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ORIGINAL ARTICLE

Development of a Student-centred Approach for Alternative Teaching Method Incorporating Human Palpation as Pedagogy Tools in Anatomy Education of the Appendicular System

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ABSTRAK

Anatomi adalah salah satu mata pelajaran yang penting untuk pelajar perubatan dan sains kesihatan yang ditawarkan semasa tahun pra-klinikal. Pengetahuan yang baik dalam anatomi manusia menentukan kecekapan mereka pada masa hadapan. Malangnya, menghafal anatomi adalah mencabar terutamanya bagi pelajar junior kerana mereka tidak terdedah kepada tata-namanya. Oleh itu, kajian ini bertujuan untuk mereka bentuk dan membangunkan kurikulum anatomi untuk membantu pelajar dalam pengekalan pengetahuan dan menterjemahkannya ke dalam fasa klinikal pendidikan. Pembangunan modul ini adalah berdasarkan teori kognitif sosial (SCT) mengikut pendekatan A-Analisis, D-Mereka bentuk, D-Membangunkan yang berasal daripada A-Analisis, D-Mereka bentuk, D-Membangunkan, I-Melaksanakan, E-Menilai (ADDIE) model bersama-sama dengan pakar kandungan. Disebabkan keprihatinan untuk memahami dan menggunakan pengetahuan anatomi secara praktikal, dan jarak perhatian pelajar yang singkat, modul ini direka bentuk bagi saling berganti antara kuliah dan sesi praktikal untuk memaksimakan pengekalan pengetahuan. Tumpuan utama pada modul kurikulum ini adalah pada anatomi kasar sistem apendikular dan berakhir dengan pelajar dikehendaki menyentuh dan membandingkan perbezaan antara struktur normal dan patologi sistem apendikular. Kurikulum ini berkesan dalam

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menangani isu perhatian yang singkat dengan menggabungkan pengalaman praktikal, dan melibatkan pelajar dalam pembelajaran sentuhan yang meningkatkan tumpuan dan penglibatan.

Kata kunci: Palpasi manusia; pembentukan; pendidikan

ABSTRACT

Anatomy is one of the most important subjects for medical and health science students offered during pre-clinical years. A good knowledge in human anatomy determines their competency in the future. Unfortunately, memorising anatomy can be relatively challenging especially for junior students since they are not exposed to the nomenclature. Therefore, this study aimed to design and develop an anatomy curriculum to assist students in knowledge retention and translation into clinical settings. The development of this module was based on social cognitive theory (SCT) according to A-Analysis, D-Design, D-Develop approach which was adopted from A-Analysis, D-Design, D-Develop, I-Implement, E-Evaluate (ADDIE) Model, together with the content experts. Due to the concern of comprehending and practically applying anatomical knowledge, and short attention spans of students, the module was designed to alternate between lectures and practical sessions to maximise knowledge retention. The main focus on this curriculum module was on the gross anatomy of the appendicular system and ends with students being required to palpate and compare the differences between normal and pathological structures of the appendicular system. This curriculum effectively addressed the issue of short attention spans by incorporating hands-on experiences, and engaging students in tactile learning that enhanced focus and engagement.

Keywords: Development; education; human palpation

INTRODUCTION

Anatomy is an important basic science subject taught during pre-clinical years for medical as well as health sciences students (Cotter & Cohan 2010). It should be taught in a creative and innovative way to encourage a more interactive learning environment (Agrawal & Kushwaha 2012). The basic knowledge and practical aspects of this subject will be used by most physicians and healthcare providers on a daily basis such as when performing physical examination, and interpreting variety of imaging techniques including computerised tomography (CT) scans and magnetic resonance imaging (MRI) and also intervention such as surgery, joint reduction and manipulation. However, undergraduate students especially junior students find anatomy to be a boring subject that required them to memorise a vast amount of

factual knowledge (Bergman et al. 2013).

According to the study, although students are aware of the relevance of human anatomy to numerous aspects of their future professional practice, they just could not cope well in this area as their anatomy subjects were taught based on regions and sometimes long-time interval (months) between regions and therefore, they did not have the coherent picture of the human body. Additionally, some students may have problems in integrating theoretical knowledge into clinical context such as memorising, retrieving and apply the knowledge of musculoskeletal system when examining and diagnosing a patient. Therefore, educators play important role to increase students' retention (Kumar & Bhattacharjee 2014) with the holistic approach of teaching methods (Muniyandi 2019; Sharma & Swarup 2017).

