Reviewing the Role of Instagram in Education: Can a Photo Sharing Application Deliver Benefits to Medical and Dental Anatomy Education?

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Abstract

Instagram is an increasingly popular social media site tailored towards sharing photos and videos. An audit investigating current Instagram accounts focusing on anatomy education found a variety of successful teaching styles, including clinical images, descriptive videos, multiple-choice questions, and cartoons. Utilising Instagram for educational purposes, benefits such as ease of use, hashtags, and its effectiveness in conveying visual topics should be weighed against limitations such as passive learning and the requirement of committed staff to oversee its use.

Keywords Instagram · Education · Anatomy · Dentistry · Teaching

Introduction

When teaching subjects like anatomy, that involve a considerable ability to visually identify structures, the incorporation of social media has become a valuable resource. As the number of hours dedicated to anatomy teaching in UK Universities decreases, the application of social media tools could become increasingly important [1].

Reports on the use of social media sites used in anatomy education include Facebook, Twitter, and YouTube. In the third quarter of 2017, Facebook had on average 1.37 billion daily users, making it the most popular form of social media [2]. In fact, a 2011 study found that 90% of medical students used Facebook, a figure which has likely grown since [3]. Using Facebook in medical education has been found to encourage collaboration and provide quick feedback because of its ease of use. It is also well tailored in sharing media from other sites like Instagram and YouTube [4]. However, some pitfalls do exist which are mainly focussed around distraction, professionalism, privacy, and safety [4].

Twitter is another notable media site used professionally by academics. In a study looking into the use of a Twitter hashtag for neuroanatomy teaching, it was found that it could be used to boost the morale of students and encourage revision. However, it required regular engagement from the teachers, and there was no evidence to suggest that it had a direct impact on their grades [5].

YouTube has become a particularly successful tool in anatomy teaching for both medical and dental students with greater potential [6, 7]. However, drawing parallels with Twitter, the study did not find that its use boosted exam grades, although it did encourage motivation of learning and enthusiasm. This finding is supported by Barry et al. who reported that 78% of medical students used YouTube as their main source for educational anatomy videos, demonstrating its value in medical teaching [1].

Despite this, there are some recognised limitations to using YouTube as an educational tool. These include criticisms by some educators that learning through watching a video is a passive experience, without the need for student interaction. To overcome this pitfall, educators are developing screencasts—a real-time screen recording application, which can promote engagement by encouraging students to write/
draw along with a tutorial. These can be used to supplement teaching and used with a flipped classroom approach to teaching and there is some evidence to suggest that they can work as well as traditional learning resources [8].

In the current climate, a decline in engagement between students and social media has recently been observed, most notably on Twitter and Facebook; however, there has also been a noticeable increase in students shifting to Instagram as their preferred social media platform for educational content [9]. As a result of the changing landscape of social media use in medical education, the purpose of this article is to review the role of Instagram in medical and dental education—with a special focus on clinical anatomy, including its benefits and limitations.

Emergence of Instagram as an Educational Resource in Health Education

Instagram is a photo- and video-sharing social networking service owned by Facebook, Inc. and was launched in October 2010. The main feature of the application allows users to upload photos (and 60-second videos), which can be edited with various filters and organised with tags and comments (using the hashtag ‘#’ symbol). Posts can be shared publicly or to followers; users can browse other users’ content by tags and locations, and view trending content. Users can also ‘like’ photos and follow other users to add their content to a feed. Focussing mainly on image uploads, Instagram has become the most popular photo sharing platform on the internet. Evidence suggests that it attracts the younger generation with 90% of its 150 million users under the age of 35. In 2017, Instagram reached 800 million users according to its press website. The proportion of these users who are students is unknown, however, a 2016 survey showed that 59% of internet users who use Instagram are between the ages of 18 and 29 [10].

As with other social media sites, Instagram is utilised predominantly for recreational use. Despite this, an increasing number of anatomy education-related Instagram accounts for both medical and dental students are emerging and becoming well-known. Current research includes an investigation into Instagram accounts using the key search terms ‘anatomy’, ‘anatomy education’, ‘medicine’, and ‘dentistry’. The most popular and relevant accounts were listed first in this search and the first 5 to 10 profiles were recorded per search. On occasion, related accounts would be recommended by Instagram and the data from these were also included. Profiles were excluded if the content was not predominantly medicine or dentistry based.

