habits in the long run, and none of the relevant studies conducted follow-up investigations. It is in the hospital, during residency, where trainee physicians obtain a substantial amount of coaching in observation. Therefore, while medical schools are catching up with incorporating art courses, residency programs also need to understand the importance of persistently teaching this skill to ingrain artful observation into residents.

### Acceptance of Ambiguity

Art is inherently ambiguous. Contrary to the perception of the public, ambiguity pervades in medicine<sup>10</sup>. In fact, many clinical cases in real life inherently embody ambiguity—a common encounter in complex diagnosis. TV series on medicine often unduly simplify the process of diagnosis to highlight heroic characters. In contrast, real life physicians resemble puzzle-solvers that assemble sporadic information. More often than not, some puzzle pieces are not available, for example, inadequate history; or there are too many pieces, say, complicated cases that involve a primary and a secondary cause and confounding manifestations. Ambiguity is physicians’ everyday enemy. Thus, it is crucial for physicians in

training, many of whom are high achievers and perfectionists, to reconcile with the nature of ambiguity

Pretest Response	Posttest Response
"This looks like an eye for some reason on first glance. But after looking at it more carefully it looks like an image under a microscope, kind of like maybe a throat with something blocked in the middle and also veins and blood blotches—looks like this person is sick."	"I see a black background with a circle in the middle. The circle is orange-red colored and has a focal point a little bit right from the center. The bottom right edge of the circle is blurry. Coming out of the focal point are red strands that are long and wispy and reach the edge of the circle. They go out in all directions except directly left. Starting from the left edge are thicker wavy red lines that go toward the center of the circle. Throughout the circle are small light circular spots. The light spots are yellow-white and generally circular. Some of the white spots are filled or surrounded by dark coloration. The dark coloration in some spots looks solid and in others looks fragmented, kind of like a debris caught on something."

*Table 1: Sample pretest and posttest of the training*

in clinical medicine<sup>11</sup>. A study on third year medical students participating in a Visual Training Strategies (VTS) course expanded our understanding of the benefits of art courses. On the pretest, students inclined to use subjective terminologies, such as “healthy”, and “normal” to describe patient photographs. The use of subjective terminology assumes that others have an established understanding, but it is typically not the case when communicating with patients. VTS training decreased the use of subjective terminology by 65%<sup>8</sup>. Meanwhile, open phrases such as “might,” and “seem” appears more frequently by 62% after training, suggesting improved speculative thinking, acceptance of multiple interpretation, and likelihood of constructing a more in-depth visual differential<sup>8</sup>. Similarly, another study found that as high as 76.5% of students in one class agreed on VTS’s impact on improved acceptance of multiple meanings<sup>12</sup>. It may not be obvious to layman, but ambiguity in art indeed teaches ambiguity in medicine. Some medical schools teach art with lectures only, but by integrating group discussions, educators can extend the benefit of art courses into teaching ambiguity as students discuss differential interpretations.

### **Empathy, Teambuilding**

Empathy is a crucial asset for physicians as it allows physicians to vicariously experience the emotions, thoughts, and decision-making processes of patients. Nonetheless, this attribute decreased dramatically during medical school and reached the lowest point during residency<sup>9</sup>. As Darrelle G. Kirch, the President of the Association of American Medical Colleges (AAMC) once said: “The public had great confidence in doctors’ knowledge but much less in their bedside manner...Being a good doctor isn’t just about understanding science, it’s about understanding people”<sup>13</sup>. The intensity of medical training is necessary to produce clinically competent physicians, but in the meantime, it incurs high levels of stress, depression, and anxiety that unavoidably render decreased empathy<sup>11</sup>. The medical community have long recognized empathy and its effect in medicine. Medical

student burnouts are associated with lower empathy and lower professionalism climate<sup>14</sup>, and empathetic physicians are more likely to have better patient-adherence to therapy, experience greater patient satisfaction, and improve clinical outcomes while encounter fewer medicolegal challenges<sup>9</sup>.

