

Use of essential analogies in clinical anatomy active learning curriculum: A personal reflection

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ABSTRACT

Essential analogies may help students in developing a better understanding of complex areas of anatomy curriculum. This report describes the observations followed by reflections of the use of analogies in 'anatomy active learning' and 'practical sessions' in a medical school. In active learning sessions, when analogies used appropriately, students may remember better where structural comparisons are made with objects or materials that are similar in respects in areas such as 'embryology' and 'neuroanatomy' and 'peritoneum' etc. Academic educators have the responsibility to plan or recognize the most relevant and innovative strategies for the process. In conclusion, the use of analogies may stimulate student's interest in anatomy learning and facilitate in developing meaningful concepts.

1. Introduction

Anatomy is the foundational and basic disciplines of medicine. The concept of 'Anatomy' learning involves 'see and believing' the body structures in a dissection based curriculum. Learning the structural organization of the human body involves extensive unfamiliar information and recall of multiple structures. In a non-dissection curriculum, some of the areas are complex to imagine for students to understand and in interpretation such as in neuroscience, peritoneum and embryology are challenging. Anatomy active learning method involves students more directly dealing with models and digital tools in the learning process. As indicated by the mapping hypothesis, an analogy is the mapping of information from one area (the source) over the similar superficial structural resemblance of another area. The source has explicit qualities and is connected by an arrangement of relations, which additionally holds in the objective [1].

Harrison and Treagust [2] feel that the analogies utilized in education are "double-edged" swords and educators have the responsibility of finding or creating the suitable analogies. Apart from core concepts of active learning (role-playing, quizzes, case studies etc.) in my experience, students tend to remember and gain a better understanding when appropriate structural comparisons are made with things that are similar in significant respects [3].

2. Analogies in clinical anatomy active learning and practical sessions

The use of innovative and essential 'analogies in active learning and teaching' approach was implemented and observed on over a total of 12 batches of medical students (approximately 1400 in number) from the years 2013–2019 in Jeffrey Cheah School of Medicine and Health Sciences, Monash University Malaysia. The duration of each clinical anatomy practical session/active learning session is for 2 h, students are provided with prosected human cadaveric specimens, models and selected digital resources. Students are facilitated to learn practical skills through more hands-on participation, interaction with resources, and also through working in teams. Students are highly encouraged to learn through collaborative learning and peer teaching in the lab. Analogies were used appropriately during practicals/active learning sessions for better and deep understanding.

As an educator, I have the responsibility to plan or recognize the most relevant and innovative strategies for the process. As a teacher, I followed analogies to build conceptual bridges and to map similarities in the complex areas. During the anatomy sessions, students are encouraged to learn or explore the nuclei of 'Thalamus' with fragmented and labeled Potato (Fig. 2), Corpus callosum fibers of the brain by comparing with 'scalp hair', demonstration of female pelvic visceral organs (bladder, uterus, and rectum) with '3 students model', pelvic peritoneal folds with 'blanket method' approach (Fig. 1) [4], *Tamarindus indica* as pharyngeal arches, *Brassica oleracea* as cerebellum etc.

The analogies which are so beneficial that we call them essential

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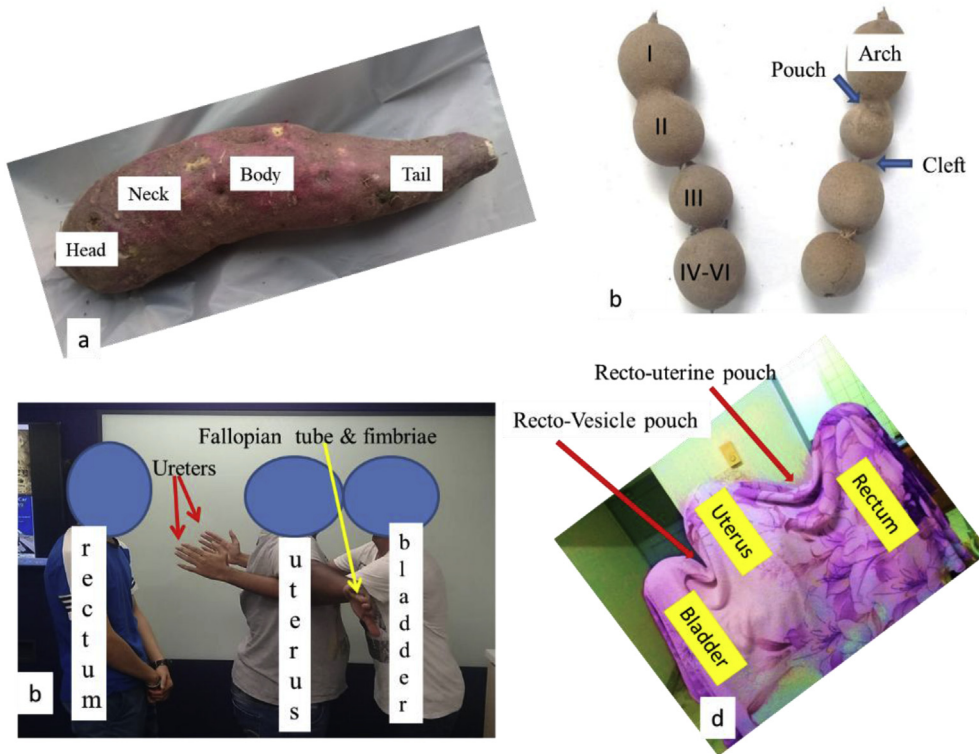


Fig. 1. Analogies in anatomy. a. Ipomoea batatas as pancreas, b. Tamarindus indica as pharyngeal arches, c. '3 students' model of female pelvis, d. Blanket method of female pelvic peritoneum.