Anatomy Education on Instagram: Search Strategies and Findings

At the present time, little is known about the exact nature of education accounts and their providers; therefore, we conducted an audit based enquiry into Instagram accounts using the key search terms ‘anatomy’, ‘anatomy education’, ‘medicine’, and ‘dentistry’. The most popular and relevant accounts were listed first in this search and the first 5 to 10 profiles were recorded per search. On occasion, related accounts would be recommended by Instagram and the data from these were also included. Profiles were excluded if the content was not predominantly medicine or dentistry based.

Several aspects of account information were collected and recorded in the table below (Table 1) to gain an understanding of the type of accounts that exist, the type of content posted and the size of their audience, including its growth from January 2018 to June 2018. This audit revealed 80 Instagram accounts relevant to anatomy, particularly focussed on medicine and dentistry. Of the 80 accounts searched, 2 begun posting in 2018, 25 in 2017, 24 in 2016, 15 in 2015, 12 in 2014, and 2 in 2013. The number of posts per account had a range of 6–4942 and the number of followers between 513–2.1 million.

The majority of accounts did not specify a country of origin, those that did were mostly from the USA. The most common subject area was medical education. However, there was also a substantial number of accounts focussed on a single profession within medicine, such as neurosurgery or orthodontics. A common observation, especially amongst the most followed accounts, was the appearance of memes (a humorous, often relatable, photo with a bold caption) and cartoons, which were present in 26% of the accounts reported.

Lack of quality control means that the uploader is responsible for de-identification of individuals and safeguarding of information. Instagram has its own terms of use, which include banning unlawful and confidential content, but it relies on other users being aware of the terms and reporting it, by which time it will have already been posted [14].
Table 1  A summary of the medical/dental anatomy-related Instagram, including the content, account owner, number of followers, and number of posts. The keywords used to search for the Instagram accounts were as follows: Anatomy; Suggestions from the seattlesciencefoundation; Anatomy education; Medicine; Dentistry; Education; SBH follows; Medical education; SarahJClifford follows; Accounts recommended by Instagram