Study Justification

In recent years, various approaches of pedagogy tools and teaching methods for anatomy have been explored. These including the use of cadaveric dissection, prosected specimens, traditional lectures, problem-based learning and multimedia resources such as usage of iPad and computer-based assisted and collaborative learning activities (Estai & Bunt 2016; Kennel et al. 2018; Rajiah 2018; Latiff et al. 2019; Sharma & Gulela 2014; Scibora et al. 2018; Thejeswar 2015). Although cadaveric dissection has always been considered as the 'Gold Standard' simulator for human anatomy education, obtaining cadaver is a challenge in certain countries (Darras et al. 2018). In addition to that, cadaveric facilities such as cold room and formalin tank is not available in some universities.

The use of prosected models as well as multimedia resources incurred some additional cost to the university where costing are required in purchasing fixated models or software license. Students are required to translate the knowledge obtained from the fixed, plastinated, artificial or computerised models into real living humans during clinical years or real practice which could also be a challenge. On the other hand, traditional lectures alone do not receive much favour and preference by most undergraduate students (Latiff et al. 2019). One of the reasons to that is that students find traditional lectures to be boring, hard and dull (Lazarus et al. 2017). Also, each anatomy lecture will usually last for about 50 to 90 minutes while a typical student attention span is around 10 to 15 minutes making it hard for educators to capture student's attention during class (Chang & Zhu 2018). Therefore, this study aimed to develop a new approach known as 'student-centred approach for alternate lecture-practical method incorporating human palpation as pedagogy tools.

By incorporating human palpation as a pedagogical tool, this approach shifts from passive reception of information to active engagement. Students become active participants, fostering a deeper understanding through hands-on experience and exploration. Besides, integrating

palpation techniques in lectures enables students to comprehend theoretical concepts better and apply them practically. Students are exposed to palpating the life human models, and having students to palpate and compare the differences between normal and pathological structures exposed them to clinical cases improving their observational and comparison skills hence, enabling translation from classroom learning into clinical practice easier (Chinnah et al. 2011). To cater diverse learning styles and paces, the student-centered methodology allows flexibility in learning. Such an approach requires no cost as the models for palpation can be recruited from the classroom itself. Also through palpation, it provides students with kinestatic experiences where students are able to link the knowledge taught during lectures into practical skills which could be useful in their future practice. At the same time, such curriculum could also build their hand-on confidence as they are exposed to hands on skills during their university years.

MATERIALS AND METHODS

Development of Module

The development of this module was based on social cognitive theory (SCT) (Figure 1), which is the theory of human behaviour developed by Bandura (1988). It incorporated personal factors (perception and experience), environmental factors (social norms and peer influences) and behaviour change (self- confidence and perceived value). The development process applied A-Analysis, D-Design, D-Develop approach which was adopted from A-Analysis, D-Design, D-Develop, I-Implement, E-Evaluate (ADDIE) Model (Julie 2011) that were designed for teaching. The IE phases (Implement, Evaluate) awaited their due prominence in future validation studies, poised to fortify and authenticate the efficacy of this pedagogical framework. This strategic deployment allowed meticulous refinement process, ensuring that each phase was scrutinised, honed, and validated to perfection, in alignment with the robust principles of both SCT and the ADDIE model.

Analysis

In teaching anatomy with palpation, the analysis phase delved into understanding the learning needs,

