

Using Body Painting and Other Art-Based Approaches to Teach Anatomy

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Recent years have seen a change in the teaching methods utilized within human anatomy education. Fewer cadavers, coupled with time constraints and limited numbers of trained staff, have forced anatomists to formulate new approaches to teaching. Student-led dissection has been replaced by the use of prosection; student–teacher interaction has been replaced by self-directed learning. In response to such challenges, faculty are opting to use novel methods of teaching, often drawn from outside of the medical context, including virtual dissection, wearable anatomical garments, and life drawing classes, all of which have added new dimensions to the classroom. One of the most popular approaches is body painting.

Body painting is considered by some to be the most ancient form of art. Origins of body painting stem from tribal cultures and are ceremonial. Body painting is now most frequently seen on the face, usually at sporting events or children’s parties. However, body painting is now being used in the medical setting as a way of projecting the inside onto the outside.

Body painting is an innovative method of anatomy teaching. Op Den Akker et al. [1] first used body painting, described as painting internal

structures on the surface of the body with high verisimilitude, during teaching in 1999.

Body painting within medical education is described as painting internal structures on the surface of the body with a high degree of detail [1]. This contrasts with simple line drawings as used in conventional practice, which can be dated back to at least a century [2]. Body painting proves particularly useful as a method for introducing surface anatomy in medical teaching and complements the teaching of clinical skills and peer examination, including techniques such as palpation and auscultation [1, 3, 4]. The value of body painting as a teaching tool is frequently attributed to its kinesthetic nature [3–5]. Furthermore, it is thought that the active and kinesthetic nature of body painting, coupled with the strong and highly memorable visual images of underlying anatomy, contribute to its success as a learning tool [1, 3, 4, 6]. Body painting has also been reported to be a valuable tool for diminishing the apprehension often exhibited by students when conducting peer physical examinations [3]. Since it has been suggested that a fear of death may be oppressive for students studying in the dissecting room and may be correlated to poor academic performance, the use of alternative teaching methods, such as body painting, may therefore be beneficial to students who struggle with cadaveric work [4, 7, 8].

Within this chapter, the practicalities and advantages of using body paint and other art-based approaches to teaching and learning

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anatomy are described. Examples are provided, along with recommendations for anyone considering developing their own body painting session. This process of painting internal structures onto the body promotes knowledge retention, creates an exciting teaching environment, and improves student engagement in their anatomical studies.

Examples of Anatomical Body Painting

Muscles of Facial Expression and Associated Neurovasculature

Painting the muscles of facial expression is a fun activity for students. It is of particular relevance for medical, dental, physiotherapy, and speech therapy students. Rote learning extensive lists of muscles from a textbook is dull and fails to demonstrate to students the associated actions of the structures. By painting the muscles onto the face, looking in a mirror or at a painted peer, and pulling various expressions such as winking, puffing out the cheeks, or raising the eyebrows, students are able to immediately see the muscles in action. The parotid gland, facial nerve, and other neurovasculature of the face also can be painted onto the face, either simultaneously or in isolation (see Fig. 18.1).

Topics Which Lend Themselves to Body Painting

- Abdominal viscera
- Facial muscles and neurovasculature
- Areas of referred pain
- Musculature
- Dermatomes
- Bones
- Borders of the heart and the position of valves
- Position of the lungs and thoracic osteology

Dermatomes

Mapping dermatomes onto skin is a great way to learn this invisible map of the body. Not only do students learn the dermatomes, but they also revise their bony landmarks, as they must palpate the relevant bones in order to correctly map the dermatomes. Dermatomes can be painted from head to toe simultaneously (see Fig. 18.1), or students can paint the dermatomes region by region as they encounter them through the curriculum. Dermatome painting lends itself to the use of bright bold blocks of color, which is highly memorable for students. Similarly, innervation from peripheral nerves also can be mapped.

Abdominal Regions, Quadrants, and Areas of Referred Pain

A quick and easy activity for students is to paint regions of the abdomen alone, or better still, the associated abdominal viscera can then be painted in situ. This activity has much impact when students observe the relative size and positions of organs. Viscera can be painted using an appropriate anatomical color palette or using vibrant colors to promote subsequent recall. Again, as with dermatomes, this reinforces knowledge of surface anatomy and bony landmarks. Instead of painting viscera, or by painting onto another peer, students can paint blocks of color to represent the referred pain from corresponding organs.