| Search code | Page title | Date of first post | No. of posts | Country of origin | Discipline/subject area | Content type | Followers January 2018 | Followers June 2018 | Profit making/commercial? | Institutional/ individual Staff/student |
|-------------|------------|--------------------|--------------|-------------------|--------------------------|--------------|------------------------|------------------------|----------------------------------|----------------------------------------|
| 1           | guided.dental | 13/08/2017         | 42           | USA               | Dental Education - oral surgery, anatomy, perio, pros/restorative, ortho, endo, implantology | Digitally produced information sheets including educational questions | 12,900 | 21,900 | Institutional | Staff |
| 1           | seattlesciencefoundation | 09/07/2015  | 482      | USA               | Medical Research and Education | Surgery and dissection videos | 84,000 | 93,900 | Institutional | Staff |
| 1           | oralmaxillofacial (Educational OMFS) | 30/09/2015 | 55       | USA               | Oral and Maxillofacial Surgery | Traumatic head injury photographs, maxfax photographs, teeth radiographs | 1008 | 1133 | Unsure | Unsure |
| 2           | neurosurgeryresident | 28/11/2014 | 247       | USA               | Neurosurgery | Photos of neurosurgery cases, brain radiographs, | 42,000 | 55,000 | Community? | Staff |
| 2           | medical.doctors (Medical Doctors Worldwide) | 11/09/2015 | 1544     | USA               | Medicine and Health | Medical news, information, motivation, educational pictures and articles | 509,000 | 551,000 | Individual | Staff and Students |
| 2           | medicalschoolposts | 03/09/2014 | 1005     | USA               | Medicine and Health | Photographs of unique medical cases, uplifting photographs of patients and family surgery and dental reposted educational videos, health product advertisements | 372,000 | Gone | Community? | Staff |
| 2           | telehealthier | 18/08/2016       | 462         | USA               | Education Website, smart health trackers, blood pressure monitors, stethoscope sales | Surgery and dental reposted educational videos, health product advertisements | 320,000 | 296 | Commercial | Institutional |
| 2           | medicalcortex | 20/02/2016       | 1006       | USA               | Medical education, jewellery sales, | Medical case videos, memes, jewellery advertisements, educational photos and videos | 164,000 | 185,000 | Commercial | |
| 2           | medschoolstudent (Med School Posts) | 15/04/2016 | 190      | USA               | Medical Education and humour | Educational posters, memes, and jokes | 146,000 | 195,000 | Individual | Student |
| 2           | med_students0 | 01/03/2015      | 1357       | USA               | Medical and Health | Surgical videos and animated surgical techniques | 165,000 | 185,000 | Individual | Student |
| 2           | anatomia.repost | 27/06/2016 | 1745     | USA               | Anatomy | Surgical videos, dissection specimens, guides to anatomy, rare cases | 255,000 | 311,000 | YouTube account | |
| 3           | aloeanatomy | 23/04/2017       | 28          | USA               | Musculoskeletal Anatomy | Information on bone structure and positioning, nerves, muscles | 673 | 3133 | Commercial | Institutional |
| Search code | Page title | Date of first post | No. of posts | Country of origin | Discipline/subject area | Content type | Followers January 2018 | Followers June 2018 | Profit making/commercial? | Institutional/individual | Staff/student |
|-------------|------------|--------------------|--------------|-------------------|-------------------------|--------------|------------------------|-----------------------|---------------------------|--------------------------|---------------|
| 4           | medicine_on_indexcards | 02/09/2017 | 20           | England            | Physicians Associate Anatomy, Pathology | Index cards with medical illustrations on them, prize giveaways | 1156 | 1615 | Individual | Student |
| 4           | medicine_in_pictures | 23/09/2016 | 670          | Medicine and Health | Informational diagrams, memes, surgical images, adverts | 61,600 | 72,800 | Commercial | Institutional |
| 4           | surgerypics (High Definition Medicine) | 24/06/2013 | 339          | Medical Education | Re-posted Surgical photographs | 461,000 | 473,000 | Institutional |
| 4           | medical_cases20 | 21/07/2016 | 352          | Arabia             | Medical quizzes, surgical images, case studies, memes, informational medical diagrams | 55,600 | 67,200 | Commercial | Individual | Student |
| 4           | study_4_medicine | 28/07/2016 | 227          | England            | Medical School, Medical Mnemonics and MCQs | Informational diagrams, Annotated radiographs, dissection specimens | 4081 | 4146 | Profit making | Individual | Student? |
| 4           | medicinaclinica | 06/04/2017 | 758          | Hospital Medicine | Surgical photos and videos, inspirational images, educational/interesting images related to medicine | 762,000 | 804,000 | Institutional |
| 4           | sprezyna92 | 17/08/2014 | 468          | Poland             | Self-promotion, medical notes, promotion of books and films, medical motivation | 11,500 | 14,000 | Profit making | Individual | Student |
| 4           | injectiondaily | 29/06/2016 | 177          | Medical Facts     | Fact images related to medical practice, disease and the body | 82,200 | 98,400 | Institutional |
| 4           | academyofsurgeons | 13/01/2017 | 145          | Surgery and Medicine | Surgical images with questions and answers in the description, memes, jokes, rare surgical cases | 116,000 | 150,000 | Institutional |
| 4           | talkinmedicine | 31/05/2017 | 217          | USA                | Medical and Health | Photos/videos of rare medical cases with description headlines | 35,400 | Gone | Institutional |
| 4           | surviving.medicine(Medical Motivation) | 07/03/2017 | 269          | USA                | Medical Motivation, Podcast promotion | Medical photographs and illustrations with motivational taglines and quotes | 12,300 | 16,200 | Profit making | Institutional | Professionals |