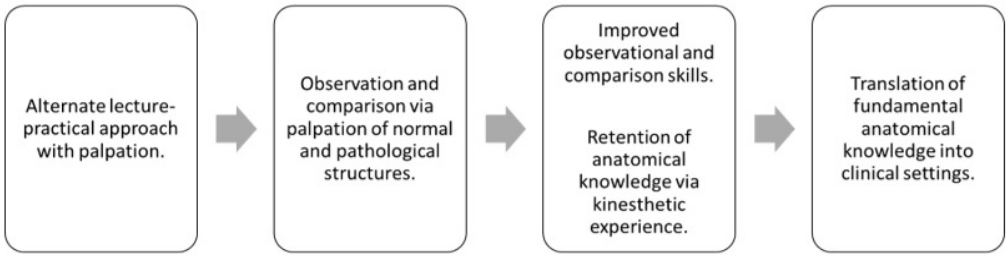

FIGURE 1: Conceptual framework

objectives, and the unique nature of the human touch in comprehending anatomical structures. It involved understanding students' perceptions of the subject matter which helped in tailoring the module to align with their existing beliefs and perspectives. If students perceived a subject as challenging, the module can be designed to address these perceptions through engaging and relatable content. Acknowledging students' diverse experiences and backgrounds was crucial. Modules can incorporate varied examples and case studies that resonate with different experiences, fostering a more inclusive and relatable learning environment. Besides personal factors, cultural relevance and peer learning dynamics were important factors to be in consideration. The analyses stemmed from the invaluable expertise of content expert educators deeply entrenched in the field of Anatomy, drawing from their extensive teaching experience. Their wealth of knowledge garnered over years of instructing derived these analyses. Additionally, the student feedback evaluations sourced from the university provided a vital perspective, offering direct insights into the learning experiences and challenges faced by the students within the Anatomy curriculum.

Design

Designing an anatomy module with palpation involved structuring the curriculum to encompass theoretical knowledge and practical application. Content expert educators design instructional strategies and materials that cater to diverse learning styles and engage with personal and environmental factors highlighted by SCT. This could encompass creating interactive learning modules, incorporating real-life case studies, and designing practical exercises that promote self-confidence and value in mastering palpation skills.

Develop

Once the design was finalised, the Develop phase involved the creation of the educational materials and resources outlined in the Design phase. This step included content creation, curriculum development, resource creation such as presentations, handouts, if applicable.

RESULTS

In the analysis phase, one of the primary issues identified was the prevalent difficulty students face in comprehending and practically applying anatomical knowledge. A significant number resorted to memorisation as a coping mechanism, lacking the ability to connect theoretical knowledge to real-world scenarios. Besides, the approach and pedagogy tools used for anatomy education in different universities vary depending on the available resources and anatomy classroom setup. Although cadaveric dissection is considered the 'Gold Standard' in anatomy teaching and learning, such facilities were not available in many universities.

According to the needs analyses,

exposure to the normal functioning anatomical structures in real life humans will equip students with the concepts on how normal functioning human anatomical structures should feel during palpation, while the palpation on real life pathological structures during the end of the module will help them to recall and recap the differences in kinesthetic feelings between the normal and abnormal structures. In addition, this approach was designed alternate between the short interval of lecture and practical where the ratio between lecture and practical was 1:2 (20 minutes practical for every 10 minutes lecture) for the non-pathological human anatomy, and a total of 6 hours (3 hours for upper extremities and 3 hours for lower extremities) practical on pathological anatomy to expose students on what were they going to see in future, may overcome the short attention span among students besides, creating awareness among them on the importance of anatomy. Such an approach was an easy-to-practice method because having a volunteered model for palpation required no cost compared to purchasing fixated models and licensing anatomy software. Thus, this approach could aid anatomy teaching and learning and enable institution which does not have sufficient resources such as cadavers, anatomical software, or prosected models in conducting effective anatomy classes. The only requirement is that the lecturer(s) will also need to function as a facilitator(s) who will be moving around between different groups to ensure the accuracy of the palpation.

Additionally, one of the main challenges in the development of the current module was, palpation on partners especially in regions closed to the private parts, were sensitive in Malaysia. Hence, that can be overcome by informing the students in advance, teaming the same gender in a team, disallowing video recording, and having screen available. Besides, having female students wear tighter clothes (those that do not slip during palpation or are too thick for their partners to feel the bony prominence) could also be beneficial. Alternately, those who wish to have visual experience (observation of bony prominence and skin texture) can choose to wear safety pants, sports bra, or swim attire during class with other students as chaperone could also be another step taken to overcoming this depending on their personal preferences and circumstances based on the laws and policy of the institution and country. Moreover, as healthcare professionals, we are still required to see patients regardless of their culture, religion, and gender. Hence, such would further prepare the students for their future practice. In designing an anatomy education module integrating palpation, the learning outcomes and assessment methods play a pivotal role in shaping a comprehensive and practical learning experience.

