KARYA ILHAM PUBLISHING
CONNECTING MINDS, BRIDGING IDEAS, INSPIRING READERS

International Journal of Advanced Research in Future Ready Learning and Education

Journal homepage:
https://karyailham.com.my/index.php/frle
ISSN: 2821-2800

A Simple Paper and Thread Model to Teach Cranial Nerve Anatomy in Veterinary Education

Sonnet Poddar[1,*], Tuli Dey[2]

[1] Department of Anatomy and Histology, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram, Bangladesh
[2] Department of Medicine and Surgery, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram, Bangladesh

ARTICLE INFO

Article history:
Received 25 June 2025
Received in revised form 27 July 2025
Accepted 15 August 2025
Available online 30 September 2025

Keywords:
Brain and brain-stem, crafty approaches, cranial nerves, paper model, teaching anatomy

ABSTRACT

Learning the origin and attachment of the animal's cranial nerve directly from the live sample is very complex for a student without prior knowledge. Thus, the study was planned to create a simple model to provide the basic idea on the origin and attachment of the animal's 12 pairs of cranial nerves. A paper template was designed with graphic software to express the different parts of the brain and the brain stem. The origin and attachment of the 12 pairs of cranial nerves were also identified in the paper template. It was cut and assembled according to the instructions to make the different parts of the brain and the brain stem. Now, various colored threads were used to represent 12 cranial nerve pairs that arise or attach to different parts of the brain and brain stem. The students used this model during the scheduled classes of the first-year veterinary medicine course facilitated by anatomy tutors. Students provided positive feedback on this crafty approach (simple model) and recommended it as a better learning method on cranial nerves before exposing a live sample. All the students can easily visualize and understand the relationship, origin, and attachment of the 12 pairs of cranial nerves from this simple model. Anyone from veterinary sciences can use this simple model to make learning easy about the animal's cranial nerves.

1. Introduction

The anatomy of the 12 cranial nerve pairs is very hard for a first-year veterinary student to learn and understand. The lack of clinical integration and deep knowledge of topographic anatomy causes difficulties in learning and understanding the anatomy of any specific topic [1].

Due to the complex pathway of the cranial nerves through the different foramina of the skull [2], relying solely on didactic lectures and textbook illustrations in theory classes makes it very challenging for students to learn effectively [3].

* *Corresponding author.*
E-mail address: sonnet@cvasu.ac.bd

https://doi.org/10.37934/frle.40.1.2327

However, using a different model [4] and virtual reality [5] can help students understand the specific anatomy topics without cadaver dissection. This might facilitate students acquiring deep knowledge of anatomy.

Different anatomical plastic models are less accessible for students due to their high expense [6]. Three-dimensional (3D) printing models are enjoyable and effective for early learners of anatomy education. But, the production cost of 3D printing models for anatomy teaching is also higher [7,8]. Both high cost and technical difficulties made the virtual reality (VR) less accessible for students in learning anatomy [9,10].

A simple model made with easily sourced and cheap materials [11,12] may be used to learn the anatomy of the animal's 12 pairs of cranial nerves [13]. Thus, we plan to design a simple paper template for creating different parts of the brain and brain stem and using various colored threads to present the 12 pairs of nerves. This paper template and instruction guide to make the full model will be available online for veterinary students.

2. Methodology

2.1 Designing the Ventral Part of the Brain and the Brain Stem

All these 12 pairs of cranial nerves originated, inserted, or attached to the ventral surface of the animal's brain. Thus, we have only designed the ventral surface of the brain, which represents the forebrain, midbrain, pons, and medulla oblongata. We have taken inspiration and the concept from the ventral surface of the horse's brain.

We have used a simple pattern to create various parts of the brain and brain stem (Figure 1). In the template, we have used a creasing line, an extra bleed area, and a cutting area.