| Search code | Page title | Date of first post | No. of posts | Country of origin | Discipline/subject area | Content type | Followers January 2018 | Followers June 2018 | Profit making/commercial? | Institutional/Staff/student |
|-------------|------------|--------------------|--------------|-------------------|--------------------------|--------------|-----------------------|----------------------|--------------------------|----------------------------|
| 4           | medplay.co.uk (Medicine MCQs - MedPlay Ltd) | 12/03/2017 1272 | Medicine, Nursing, Pharmacy and Premed students | Surgery and Clinical Cases | Medicine and Surgery | MCQ's for Medicine, Nursing, Pharmacy and Premed students | 12,800 | 30,200 | Profit making | Education company |
| 4           | medical_blog_ | 05/03/2017 689 | Surgery and Clinical Cases | Medicine and Surgery | Medicine and Surgery | Surgical images and videos | 11,300 | gone | Institutional |
| 4           | academyofscsurgery | 10/10/2017 19 | Surgery and Clinical Cases | Medicine and Surgery | Medicine and Surgery | Surgical images and videos | 3275 | 6032 | Institutional |
| 4           | medbases | 18/07/2017 218 | Medicine and Surgery | Medicine and Surgery | Medicine and Surgery | Surgical images and videos, radiograph images, annotated specimens | 17,000 | gone | Institutional |
| 5           | dentistrymyworld | 06/03/2015 1841 | Dentistry | Dentistry | Dentistry | Dental images and videos, rare cases, cosmetic dentistry photographs, memes, radiographs, dental equipment, seasonal posts product advertisement | 332,000 | 355,000 | Profit making | Institutional |
| 5           | dentistrymyworld1 | 29/12/2015 3,311 | Dentistry, Health and Wellness | Dentistry | Dentistry | Animated videos of dental procedures, case study videos, memes, dental-related photographs | 873,000 | 124,000 | Commercial | Institutional |
| 5           | dentistryxworld | 06/07/2017 10 | Dentistry | Dentistry | Dentistry | Dental procedures, techniques, head anatomy | 4,181 | 3907 | Institutional |
| 5           | dentistry.world | 24/08/2015 2438 | Dentistry | Dentistry | Dentistry | Case study videos, procedure videos, orthodontics, before and after images, product advertising, information images | 277,000 | 323,000 | Profit making | Community |
| 5           | dentistryzone | 20/12/2016 743 | Worldwide | Dentistry and Dentists | Dentistry and Dentists | Videos and photos of rare cases, before and after photos, anatomy diagrams, cosmetic dentistry | 16,100 | 33,100 | Profit making | |
| 5           | dentistry_forum | 25/09/2014 1720 | Worldwide | Dentistry education | Dentistry education | Before and after treatment photos, radiographs, treatment videos | 255,000 | 279,000 | Profit making | |
| 5           | idenstry | 02/07/2015 4942 | Dentistry | Dentistry | Dentistry | Clinical videos and photos, related photos, comics, jokes, memes | 282,000 | 334,000 | Individual |
| 5           | dentistrypage | 29/03/2017 365 | Dentistry | Dentistry | Dentistry | Before and after treatment photos, cosmetic dentistry | 64,200 | 62,500 | Profit making | |
| Search code | Page title        | Date of first post | No. of posts | Country of origin | Discipline/subject area         | Content type                                                                 | Followers January 2018 | Followers June 2018 | Profit making/commercial? | Institutional/ Staff/student |
|------------|-------------------|--------------------|--------------|-------------------|---------------------------------|------------------------------------------------------------------------------|------------------------|-----------------------|-----------------------------|-------------------------------|
| 5          | dentistry corner  | 26/03/2016        | 1034         |  | Dental-related content | Clinical cases, memes, jokes, related to dentistry photos, anatomy, reposted content | 22,600                 | 24,500                | Profit making               | Website                       |
| 5          | dentistryglobal   | 11/12/2016        | 564          | Worldwide         | Dentistry                      | Educational videos, comics, puns, anatomy, tooth-related merchandise          | 71,600                 | 77,500                |                             | Community                     |
| 5          | dentistryscience  | 04/12/2016        | 749          |  | Dentistry for professionals | Teeth, before and after treatment photos, educational videos, memes, tooth anatomy | 62,400                 | 98,300                |                             | Community                     |
| 5          | dentistrysc       | 06/04/2017        | 464          | Worldwide         | Dentistry                      | Dental cases, anatomy, head and neck diseases,                               | 19,400                 | 33,800                |                             | Institutional/ Community      |
| 5          | dentistry2day     | 26/12/2015        | 604          | Worldwide         | Dentistry                      | Clinical cases, dentistry in the media, memes,                               | 78,100                 | 82,000                |                             | Community                     |
| 5          | dentists.doctors  | 22/12/2014        | 1003         |  | Dentistry, Medicine, Pharmacy | Dental surgery, dental tools, anatomy, medical jokes, jokes, memes, related content | 161,000                 | 174,000               |                             |                             |
| 5          | dentistry_room    | 08/05/2016        | 292          | Dubai/UAE         | Cosmetic Dentistry             | Photographs of teeth including before and after, poor teeth hygiene and prepped for treatment | 7785                   | 11,700                |                             |                             |
| 5          | dentistry.blog    | 27/05/2017        | 331          |  | Orthodontics, cosmetic dentistry, dental surgery | Before and after photos, braces, oral surgery, jaw re-alignment, dental techniques, | 9155                   | 10,000                |                             | Individual                   |
| 5          | dentistrymentor   | 26/03/2017        | 1106         |  | Medical and Health, Dentistry | Teeth, before and after treatment photos, orthodontics, moulds, implants | 6691                   | 12,400                |                             |                             |