Learning Outcomes

(i) Conceptualisation of Anatomical Structures:

The primary goal was for students to not just memorise anatomical structures

but to deeply conceptualise them. By leveraging palpation techniques, students should grasp these structures in three dimensions, understanding their placement, relationships, and functions within the human body.

(ii) Exposure to Palpation Techniques:

Introducing students to various palpation techniques was fundamental. They should be exposed to different methods of tactile exploration, enhancing their sensory skills and enabling them to interpret subtle variations in anatomical structures through touch.

(iii) Application of Anatomical Knowledge through Palpation:

The ultimate aim was for students to bridge the gap between theoretical knowledge and practical application. They should adeptly apply their understanding of anatomical structures in a palpation context, identifying and locating specific anatomical landmarks with precision.

Assessment Methods

(i) Single Best Answer (SBA) Questions:

Utilising SBAs as assessment tools allowed for testing students' theoretical understanding of anatomical structures. Questions were structured to evaluate their knowledge acquisition, asking about structural details and functions, thereby gauging their conceptualisation of learned content.

(ii) Objective Structured Clinical Examination (OSCE):

OSCE stations centered on palpation offer a practical assessment method. By testing students' ability to palpate specific anatomical structures like the acromion process, greater and lesser tubercle, carpal bones, anterior superior iliac spine, greater trochanter, patella, tarsal bones acromion process or carpal bones. This method evaluated their tactile proficiency and accuracy in locating and identifying these structures.

By aligning the learning outcomes with assessment methods, this design created a symbiotic relationship between theoretical knowledge and practical application. Students not only comprehend anatomical structures conceptually but also develop the tactile skills necessary to translate this knowledge into palpation. The varied assessment methods cater to different aspects of learning, ensuring a well-rounded evaluation that validates both theoretical understanding and practical proficiency in palpation techniques.

Table 1 showed the curriculum developed and will be used for future validation studies. The syllabus covers only the gross anatomy of the appendicular skeleton. This one-and-a-half-month course on the gross anatomy of the appendicular skeleton consists of a total of 12 hours of lectures and 36 hours of hands-on such as student activity and palpation followed by a week of exposure to pathological anatomical structures consisting of six hours where students were required to palpate and compare the differences

between the normal and pathological structures.

The lesson was commenced in a setup equipped with a laptop and projector to display PowerPoint lecture slides, a whiteboard with markers for student activity along chairs and plinths where students can practice palpation. Before the commencement of every lesson, students were divided into groups of two or three. The lesson began with a brief session of lecture on the overview of the area studied including its compartment, vessels and nerve supply using images to facilitate visualisation on the studied structure. During this session, they were exposed to all the anatomical nomenclature related to the studied structure to facilitate learning. This session was followed by student activity where they were required to have a question and answer session with their partners and/or sketch a brief schematic diagram on a piece of paper and/or demonstrate to the class the movements or techniques which provided kinesthetic learning experience. Similarly, during hands-on palpation, students were required to palpate the structures taught during lectures on themselves and their partners. With this, students can appreciate better the anatomy of the structures taught.

DISCUSSION

The curriculum is developed to cater to different types of learners namely those visual, auditory, and kinesthetic learners (Mohd et al. 2019; Rahman & Budiyanto 2019). Visual learners typically prefer images and diagrammatic models which is provided during the lectures. In addition to that, students will benefit from observing the procedures of palpation. Auditory learners prefer spoken directions over written directions and having illustrations and diagrams in text which is commonly done during lectures. Also, the directions and methods of palpation will be described in the text before being demonstrated and practiced hands-on by the students. With hands-on during practical sessions, kinesthetic learners may likely gain benefits from this by applying what they had learned during the lecture to hands-on practical and student activities.

To overcome the short attention span among students as addressed by Chang and Zhu (2018), we had developed alternate lecture-practical approach. This approach alternated between a 10-15 minutes lectures followed by a 20-30 minutes practical which included either palpation or student activity. With this, the students can pay full attention during the entire lecture as well as gaining hands-on experience during the practical session.