Skeletal Anatomy

Osteological knowledge is imperative for students. Painting the skeleton is a memorable task. Regions can be painted in isolation, such as the bones of the hand or an entire limb can be painted. Musculature and neurovasculature can be added if required. Bones of the hand are something that individuals can paint onto themselves, rather than having to work in pairs. An easily accessed area, such as the hand, lends itself to a painting activity with school groups, recruitment fairs, or for other such public engagement events.



Fig. 18.1 Body painting (a) dermatomes, (b) facial anatomies

“Body painting has helped me to interact with individuals in a manner that is outside the normal socially acceptable level of conduct. This has helped me develop a more professional attitude towards patients and I see this as very useful.”

A medical student at
Durham University, UK

Creation of Learning Landmarks

Students have reported body painting as a highly motivating exercise [4]. Its main advantage appears to be the creation of what could be called “learning landmarks”: vivid experiences which are memorable in themselves and which then provide access to the educational content associated within that context [4]. In particular, students acquire a good understanding of dimensions and positions of anatomical structures using this method while studying [1]. Literature is in accordance with the idea that body painting is a highly memorable experience, which gives students an appreciation of the links between the visual, tactile, and auditory aspects of human anatomy.

Advantages of Using Body Painting

Although body painting has origins in ancient tribal customs, it has a number of educational advantages within contemporary curriculum [4, 5].

Emphasis on Living Anatomy

Historically, anatomy has been taught by dissection. Cadavers are useful for studying the anatomy of large organs [9] and give an overview of spatial orientation [10, 11]. Anatomy is most commonly encountered by medical practitioners in the form of living anatomy and medical imaging [6]; therefore, students should also be encouraged to engage in teaching activities with an emphasis upon living anatomy and body painting is one such activity. “Clinicians often blame anatomists for teaching students too many details and not enough clinically relevant structures” [12]. Body painting allows the clinical relevance of the gross anatomy to be emphasized to students. Surface anatomy is a way of bringing cadaveric anatomy to life [13] and body painting falls into this category.

Cost-Effectiveness

Body paints and paint brushes are readily available for purchase and are relatively inexpensive [5]. Old containers can be used for storage of water; the paint brushes do not need to be specialist. Large numbers of students can engage in the activity simultaneously and require little direction once instruction sheets have been produced, making the activity cost-effective in terms of both staff time and physical resources.

Positive Learning Environment

It is rare for even the most reserved students not to positively engage with body painting sessions. This fun activity becomes a break from the tedium of the dissecting room. Student enjoyment results in a positive learning environment and peer–peer teaching often results. As body painting is not a didactic modality for delivering teaching, its use creates positive and more relaxed relationships within the classroom between faculty and students [4, 5].

Retention of Knowledge

By actively engaging in the painting process, rather than passively learning in a didactic teaching session, students’ learning becomes deep rather than surface [4, 5]. The use of bright colors aids students’ memory of the structures that they paint. The painting process is multisensory and utilizes all learning approaches simultaneously; students visualize, students paint (kinesthetic), students read instructions aloud (auditory), and students feel the paint on their own skin when acting as the canvas (sensory). Thus, retention of knowledge is promoted. Furthermore, students often photograph their painting for revision and sentiment—both positives in terms of subsequent recall.

Emphasis on Future Clinical Practice

During a body painting session, students must palpate bony landmarks in order to demarcate the associated anatomical structures. This has direct learning benefits for future clinical practice. Moreover, regions such as boundaries of the lungs and positions of heart valves can be painted on and lend themselves to subsequent clinical examination with the stethoscope. When dealing with peers in a state of relative undress and completing palpation and examination—students must communicate appropriately, empathize with their peer canvas, and approach their peer in a professional manner; thus, skills required in the clinical environment are developed. These body painting sessions allow integration between anatomy and clinical skills and enable the future patient to be the focal point [4, 5].

An Alternative to Cadavers

One of the major advantages of using body paint is that it can be used as an alternative approach to cadaveric study on occasions where living and surface anatomy are being studied or for students who struggle with cadavers [4]. The dissecting room

environment can be one that students who have emotional difficulties with cadavers find troublesome. Learning out of the dissecting room context can be both supportive and educationally beneficial for students who struggle emotionally. Similarly, surface anatomy is difficult to demonstrate on cadavers, and for this reason body painting is useful—it emphasizes living anatomy throughout. When time is short for dissection, or cadavers are in limited supply, faculty may wish to consider implementing body painting into their curricula. Body painting cannot entirely replace cadaveric study, but it is a powerful tool and adjunct for emphasizing the living nature of anatomy [4, 5].