| 5          | dentistry_aesthetics | 24/09/2017      | 235          |  | Dentistry                      | Reposts of before and after treatment photos with descriptions of the treatment | 5790                   | 11,500                |                             | Individual/ Student           |
| 6          | dentistryeducation | 14/10/2017      | 6            |  | Dental Education               | Tooth anatomy, head and neck anatomy                                       | 1006                   | 2331                  |                             |                             |
| Search code | Page title               | Date of first post | No. of posts | Country of origin | Discipline/subject area         | Content type                                                                 | Followers January 2018 | Followers June 2018 | Profit making/commercial? | Institutional/Staff/student |
|-------------|--------------------------|--------------------|--------------|-------------------|---------------------------------|-------------------------------------------------------------------------------|------------------------|----------------------|--------------------------|---------------------------|
| 6           | guided.dental            | 13.08/2017         | 82           |                   | Dental Education                 | Oral surgery, anatomy, perio, pros/restorative, ortho, endo, implantology - quiz photos with answers in the next post | 13,400                 | 21,900               |                         |                           |
| 7           | about_dentistry          | 07.08/2015         | 2170         | USA               | Dental Education                 | Videos of treatment, memes, related content, merchandise advertisement       | 302,000                | 335,000               | Profit making           |                           |
| 7           | amelia_studies           | 19.03/2016         | 284          | USA               | Medical Student Notes            | Photos of medical notes containing information                               | 89,300                 | 97,300               |                         |                           |
| 7           | brainyleslie_            | 20.06/2017         | 143          | USA               | Neurosurgery                     | Brain scans of clinical cases, personal stories, medical advice, team photos  | 1039                   | 3407                 |                         | Individual Staff         |
| 7           | neuroradcases            | 22.08/2017         | 78           | USA               | Neuroradiology                   | Radiographs of clinical cases relating to the spine, brain and skull          | 1235                   | 2123                 | Individual Staff       |                           |
| 7           | blu_med                  | 27.09/2016         | 76           |                   | Medical and Health               | Medical photos with educational captions, radiographs, summaries of diseases | 513                    | 707                  | Individual              |                           |
| 8           | arorameded               | 05.07/2016         | 1274         |                   | Global Medical Education         | Information sheets on medical topics, selfies, memes                         | 1344                   |                      | Gone                    | Individual Professional  |
| 9           | sarahjclifford           | 14.03/2014         | 363          | England           | Medical Illustration             | Hand-drawn notes, medical drawings, selfies, promotions                       | 73,600                 | 75,900               | Profit making           | Individual               |
| 9           | mike.natter              | 21/12/2014         | 1174         | USA               | Medical drawings                 | Medical illustrations and diagrams, humorous cartoons, practicing doctor advice | 74,900                 | 77,900               | Profit making           | Individual               |
| 9           | thegirlwiththewhitecoat  | 03.01/2018         | 12           |                   | Medical Notes                    | Hand-drawn notes, medical inspiration                                         | 466                    | 1877                 | Individual              |                           |
| 9           | the_littlemedic          | 08.04/2017         | 69           |                   | Revision Notes                   | Hand-drawn medical school notes                                               | 2519                   | 3764                 | Individual              |                           |
| 9           | simplify.drugs           | 15.09/2016         | 420          |                   | Pharmacology Education           | Memes, MCQs, information on medical diseases, related content                 | 53,300                 | 67,700               |                         |                           |
| 9           | geekymedics              | 10.01/2017         | 57           |                   | Medical Education                 | Medical diagrams, anatomy, medical technique videos, cranial nerve education | 11,300                 | 13,500               | Website                 |                           |
| Search code | Page title     | Date of first post | No. of posts | Country of origin | Discipline/subject area       | Content type                                                                 | Followers January 2018 | Followers June 2018 | Profit making/commercial? | Institutional/Staff/student |
|-------------|----------------|--------------------|--------------|-------------------|-------------------------------|-------------------------------------------------------------------------------|-------------------------|------------------------|----------------------------|-----------------------------|
| 9           | thexraydoctor  | 31/01/2015         | 1401         |                   | Radiology                     | Radiographs of clinical cases in medicine                                      | 32,400                  | 37,000                 | Individual                |                             |