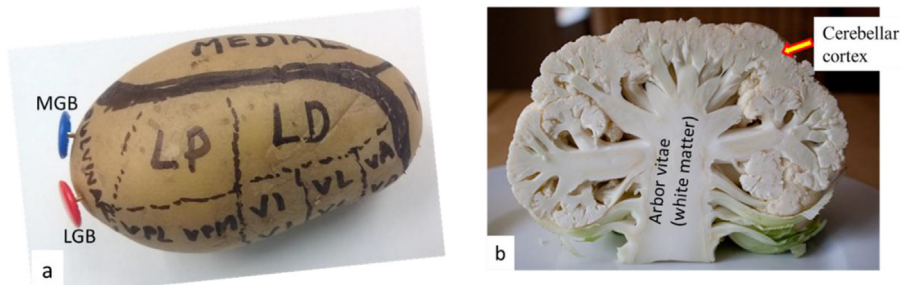


Fig. 2. Analogies in anatomy. a. Solanum tuberosum as thalamus & nuclei. MGB: medial geniculate body, LGB: lateral geniculate body, b. Brassica oleracea var. botrytis as the cerebellum.

analogies [2] and incorporating these analogies helped the student in understanding by relating to body structures. In student-centered learning, majority of the students enjoyed and strongly agreed that the appropriate analogies stimulated deep learning and they could compare the complex areas of anatomy with the most familiar objects of daily life and from nature. Some of the students felt that the analogies in anatomy established supportive learning in critical areas of neuroscience. This teaching approach received excellent response and outstanding student evaluation (SETU 4.95 out of 5).

As per my observation, this active learning method helped the students to construct their knowledge in critical and clinically relevant areas. These quality teaching approaches supported in student understanding and may lead to improved performance in the assessment. Overall, the method of using 'analogies in anatomy curriculum' was well received by the majority of the medical students. Especially the pelvic viscera with '3 student's model' helped in understanding the structural orientation of female pelvic organs and the relationship of ureter to the lateral aspect of the uterus and the chances of accidental damage during Hysterectomy. The 'blanket' method of pelvic peritoneum facilitated the students in achieving the idea of the structural

arrangement of vesicouterine and recto-uterine peritoneal pouches. The 'potato' model helped in getting the concept of nuclear arrangement and functional distribution of thalamic nuclei in the brain. All the analogies received great applause and students felt that this method helped them to foster independent learning.

Some of the anecdotal feedback received from the students

"Thought that the Dr. Narendra's '3 student model of the pelvis' analogy during the practical helped a lot to stimulate thinking and reinforce/correct idea learnt on pelvic organ relations"

Another medical student feedback on brain analogies

"Thank you Dr. Narendra for providing useful analogies to study the brain. It made me simple and clear"

Another medical student on embryology analogies

"The session was interactive with using the 'Tamarindus Indica' as pharyngeal arches. It was definitely useful especially giving us an idea/understanding in differentiating the arches, cleft and pouches"

3. Improvements to education

When analogies are used appropriately in any education system will help the student to compare and develop a meaningful understanding of complex areas [5]. Students may relate the familiar structures with complex areas of the curriculum for better learning and outcome. Based on my observations, I can conclude that the use of analogies will improve student learning and understanding.

Ethical statement

No humans or animals were part of this study. The author has contributed and approved this manuscript.

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Declaration of competing interest

The author has no conflicts of interest to declare.

References

- [1] S. Narayanan, V. Ananth, The influence of learning style in understanding analogies and 2D animations in embryology course, *Anat. Cell Biol.* 51 (4) (2018) 260–265, <https://doi.org/10.5115/acb.2018.51.4.260>.
- [2] A. Harrison, D. Treagust, Teaching and learning with analogies: friend or foe? in: P.J. Aubusson, A.G. Harrison, S.M. Ritchie (Eds.), *Metaphor and Analogy in Science Education*, Springer, Dordrecht, the Netherlands, 2006, pp. 11–24, https://doi.org/10.1007/1-4020-3830-5_2.
- [3] R.B. Sundrud, K. Hueftle, Essential analogies in human anatomy & physiology, *Am. Biol. Teach.* 71 (9) (2009) 554–557, <https://doi.org/10.1662/005.071.0911>.
- [4] S. Nayak, A novel method of teaching peritoneal relations of female reproductive organs, *Adv. Physiol. Educ.* 30 (2) (2006) 95–96, <https://doi.org/10.1152/advan.00005.2005>.
- [5] K.P. Seiler, J. Huggins Jm, From cheese curls to fatty acid structure: using "commonplace" analogies to teach science to nonmajors, *Adv. Physiol. Educ.* 42 (2) (2018) 393–395, https://doi.org/10.1152/advan.00180.2017_1.