Use Outside of the Classroom

In addition to anatomy teaching, body painting can be used for a number of other uses and institutional activities. Quick and easy activities are often required for departmental open days and tours. Painting the hand lends itself to such an occasion as no undressing is required and participants can paint their own limbs. Bones of the hand, the dermatomes of the hand or neurovasculature can be painted within a few minutes. Prior anatomical knowledge is not necessary; participants can work from images or simple instruction sheets. Similarly, body painted models can be used for other public engagement events, such as museum exhibitions.

Designing Body Painting Teaching Sessions

Planning body painting teaching sessions can be daunting. By following these simple steps [4, 5], body painting sessions can be easily designed and implemented.

Identify Your Chosen Teaching Session and Learning Outcomes

All sessions need specific learning outcomes. Give careful consideration to which structures

you wish the students to learn. What is the take-home message of your session, and can that be achieved using body painting as opposed to dissection or a lecture? Develop one session as a starting point, then following evaluation, move on to develop further sessions. Body painting sessions can form part of timetabled anatomy and clinical skills teaching. Body painting fits particularly well into a multi-station practical whereby each station addresses one aspect of the body region being taught. For example, a teaching session on the anterior thigh may have the following stations: musculature, nerve supply, blood supply, and osteology. When body painting is introduced into a practical, it may form one of the stations or become a double station if a clinical skill is being taught simultaneously. The stations for the anterior thigh session may then become a musculature, neurovasculature, osteology, and a body painting station which teaches the distribution of dermatomes.

Design Your Instruction Sheet

Students need specific instructions to follow to enable them to achieve the desired learning outcomes. Instructions need to be formatted as a step-by-step guide which is easy to follow. Photographic images of a pre-painted model or diagrams are helpful. Copies of the instruction sheets, presented as a checklist which students can mark off, are a good aid for regions which are

To Do

- Think about a teaching session with either gross anatomy or surface anatomy learning outcomes. How could you incorporate body painting into that class?
- Consider the environment, the resources, and which body region and structures will be painted.
- Can you devise easy-to-follow instructions? Will you include images in your instruction sheets?

more complex and have combined clinical examination. Following their first use, ask students for feedback as to whether the instructions were easy to follow. From a practical perspective, laminating instruction sheets is useful due to surrounding water and paint.

Choosing Your Teaching Environment

Body painting is easily adapted to a number of teaching and learning environments. Consideration needs to be given to safety; are you using a laboratory where students can come into contact with irritants or other hazardous substances? Consider student dignity; is the interior of the room easily viewed from outside? Are the surfaces wipeable after painting? As the paints are water based, classrooms other than laboratories can be utilized for painting. Students need a surface for their equipment and instructions, as well as enough space to move around their chosen student canvas.

Sourcing Your Equipment

Body paints are often sold as children's face paints. The most important considerations are that the paints you buy are water based and hypoallergenic. The colors you select depend on whether you wish to paint in an anatomically correct palette, such as beige, red, and brown, or whether you wish to use bolder colors such as orange, blue, and purple. Paints are available from arts and crafts suppliers, toy shops, and the Internet. Paint brushes do not need to be specialist. Brushes can be natural fibers or synthetic—depending on your budget. It is advisable to purchase a selection of sizes of brush as some areas, such as dermatomes require large block painting, whereas others, such as nerves, require finer lines to be painted. Any plastic pots will suffice for washing brushes and wetting paints during the session. Disposable wipes are ideal for removing paint from skin or work surfaces after teaching, although often students wish to keep their paint on!

Equipment Needed to Use Body Paints

- Supply a range of colored paints, paint brushes, and/or sponge applicators.
- Body paints should be water based and hypoallergenic.
- Water or wipes need to be available for paint removal/mixing.
- Have mirrors available so that the student canvas can observe the painting.
- Screens or cubicles may be needed for dignity.

Assigning Student Roles and Groups

Where possible, allow students to self-select their partner or group members. This eases any discomfort associated with undressing and physical examination. Some students may have a preference for the role they undertake, whether that is the painter or the canvas. Students can be encouraged to alternate roles as there are advantages to each [8]. To ensure that the canvas engages, they can read the instructions to the painter and observe the painting process in a mirror.

Tips for Using Body Painting Within Anatomy Teaching

Use Within Both Large and Small Group Settings

Body painting use is not limited to small group settings. Sessions can easily be adapted for large numbers of students. The number of paints available and space requirements are the only limiting factors. Resource-wise, students can easily share paints and brushes. Students can work in pairs, or larger groups, depending on the amount of anatomical structures to be painted and the time frame in which they must work.