Palpation techniques was selected as pedagogy tools for this practical session due to its great value in future clinical practice. It is an essential skills in every clinical examination to diagnose, and locate important structures such as setting up intravenous line as well as intervention which includes various orthopedic joint reduction, chiropractic and physiotherapy treatment (Asadipour et al. 2020; Denneny et al. 2017; Granados et al.

TABLE 1: Anatomy education syllabus

Week	Topics	Lecture Hours (minutes)	Practical Hours (Minutes)
1	**Introduction to Anatomical Concepts and Nomenclature**		
	Terms related to position and movement (Lecture)	15 m	
	Terms related to position and movement (Student Activity)		30 m
	Types of joints (Lecture)	15 m	
	Types of joints (Student Activity)		30 m
	Muscle types, structure and action of skeletal muscles (Lecture)	15 m	
	Muscle types, structure and action of skeletal muscles (Student Activity)		30 m
	Overview of the human body from superficial to deep (Lecture)	15 m	
	Overview of the human body from superficial to deep (Student Activity)		30 m
	Introduction to Palpation		
	Definition, objective, importance and general techniques (Lecture & Demonstration)	15 m	
	General techniques (Student Activity)		30 m
	Techniques of bone and ligament palpation (Lecture & Demonstration)	15 m	
	Techniques of bone and ligament palpation (Student Activity)		30 m
	Techniques of muscle palpation (Lecture & Demonstration)	15 m	
	Techniques of muscle palpation (Student Activity)		30 m
	Techniques of muscle palpation [Part 2] (Lecture & Demonstration)	15 m	
	Techniques of muscle palpation [Part 2] (Student Activity)		30 m
2	**Bony Structures, Ligaments, Nerve Supply and Blood Vessels of The Upper Extremity**		
	Overview and anatomical nomenclature of bony structures, ligaments, nerve supply and blood vessels of the upper extremity (Lecture)	10 m	
	Overview and anatomical nomenclature of bony structures, ligaments, nerve supply and blood vessels of the upper extremity (Student Activity)		20 m
	Shoulder girdle (Lecture)	10 m	
	Shoulder girdle (Palpation)		20 m
	Arm and forearm (Lecture)	10 m	
	Arm and forearm (Palpation)		20 m
	Wrist and hand (Lecture)	10 m	
	Wrist and hand (Palpation)		20 m
	The brachial plexus and its branches (Lecture)	10 m	
	The brachial plexus and its branches (Student Activity)		20 m

	Artery and veins of the upper extremity (Lecture)	10 m	
	Artery and veins of the upper extremity (Palpation)		20 m
	Muscles of the Shoulder Girdle		
	Overview and anatomical nomenclature of muscles of the shoulder girdle (Lecture)	10 m	
	Overview and anatomical nomenclature of muscles of the shoulder girdle (Student Activity)		20 m
	Trapezius, splenius capitis and cervicis (Lecture)	10 m	
	Trapezius (Palpation)		20 m
	Levator scapulae and rhomboids (Lecture)	10 m	
	Levator scapulae and rhomboids (Palpation)		20 m
	Deltoid and serratus anterior (Lecture)	10 m	
	Deltoid and serratus anterior (Palpation)		20 m
	Rotator cuff muscles (Lecture)	10 m	
	Rotator cuff muscles (Palpation)		20 m
	Pectoralis major and minor (Lecture)	10 m	
	Pectoralis major and minor (Palpation)		20 m
3	**Muscles of the Arm and Forearm**		
	Overview and anatomical nomenclature of muscles of the arm and forearm (Lecture)	10 m	
	Overview and anatomical nomenclature of muscles of the arm and forearm (Student Activity)		20 m
	Biceps brachii, brachialis and coracobrachialis (Lecture)	10 m	
	Biceps brachii, brachialis and coracobrachialis (Palpation)		20 m
	Triceps brachii and brachioradialis (Lecture)	10 m	
	Triceps brachii and brachioradialis (Palpation)		20 m
	Pronator muscles and supinator (Lecture)	10 m	
	Pronator teres and supinator (Palpation)		20 m
	Wrist flexor group of muscles (Lecture)	10 m	
	Wrist flexor group of muscles (Palpation)		20 m
	Wrist extensor group of muscles (Lecture)	10 m	
	Wrist extensor group of muscles (Palpation)		20 m
	Muscles of the Hand		
	Muscles of the thenar group (Lecture)	15 m	
	Muscles of the thenar group (Palpation)		30 m
	Muscles of the hypothenar group (Lecture)	15 m	
	Muscles of the hypothenar group (Palpation)		30 m
	Adductor policis and lumbrical manus (Lecture)	15 m	
	Adductor policis and lumbrical manus (Palpation)		30 m
	Palmar interossei and dorsal interossei (Lecture)	15 m	
	Palmar interossei and dorsal interossei (Palpation)		30 m