Unlike teaching straight forward scientific concepts, empathy is very challenging to teach. But it is achievable. Appreciation of artworks can activate mirror neurons in the brain that neurologically imagine, reconstruct, and mimic behaviors and expressions of others, leading to empathetic social interactions<sup>15</sup>. Physicians with artistic backgrounds understand the value of art in promoting empathy<sup>16</sup>, and studies with art courses in medical schools reported increased empathy in students to various degrees<sup>6</sup>. Developing empathy requires one to be aware and accept one's own emotions, and art is a great conductor that allows medical students to reconnect with their own inner feelings—supporting emotional self-care, considering others' viewpoints, and avoiding preconceived notions—all of which are essential elements of empathy<sup>17</sup>. For instance, as patients experience inevitable but uncomfortable intimacy during physical exams, physicians who convey empathy can reduce patient's anxiety in this situation. After an *Art of Seeing* program at McMaster University, residents in family medicine and obstetrics and gynecology reported increased awareness of personal and professional space in a clinical encounter and how patients might feel<sup>9</sup>. Due to sustained levels of stress in physicians, empathy requires maintenance; otherwise it may dwindle back to baseline. Thus, the medical community should recognize art's power in arousing human emotions to deter dehumanization in the process of training and maintaining physician's sensitivity to their own emotions as well as others.

Several populations, however, are particularly hard for medical students to empathize with, such as geriatric patients and psychiatric patients. Many students find it difficult to connect with patients with chronic mental illnesses. A study led students to a Living



Museum, which functions as an art studio and a display space for artworks created by psychiatric patients in a state psychiatric hospital. Students visited the studio endorsed positive attitudes towards psychiatric patients than those that didn't<sup>18</sup>. Another study suggested that students found more commons with geriatric patients and built more positive attitudes after interacting with them<sup>19</sup>. In this study, medical students connected and socialized with older adult participants through an interactive art-based program at a local museum. Some participants created art pieces together, and some examined artworks individually or with paired partners. Although this intergenerational art program did not influence student's career plans (e.g. change to go into geriatrics), it is still beneficial since 50% of all patients are older adults. The clinical ability to empathize and overcome the generation gap is foundational in a progressively aged society.

While art enables empathy to foster positive physician-patient relationships, it also drives cordial colleague-relationship between physicians and other healthcare personnel. A good surgeon cannot perform a surgery without his/her surgical tech, nurses, anesthetists, and other auxiliary but indispensable support. Hence medical students as well as incumbent practitioners need to emphasize the quality of teamwork. Students in art courses that include discussions express their appreciation for the opportunity to listen to their peers' opinions and learn from different viewpoints with no predetermined answers<sup>6</sup>, and this process is very similar to discussing clinical differential diagnosis. Teamwork in physicians expand beyond the circle of physicians, and successful healthcare delivery cannot transpire without appreciating the contribution of fellow team member's perspectives. Brigham and Women's Hospital developed Multidisciplinary Teambuilding Museum Workshops for their Integrated Teaching Unit, which aims to break down the hierarchical relationship and foster awareness of team dynamics. Participants included various healthcare personnel. The program instructs participants to notice patterns of communication and linking their discussions to current new

cases. This program served over 70 teams by 2014, since its establishment in 2009<sup>10</sup>. Similar programs in medical schools that involved both the students and the faculty reported collegial atmosphere in museum sessions and energetic discussions<sup>20</sup>. These evidences collaboratively suggested that art can contribute to team building and break down hierarchical walls at different stages of a physician’s progression, and it may further foster the rapport of healthcare professionals in different specialties and positions.

### Curriculum and Reception

There was no documented art training in residency programs and very few such programs in medical schools in 2005<sup>17</sup>. By 2019, a survey of 70 medical schools in different countries reported that the majority offer art courses as electives, with only 4 being required components of curriculum<sup>5</sup>. While we celebrate scientists’ gradual acceptance of art into medical education, we cannot overlook the urgency of advocating for the movement and further incorporate art into healthcare education. Medical schools in the U.S., Canada<sup>9</sup>, U.K.<sup>25, 22</sup>, and Australia recognize art’s potential to improve medical training. Unfortunately, this isn’t the case for most medical schools in other countries.

After the pioneer study conducted in Yale school of medicine in 2001, many schools have since experimented various art teaching methods. In 2002, Housen developed Visual Thinking Strategies (VTS), a training that values deep seeing, language literacy, visual literacy, and peer discussions<sup>10</sup>. Many art courses now, including those in medical schools, use VTS as part of their curricula (Figure 1). Some schools also design

Observation step	Goals	Facilitator questions	Student tasks
Observation (O)	Identify objective visual findings	<b><i>What do you see? What makes you say that? What else do you see?</i></b>	Record observations without judgment
Interpretation (I)	Draw conclusions about the work's meaning	What do you think this means? What is your visual differential?	Generate multiple interpretations
Reflection (R)	Evaluate conclusions and question validity	Does this make sense to you? How can your beliefs bias your observations?	Consider personal beliefs and bias
Communication (C)	Share ideas	Can someone create a mental image of your description?	Contribute to group discussion

Note: Questions in bold italics designate the three question prompts used in Visual Thinking Strategies (VTS).