| 9           | med_life       | 19/09/2016         | 310          |                   | Medical Education             | Information sheets of medical cases and anatomy and physiology                | 90,200                  | 10,700                  | Profit making             |                             |
| 9           | myneurosurgery | 03/08/2013         | 848          |                   | Neurosurgery Education        | Neurosurgery clinical case photographs, radiographs of the head and spine      | 105,000                 | 109,000                 |                           |                             |
| 10          | medicaltalks   | 20/04/2014         | 1465         |                   | Medical Case Studies          | Photographs and videos of medical cases with medical descriptions             | 190,000                 | 210,000                 | Community                 |                             |
| 10          | medicalpedia   | 05/06/2016         | 350          |                   | Medical Education             | Rare or shocking medical cases with educational descriptions                   | 236,000                 | 371,000                 | Institutional             |                             |
| 10          | medical_notes12| 11/11/2016         | 3183         |                   | Medical Notes                 | Anatomical diagrams, MCQs inspirational quotes/pictures, clinical cases, information sheets, symptoms and diagnostic tools | 169,000                 | 228,000                 |                           |                             |
| 10          | medicosity     | 19/05/2016         | 492          |                   | Medical Education             | Clinical cases, memes, cartoons, related content                              | 45,500                  | 61,700                  | Community                 |                             |
| 10          | medgeeksine    | 10/08/2015         | 1711         |                   | Medical Education             | Medical facts, information sheets on medicine and diagnosis, memes, MCQs, jokes, related content | 200,000                 | 216,000                 | Website                   |                             |
| 10          | remains2beseen | 18/06/2015         | 1049         |                   | Pathology and Human Remains   | Anatomy, post mortem practices, body parts, pathology, dissections            | 85,300                  | 89,400                  | Individual                |                             |
| 10          | anakkedokteran | 14/05/2015         | 1085         | Philippines       | Medical Education             | Information sheets/MCQs on medicine, medical news, inspirational posts        | 35,900                  | 34,900                  | Individual                |                             |
| 10          | medicalmad     | 14/06/2016         | 503          | German            | Medial Pictures and Videos    | Medical case photographs and radiographs                                        | 14,200                  | Gone                    | Individual                |                             |
| 10          | codexanatomicus| 16/02/2017         | 126          |                   | Medical Artwork               | Anatomical diagrams                                                          | 65,800                  | 94,700                  | Profit making             | Individual                  |
| 10          | medicalterms   | 11/01/2016         | 710          |                   | Medical Terms                 |                                                                               | 200,000                 | 240,000                 | Profit making             |                             |
| Search code | Page title | Date of first post | No. of posts | Country of origin | Discipline/subject area | Content type | Followers January 2018 | Followers June 2018 | Profit making/commercial? | Institutional/ Staff/student |
|-------------|------------|--------------------|--------------|------------------|------------------------|--------------|------------------------|------------------------|--------------------------|-----------------------------|
| 11          | odontologiapreventiva | 22/02/2014 | 294 | Medical and Health | Medical definitions, information sheets on anatomy and medicine | Tooth anatomy, before and after teeth treatment, tooth growth, tooth facts, cartoons, orthodontic treatment information | 72,000 | 86,100 | | |
| 11          | oidentistas | 12/01/2018 | 57 | Orthodontics | Before and after orthodontic treatment rare cases with explanatory descriptions, questions on cases with answers in the description/comments, memes, tooth factors, adverts | 188,000 | 200,000 | Profit making | Magazine |
| 12          | anatomianatomy | 16/11/2014 | 1289 | Muscles, Bones and Joints | Anatomy of the human body, relevance to exercise, CNS | 86,000 | 104,000 | | |
| 12          | anatomeiae | 27/05/2015 | 799 | Anatomy Education | Anatomy, medical cases, adverts, cartoons, anatomy-related artwork | 600,000 | 670,000 | Website | |
| 12          | _anatomia_ | 11/11/2016 | 608 | Switzerland | Anatomy | Anatomy, neurosurgery cases, bacteria, medical-related content, memes | 44,400 | 568,000 | Profit making | Institutional |
| 13          | dr.daniel.fortino | 21/12/2017 | 30 | USA | Implant and Periodontal Surgery | Clinical case photographs and radiographs, photos of the dental team, before and after treatment photographs | 557 | 1240 | Individual | |
| 13          | dental_anatomy | 17/09/2014 | 456 | Dental Anatomy | Head and Neck anatomy, anatomy on other body systems, models for practical anatomy | 764 | 814 | | |
| 13          | dr.smile | 30/03/2014 | 1740 | Dentistry | Tooth anatomy, clinical cases, related content, radiographs | 326,000 | 344,000 | Individual | |
Educational content was most commonly presented as a photo of a clinical case, often taken in operation theatres, with an associated description providing scientific information about the treatment and outcome of the patient. Those undertaking artwork as educational content only made up 5 of the 80 accounts.