4	**Bony Structures, Ligaments, Nerve Supply and Blood Vessels of The Lower Extremity**		
	Overview and anatomical nomenclature of bony structures, ligaments, nerve supply and blood vessels of the lower extremity (Lecture)	10 m	
	Overview and anatomical nomenclature of bony structures, ligaments, nerve supply and blood vessels of the lower extremity (Student Activity)		20 m
	Pelvis (Lecture)	10 m	
	Pelvis (Palpation)		20 m
	Thigh and leg (Lecture)	10 m	
	Thigh and leg (Palpation)		20 m
	Foot (Lecture)	10 m	
	Foot (Palpation)		20 m
	Lumbar and sacral plexus & their branches (Lecture)	10 m	
	Lumbar and sacral plexus & their branches (Student Activity)		20 m
	Artery and veins of the lower extremity (Lecture)	10 m	
	Artery and veins of the lower extremity (Palpation)		20 m
	Muscles of the Gluteal Region		
	Overview and anatomical nomenclature of muscles of the gluteal region (Lecture)	10 m	
	Overview and anatomical nomenclature of muscles of the gluteal region (Student Activity)		20 m
	Gluteal maximus, medius, minimus (Lecture)	10 m	
	Gluteus maximus and medius (Palpation)		20 m
	Piriformis (Lecture)	10 m	
	Piriformis (Palpation)		20 m
	Tensor fascia lata (Lecture)	10 m	
	Tensor fascia lata (Palpation)		20 m
	Deep lateral rotators (Lecture)	10 m	
	Deep lateral rotators (Palpation)		20 m
	Iliopsoas muscles (Lecture)	10 m	
	Iliopsoas muscles (Palpation)		20 m
5	**Muscles of Thigh and Leg**		
	Overview and anatomical nomenclature of muscles of the thigh and leg region (Lecture)	10 m	
	Overview and anatomical nomenclature of muscles of the thigh and leg region (Student Activity)		20 m
	Quadriceps group and sartorius (Lecture)	10 m	
	Quadriceps group and sartorius (Palpation)		20 m
	Hamstring group (Lecture)	10 m	
	Hamstring group (Palpation)		20 m
	Pectineus, adductors and gracilis (Lecture)	10 m	