*Figure 1: Sample course using VTS<sup>8</sup>.*

independent curricula to teach different subjects and specialties such as anatomy<sup>2</sup>, histology<sup>21</sup>, primary care<sup>22</sup>, ophthalmology<sup>6</sup>, palliative care<sup>23</sup>, family medicine<sup>9</sup>, and obstetrics and gynecology<sup>9</sup>. Prevalently, methods used in these art courses include discussions, seminars, lectures, museum visits under the guidance of curators, reflective assignments, and drawing practice.

Students, residents, and other medical professions enthusiastically embrace the art courses across all the studies examined, although occasionally encountering some administrative skeptics<sup>10</sup>.

## **Discussion**

Many medical schools and residencies have gradually adapted art courses and proved its beneficial impact on observational keenness, acceptance of ambiguity, empathy cultivation, and teambuilding. Medical students, residents, physicians and other healthcare professional supported the programs enthusiastically. Overall, art and modern medicine seemed to finally coalesce together.

Meanwhile, there is much space for improvement. Studies conducted in this area gathered their data differently, and many data involved confounding variables and selection bias. For example, some studies recruited student volunteers as subject—a potential selection bias since these students may already have art background or interests in art. Moreover, no study thus far has done follow up investigation on their art courses' long-term effect, nor have demonstrated if persistent and long-term art training is necessary. There are insufficient rigorous data in this field of research, but we have to admit that social science data are hard to claim in the first place; and getting hard-core scientists to accept these flawed but still true data may be a challenge. Nevertheless, much progress has suggested future positive outlook

for developing art integration in more fields and specialties. Future studies should carefully calibrate subject selection, variable control, and fine-tuning of data collection. Art integration into medical education is still in its developing stage. In order to maximize its benefits, further studies should investigate the impact of components in curricula—in particular the necessity of discussions and museum visits, considering some schools currently offer seminars/lectures only. The future of synergizing art and medical education is promising, and educators and artists may continue to explore the potential of cross-discipline teaching.

Reference

1. Porzionato A, Macchi V, Stecco C, Parenti A, De Caro R. The anatomical school of padua. *Anat Rec*. 2012;295(6):902-916. <https://doi.org/10.1002/ar.22460>. doi: 10.1002/ar.22460.
2. Bell LTO, Evans DJR. Art, anatomy, and medicine: Is there a place for art in medical education? *American Association of Anatomists*. 2014;7(5):370-378. <https://doi.org/10.1002/ase.1435>. doi: 10.1002/ase.1435.
3. Digrazia C. Yale's life-or-death course in art criticism. *The New York Times*. 2002.
4. Lu J. Will medical technology deskill doctors? *International Education Studies*. 2016;9(7):130. doi: 10.5539/ies.v9n7p130.
5. Mukunda N, Moghbeli N, Rizzo A, Niepold S, Bassett B, DeLisser HM. Visual art instruction in medical education: A narrative review. *Medical Education Online*. 2019;24(1):1558657. <https://doi.org/10.1080/10872981.2018.1558657>. doi: 10.1080/10872981.2018.1558657.
6. Gurwin J, Revere KE, Niepold S, et al. A randomized controlled study of art observation training to improve medical student ophthalmology skills. *Ophthalmology*. 2018;125(1):8-14. <https://www.sciencedirect.com/science/article/pii/S0161642017317086>. doi: 10.1016/j.ophtha.2017.06.031.
7. Dolev JC, Friedlaender LK, Braverman IM. Use of fine art to enhance visual diagnostic skills. *JAMA*. 2001;286(9):1020-1021. <http://dx.doi.org/10.1001/jama.286.9.1019>. doi: 10.1001/jama.286.9.1019.
8. Jasani SK, Saks NS. Utilizing visual art to enhance the clinical observation skills of medical students. *Med Teach*. 2013;35(7):e1327-e1331. <https://doi.org/10.3109/0142159X.2013.770131>. doi: 10.3109/0142159X.2013.770131.
9. Zazulak, J., Sanaee, M., Frolic, A., Knibb, N., Tesluk, E., Hughes, E. and Grierson, L. (2020). *The art of medicine: arts-based training in observation and mindfulness for fostering the empathic response in medical residents*.
10. Katz JT, Khoshbin S. Can visual arts training improve physician performance?. *Trans Am Clin Climatol Assoc*. 2014;125:331–342.
11. Leung J, Cloninger CR, Hong BA, Cloninger KM, Eley DS. Temperament and character profiles of medical students associated with tolerance of ambiguity and perfectionism. *PeerJ*. 2019;7:e7109. Published 2019 Jun 13. doi:10.7717/peerj.7109
12. Bentwich ME, Gilbey P. More than visual literacy: art and the enhancement of tolerance for ambiguity and empathy [published correction appears in *BMC Med Educ*. 2017 Dec 21;17(1):263]. *BMC Med Educ*. 2017;17(1):200. Published 2017 Nov 10. doi:10.1186/s12909-017-1028-7
13. Rosenthal E. Pre-med's new priorities: Heart and soul and social science. *The New York Times*. 2012.
14. Brazeau, Chantal M L R, Schroeder R, Rovi S, Boyd L. Relationships between medical student burnout, empathy, and professionalism climate. *Academic medicine : journal of the Association of American Medical Colleges*. 2010;85(10 Suppl):S33-S36. <https://www.ncbi.nlm.nih.gov/pubmed/20881699>. doi: 10.1097/ACM.0b013e3181ed4c47.
15. Jeffers CS. Within connections: Empathy, mirror neurons, and art education. *Art Education*. 2009;62(2):18-23. <http://www.tandfonline.com/doi/abs/10.1080/00043125.2009.11519008>. doi: 10.1080/00043125.2009.11519008.
16. Mullangi S. The synergy of medicine and art in the curriculum. *Academic Medicine*. 2013;88(7):921-

923. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&NEWS=n&CSC=Y&PAGE=fulltext&D=ovft&AN=00001888-201307000-00016>. doi: 10.1097/ACM.0b013e3182956017.
17. Shapiro J, Rucker L, Beck J. Training the clinical eye and mind: Using the arts to develop medical students' observational and pattern recognition skills. *Med Educ*. 2006;40(3):263-268. <https://doi.org/10.1111/j.1365-2929.2006.02389.x>. doi: 10.1111/j.1365-2929.2006.02389.x.
18. Cutler, J., Harding, K., Hutner, L., Cortland, C. and Graham, M. (2020). *Reducing Medical Students' Stigmatization of People With Chronic Mental Illness: A Field Intervention at the "Living Museum" State Hospital Art Studio*.
19. Gonzales E, Morrow-Howell N, Gilbert P. Changing medical students' attitudes toward older adults. *Gerontol Geriatr Educ*. 2010;31(3):220-234. <https://doi.org/10.1080/02701960.2010.503128>. doi: 10.1080/02701960.2010.503128.
20. Bardes CL, Gillers D, Herman AE. Learning to look: Developing clinical observational skills at an art museum. *Med Educ*. 2001;35(12):1157-1161. <https://doi.org/10.1046/j.1365-2923.2001.01088.x>. doi: 10.1046/j.1365-2923.2001.01088.x.
21. Cracolici V, Judd R, Golden D, Cipriani NA. Art as a Learning Tool: Medical Student Perspectives on Implementing Visual Art into Histology Education. *Cureus*. 2019;11(7):e5207. Published 2019 Jul 23. doi:10.7759/cureus.5207
22. Kirklin D, Duncan J, McBride S, Hunt S, Griffin M. A cluster design controlled trial of arts-based observational skills training in primary care. *Med Educ*. 2007;41(4):395-401. <https://doi.org/10.1111/j.1365-2929.2007.02711.x>. doi: 10.1111/j.1365-2929.2007.02711.x.
23. Centeno C, Robinson C, Noguera-Tejedor A, Arantzamendi M, Echarri F, Pereira J. Palliative care and the arts: vehicles to introduce medical students to patient-centred decision-making and the art of caring. *BMC Med Educ*. 2017;17(1):257. Published 2017 Dec 16. doi:10.1186/s12909-017-1098-6
24. Naghshineh S, Hafler JP, Miller AR, et al. Formal art observation training improves medical students' visual diagnostic skills. *J Gen Intern Med*. 2008;23(7):991-997. doi:10.1007/s11606-008-0667-0
25. Lazarus PA, Rosslyn FM. The arts in medicine: Setting up and evaluating a new special study module at leicester warwick medical school. *Med Educ*. 2003;37(6):553-559. <https://doi.org/10.1046/j.1365-2923.2003.01537.x>. doi: 10.1046/j.1365-2923.2003.01537.x.