Of all the accounts investigated, 42 focussed only on medical-related content, 23 on dental-related content, 6 on gross anatomy, and 9 were relevant to both medicine and dentistry. Within the dental field, there was frequent use of ‘before and after’ photos of patients’ teeth from a procedure. There were also many radiographs on different procedures and related dental humour. For medicine-focussed accounts, rare or shocking cases were common. Multiple-choice questions associated with uploads were also popular, with the answer to the question often presented in the description. Brain scans and photos of brain surgery are uploaded regularly.

None of the accounts explicitly stated that there was a procedure to ensure quality control over their content, so there was no guarantee that the information being spread was correct. Furthermore, whilst the majority of accounts did not use the platform to generate revenue, 22 of the accounts (27.5%) seemed to adopt some kind of advertising within their content. Owners of the Instagram accounts included both institutions and individuals. Some accounts identified whether students, professionals, or other individuals were posting, but not all specified.

Discussion

The majority of anatomy-related Instagram accounts (see Table 1) first posted within the last 2 years, indicating how recent the growth of Instagram is as a platform for dental and medical education.

The main benefit of Instagram over other social media is that it focuses on photos and videos, which is valuable for the subject of anatomy as it relies heavily on visual resources to support learning. However, we acknowledge that two-dimensional photos may lack the capacity to develop necessary visuospatial skills to help formulate a three-dimensional understanding of anatomy, and so, in this respect, Instagram provides learning opportunities comparable to that of an anatomical atlas. However, the act of creating images is considered an educational process in itself [15], and the mobile accessibility of posts may support the timeliness of particular learning objectives for some groups of students. It also means that users from all around the world can gain an understanding of anatomy without requiring a detailed knowledge of a language.

Passive learning techniques (mentioned as a disadvantage to YouTube videos) is also a limitation applicable to Instagram, since it may provide students with inflated confidence in their knowledge and self-assessment ability [14]. Some individuals may use Instagram as a form of procrastination which may distract them from engaging with genuine educational posts. One approach used to encourage engagement is via the publication of images associated with engagement by the user such as multiple-choice questions with the answer revealed in the following post. Another method involves writing thought-provoking questions in the description to encourage interaction and discussion, as demonstrated by the account ‘medical_notes12’. Despite the relatively small number of Instagram accounts relating to medical and dental education, Instagram still offers some benefits over YouTube. For example, it limits the content to images and short videos, which may better suit some learning approaches.

The common use of memes, jokes, and cartoon references demonstrates the need for positive and light-hearted morale boosting content which is comparable to reports on how Twitter is utilised in education [5]. The success of each post is determined by interactions, discovery, reach, impressions, and the number of likes it receives, which is obtainable from the insights tab with each Instagram account. Our own module evaluations at the University of Southampton revealed that student’s preference was for colourful images with annotated/associated descriptive text over that of 60-s videos, summary tables, or labelled images. This finding is supported across Instagram education sites more broadly (see Table 1). It has been suggested that accounts created by students for students are more cognitively and socially congruent as they are relatable to peer-assisted learning benefits [16], potentially indicating that peer-related content is preferable to that of professional or institutional content [9]. This hypothesis would certainly align with the transition to Instagram for many younger social media users and with the suggestion that students, given the choice, are opting in favour of more traditional lines of communication and support from academic and clinical staff [9].