Consider Students' Sensitivities and Cultural Perspectives

The majority of students will have no hesitations in participating in a body painting session. However, as with peer examination, students may have concerns with being in a state of undress. Faculty members are advised to be sensitive to these issues, particularly to students who are body image conscious. Providing screens or cubicles helps students feel more comfortable. Some students may choose to paint on top of clothing, which works well. Allowing students to self-select the groups they work in also encourages their participation.

Cross-Linking

See also Chapters 3, 13, and 17.

Allow Photography

Permitting students to take photographs of their paintings promotes reflection and revision. Of course, caution must be used, and students should be encouraged to seek consent before photographing others. Advise students that photography is permitted in advance of the session.

Introduce and Demonstrate

Students may be reluctant to start painting without an introduction to the topic or a quick demonstration of surface anatomy palpation. A brief overview gives students greater confidence. This can include the instructor painting a model or volunteer if time allows. Instructors should circulate as much as possible in order to reassure students. In doing so, they should be mindful of student dignity and comfort, especially if regions such as the thorax or abdomen are being painted.

Give Students Feedback

During painting sessions, faculty can observe the painting and palpation being conducted by students. Timely and appropriate feedback should be given but with sensitivity and encouragement. Use this as an opportunity to engage the students in a dialogue about the learning objectives and, if appropriate, the relevance to their future clinical practice.

Reflect on the Success of the Session

Being a reflective practitioner is an important part of the teaching process. Following painting sessions, teachers should take the time to consider the successful elements of the session and the aspects that could be improved for future iterations. Was the time devoted to the activity appropriate? Did the session fulfill the learning outcomes? Did the students engage with the painting process? Was student comfort and dignity maintained? Did students receive adequate instruction and feedback? Was the equipment provided sufficient?

Other Important Considerations When Using Body Paints in Anatomy Teaching Sessions

- Provide easy-to-follow instructions.
- Allow students to self-select the peers they wish to work with.
- Involve the student canvas in the process by encouraging them to read the instructions aloud and by providing mirrors for them to observe through.
- Encourage students to use bold colors—this promotes retention of knowledge.
- Ensure sufficient time is provided.
- Encourage students to take photographs of their painting—this promotes subsequent recall.

Other Art-Based Approaches to Teaching Anatomy

Body painting is just one of many art-based activities which can be readily adapted for use in anatomical teaching.

Life Drawing

Engaging students in life drawing is particularly useful for teaching surface anatomy. Drawing provides a medium by which students can consider differing body morphologies and surface anatomy. Drawing trains students to observe the asymmetry in a body—a skill particularly useful for those going on to clinical practice. When taking the time to draw something, the artist must study the object in great detail, whether that is drawing anatomical dissections or plastic models. Due to this study, life drawing is therefore also a beneficial process for learning, in particular when considering spatial relationships between anatomical structures.

Plasticine (Clay) Modeling

Children's reusable modeling clay (plasticine) lends itself to anatomical teaching. As with body paints, the clay is cheap, readily available for purchase, reusable, and can be adapted for use in large group sessions. Examples of its use include modeling the muscles of facial expression on to a plastic skull (see Fig. 18.2) and modeling vertebrae or embryological structures. The advantages are similar to body paint in terms of appeal to a variety of learning styles, diffusion of emotional responses to cadavers, and memorability.

Anatomical Cake Baking

Studying anatomy does not need to be a task confined to the classroom; students can enjoy learning anatomy at home too. Baking and decorating foodstuffs such as cakes, bread, or cookies to resemble anatomies is a fun way to study (see Fig. 18.3) without reading textbooks. By depicting the anatomy, students must orientate themselves with the anatomy and relevant spatial