	Pectineus, adductor longus, adductor magnus and gracilis (Palpation)		20 m
	Tibialis anterior, tibialis posterior, fibularis longus and fibularis brevis (Lecture)	10 m	
	Tibialis anterior, tibialis posterior, fibularis longus and fibularis brevis (Palpation)		20 m
	Popliteus, gastrocnemius and soleus (Lecture)	10 m	
	Popliteus, gastrocnemius and soleus (Palpation)		20 m
	Muscles of Leg and Foot		
	Overview and anatomical nomenclature of muscles of the foot (Lecture)	10 m	
	Overview and anatomical nomenclature of muscles of the foot (Student Activity)		20 m
	Extensor digitorum and hallucis longus, extensor digitorum and hallucis brevis (Lecture)	10 m	
	Extensor digitorum and hallucis longus, extensor digitorum and hallucis brevis (Palpation)		20 m
	Abductor hallucis, abductor digiti minimi, and flexor digitorum brevis (Lecture)	10 m	
	Abductor hallucis, abductor digiti minimi, and flexor digitorum brevis (Palpation)		20 m
	Flexor digitorum and hallucis longus, lumbricals and quadratus plantae (Lecture)	10 m	
	Flexor digitorum and hallucis longus (Palpation)		20 m
	Flexor hallucis brevis, adductor hallucis, and flexor digiti minimi (Lecture)	10 m	
	Flexor digiti minimi and dorsal interossei pedis (Palpation)		20 m
	Interossei (Lecture)	10 m	
	Dorsal interossei pedis (Palpation)		20 m
6	**Important Landmarks of Upper Limb**		
	Carpal tunnel (Lecture)	15 m	
	Carpal tunnel (Practical and Surface Anatomy)		30 m
	Anatomy snuff box (Lecture)	15 m	
	Anatomy snuff box (Practical and Surface Anatomy)		30 m
	Cubital fossa (Lecture)	15 m	
	Cubital fossa (Practical and Surface Anatomy)		30 m
	Axillary fossa (Lecture)	15 m	
	Axillary fossa (Practical and Surface Anatomy)		30 m
	Important Landmarks of Lower Limb		
	Femoral triangle (Lecture)	15 m	
	Femoral triangle (Practical and Surface Anatomy)		30 m
	Adductor anal (Lecture)	15 m	
	Adductor canal (Practical and Surface Anatomy)		30 m

	Popliteal fossa (Lecture)	15 m	
	Popliteal fossa (Practical and Surface Anatomy)		30 m
	Tarsal tunnel (Lecture)	15 m	
	Tarsal tunnel (Practical and Surface Anatomy)		30 m
7	**Palpation and comparison of the differences of normal and pathological structures of the upper limb**		
	Shoulder (Frozen Shoulder/Dislocation/Other pathologies)*		30 m
	Arm (Overuse injuries/Tendinitis/Rupture/Other pathologies)*		30 m
	Elbow (Dislocation /Golfers elbow/Tennis Elbow/Other pathologies)*		30 m
	Forearm (Compartment syndrome/Brachial plexus injuries/ Fracture/Other pathologies)*		30 m
	Wrists (Carpal Turner/Brachial plexus injuries/Other pathologies)*		30 m
	Hand (Carpal Turner/Brachial plexus injuries/Tendinitis/ Other pathologies)*		30 m
	Palpation and comparison of the differences of normal and pathological structures of the lower limb		
	Hip (Fractures/Dislocation/History of total hip replacement/ Other pathologies)*		30 m
	Thigh (Overuse injuries/Rupture/Other pathologies)*		30 m
	Knee (Osteoarthritis/Anterior cruciate ligament tear/Meniscus tear/Patellofemoral syndrome/Other pathologies)*		30 m
	Leg (Great saphenous vein used as bypass/Sciatica/Archilles tendon rupture/Other pathologies)*		30 m
	Ankle (Sprain/Other pathologies)*		30 m
	Foot (Plantar Fasciitis/Other pathologies)*		30 m
	Total Hours	**12 Hours**	**36 Hours**

* Depends on the availability of models/patients

2018; Greenhill et al. 2018; Marteau et al. 2019; Narula et al. 2018; Shaw 2017; van Loon et al. 2018). Hence, we believed that early exposure of students on this skill will improve students' confidence in their future practice. In addition to that, incorporating this skill into our anatomy education could help students in retaining knowledge learned during anatomy classes. Also, incorporating palpation into the syllabus requires no additional cost as only student volunteers are required to be the model.

Addressing these aspects involves capitalising on strengths like real-life application and attention enhancement, mitigating weaknesses through sensitivity considerations, leveraging opportunities for self-directed learning, and navigating threats by providing additional training for lecturers and ensuring adequate access to necessary equipment. However, the nature of large groups poses limitations in ensuring each student

receives personalised guidance during palpation activities. This challenge may impact the depth of interaction and personalised feedback essential for optimal learning experiences. By proactively addressing these elements, educators can optimise the integration of palpation into anatomy education, ensuring a more inclusive, engaging, and effective learning journey for students.

CONCLUSION

This curriculum effectively addresses the issue of short attention spans by incorporating hands-on experiences, engaging students in tactile learning that enhances focus and engagement. However, despite being cost-effective and fostering practical learning, a significant challenge lies in providing individualised attention to every student within a large group setting.

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