Keenan et al. describes the main barriers of social media in education and includes key aspects such as the need to have educational value, professionalism, staff knowledge and experience, staff motivation, and student usage [17]. These values and criteria are very much applicable to Instagram and would suggest that a successful educational account would require a committed person/team (preferably managed by a dedicated person) to source and post relevant content which is quality-controlled. Similar to other social media platforms, Instagram posts that are not made public will require students to have an Instagram account in order to access them, which poses an issue around accessibility. However, educators can also make the resources available elsewhere, such as via ‘widgets’ for Institutional learning management systems (such as Blackboard) that enable the account feeds to be embedded within web pages. This will ensure that all students have access to the content. The report by Keenan et al. also describes
the value of social media sites in education more broadly. Themes such as encouraging engagement outside of the classroom, collaboration, and dissemination are all important considerations—plus the familiarity and immediacy of content were shared as positive ideas towards what sites like Instagram could bring to teaching [17].

By using our understanding of how social media use within education is evolving, medical and dental educators can utilise the ‘intuitive interface’ of Instagram to upload engaging information and optimise the delivery of content. They may be able to make innovative use of their content by adopting modern educational approaches in their teaching, such as ‘flipping the classroom’ or ‘blended learning’. However, considering the emphasis and popularity of informal peer-to-peer study-related uploads on Instagram, educators might want to think carefully about how they choose to engage their students using social media. There is most likely still room for professional, informative, and quality-assured profiles administered by academics. Particularly because so many young adults are shifting over to Instagram as their preferred social media platform [9].

As educational accounts continue to grow on Instagram, it will become increasingly important for the ethical considerations to be addressed. Several Instagram accounts upload operative procedures that include patients and/or cadaveric material, and the legislation surrounding this type of content will vary between countries. Although there are warnings over the display of sensitive material there are no details of informed consent from the patients or body donors. It will also be important for students to be aware of professionalism within their respected disciplines, particularly as it becomes more desirable to attract new followers with increasingly engaging content.

### Conclusion

The findings we report here suggests that Instagram could be well-suited to support dental and anatomy education, although there is a lack of performance data amongst the literature to allow for an endorsement of its true impact on education. Instagram shows many similarities to other big social media sites like Facebook, Twitter, and YouTube in how it is easily accessible through smartphones and computers—the main differences between them are what make them suited for different purposes and how they attract divergent audiences.

Facebook is mostly tailored towards enabling individuals to communicate with one another through ‘likes’ and comments on photos or ‘statuses’. However, issues like professionalism arise as an individual must interact on the site via their personal profile which can lead to privacy and safety concerns. YouTube’s content is unidirectional media that relies on the viewers’ concentration for the duration of the video and is less focused on interaction or responses. Its major benefits centre around the ability to pause, rewind, and replay video content, and so could very useful, particularly for instructional educational videos or screencasting tutorials [18]; however, it is not tailored for photos or still images. The use of hashtags is popular across all social media sites but has a particular resonance with Instagram as a topic marker which enables content of interest to be searched for easily, a particularly useful feature for education.

In light of the aforementioned limitations of Instagram, such as the lack of quality control and patient confidentiality, it is clear that there is scope for modifications to its terms and conditions and regulatory procedures that would make it more suitable for medical and dental education. Examples of improvements include the verification of quality accounts, which could be achieved by having educators’ peer-reviewing relevant accounts (such as those provided by our audit) and approving content. Evidence of consent is another issue which could be acted upon through internal processes. One suggestion would be for posts to be submitted to a review process before they eventually go live - if social media can implement this system for paid promotions and marketing, then it would stand to reason that they can also administer it for ethical purposes.

Given the diversity of profiles amongst staff and students, one possible approach to building successful Instagram profiles might be through co-creation. This would potentially witness the advantages of creative motivational content from students, integrated with professional quality standards offered by staff. Working in partnership with students is gaining significant traction in higher education since it was endorsed by The Higher Education Academy as a form of best practice [15]. In addition, on applications like Instagram, it may be more cost and time efficient for students to create the content as a way of providing them with opportunities to build their knowledge through the design process.

In the current age of advancing technology, the future role of Instagram in the technological sphere remains to be seen. However, at present, it is a potential tool which can complement the student experience in a similar way to that of Facebook and YouTube; however, it cannot replace hands on anatomy education and its full impact on learning remains to be seen.

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### Compliance with Ethical Standards

**Conflict of Interest** The authors declare that there is no conflict of interest.
Ethical Approval  
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This investigation was part of a service evaluation/audit carried out by curriculum leaders at the University of Southampton. Ethical approval was not necessary under these circumstances.

Informed Consent  
Informed consent was obtained from all individual participants included in the study. All subjects of the institutional survey gave consent for anonymised data to be used for publication purposes. Data collated from Instagram was already in the public domain.

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