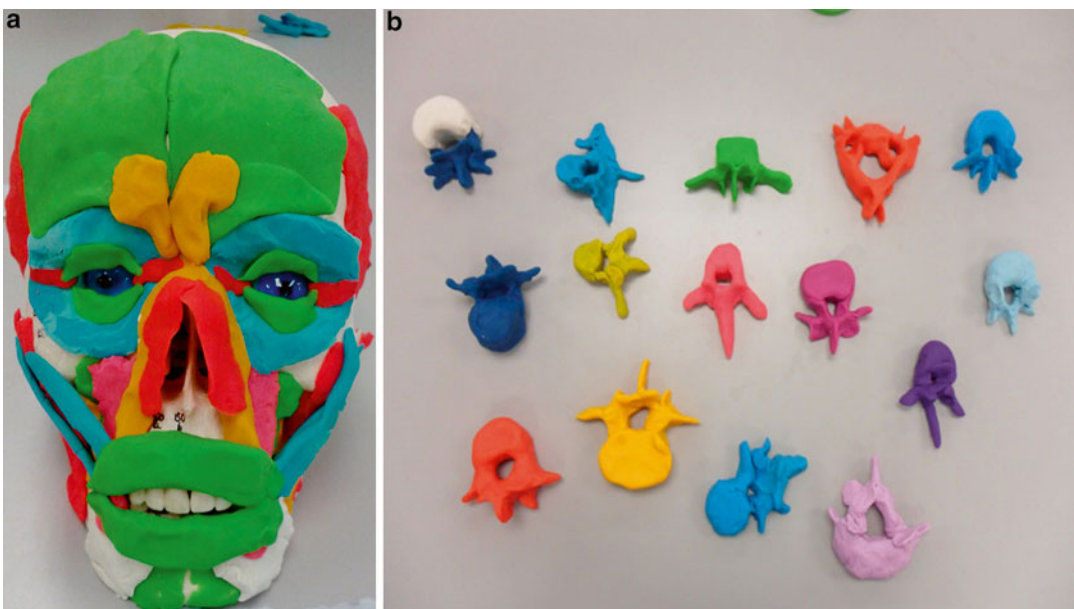


Fig. 18.2 Modeling clay (a) muscles of facial expression, (b) vertebrae

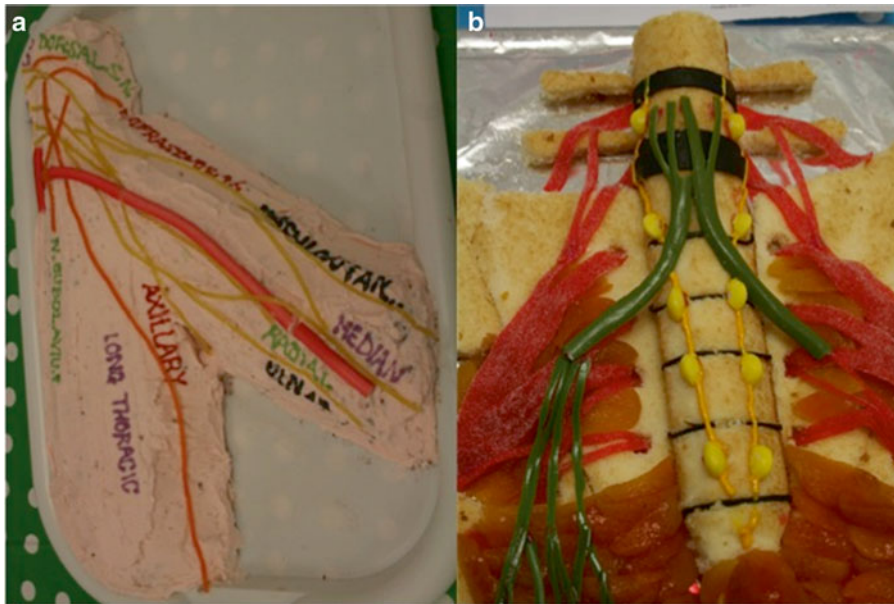


Fig. 18.3 Anatomical cake baking (a) brachial plexus, (b) hypogastric plexus

relationships. As this task takes time, the students are reinforcing the anatomy over a prolonged period, but often without realizing they are doing so. Holding an event where students can bring in their baked items makes a great end-of-semester revision session.

Conclusions

Art-based approaches to teaching and learning add new dimensions to the educational environment and to the student experience [4, 5, 8]. Body painting remains one of the most popular art-based modalities employed within anatomy education. Body painting is a useful tool for learning gross and surface anatomy. It actively engages students in the learning process and enables long-term retention of knowledge. The use of bold color promotes memorability and adds an element of fun. Utilizing body painting encourages students to confront issues associated with clinical examination such as vulnerability, communication, professionalism, and body image in a positive and safe learning environment [4, 5, 8]. Life drawing, clay modeling, and other art-based

approaches are also educationally beneficial due to their engagement, memorability, and context outside of the dissecting room.

“Body painting is fun, very enjoyable and often a challenge. You do not need to be a good artist, just to be able to follow instructions. Also body painting allows you to realize the situation of organs in the body, often for myself I find it surprising their exact locations and actual size.”

A medical student at
Durham University, UK

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