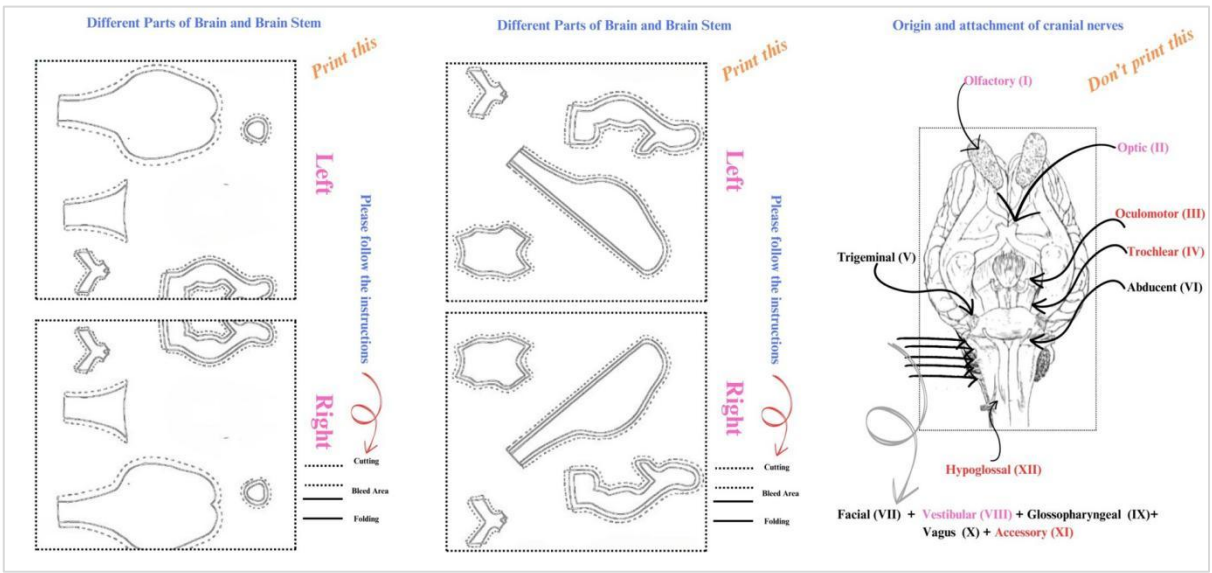

Fig. 1. Paper template for creating different parts of the brain and the brain stem

Again, the paper template identified the origin, insertion, or attachment of the 12 pairs of cranial nerves. This template was exported as a PDF file and printed in black and white.

2.2 Selecting Various Colored Threads and Attaching Them to the Brain

We have chosen various colored 12 pairs of thread (09 inches long). They are attached to the specific area of the brain and brain stem with gum and represent the horse's I to XII cranial nerves.

The paper template of the brain and brain stem with marked areas of cranial nerve attachment is freely available online via this https://anatomynotes.top/anatomy-notes/.

2.3 Application of This Model and Collection of Feedback

We have used the proposed model to teach first-year veterinary medicine students during their scheduled classes. Anonymous feedback was collected via an open-ended Google Form. However, we have also developed a questionnaire to evaluate the students' perception of this paper and the thread model. A total of 125 first-year veterinary students from Chattogram Veterinary and Animal Sciences University willingly participated in this study. The questionnaire contained four questions which possess only two options (Yes/No). Students were asked to select only one option (Yes/No) from each question.

2.4 Data Collection and Analysis

Students' perceptions of the proposed model were collected and tabulated in Microsoft Excel 2010. The obtained data were analyzed and presented in graphs with the percentages.

3. Results and Discussion

3.1 Assembled and Created the Model to Learn 12 Pairs of Nerves

The assembled model, which is made of different parts from the paper template, looks like the horse's brain and brain stem [14]. Again, the attached colored threads clearly show the horses ' '12 pairs of cranial nerves (Figure 2).

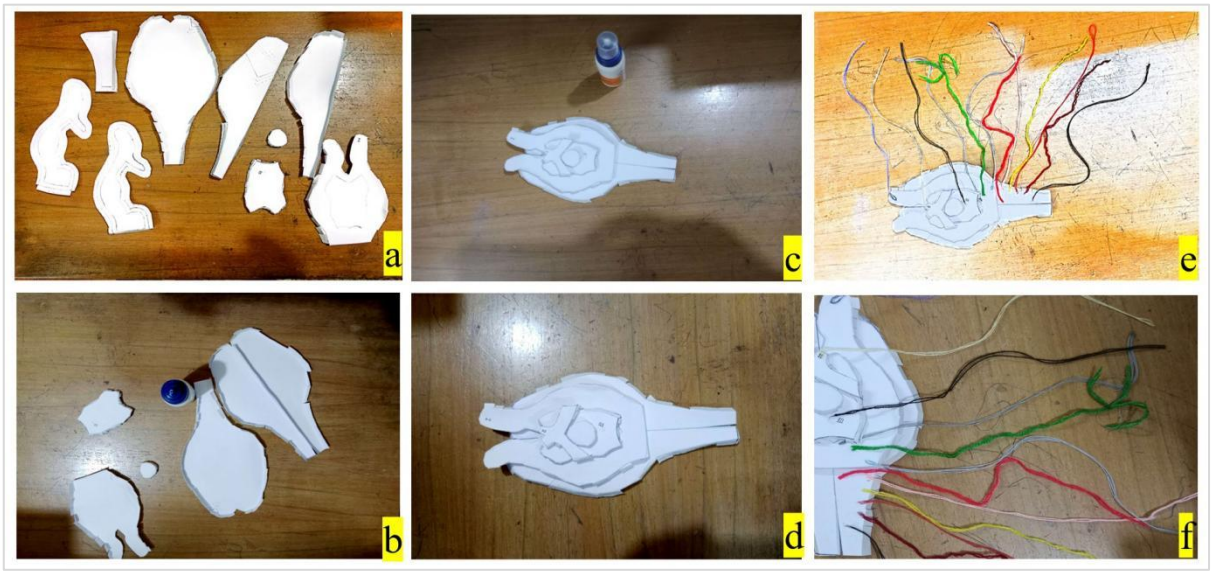

Fig. 2. Assembled brain model showing 12 pairs of cranial nerves of the horse; a) cutting and folding of paper template, b) attaching different parts with gum, c) ventral part of brain, d) parts of brain from created brain model, and e and f) showing origin or attachment of 12 pairs of cranial nerves.

3.2 Students' Satisfaction and Feedback

We found Positive feedback on this simple model (crafty approaches) from an anonymous student from the first-year veterinary medicine course.

"It was very beneficial for deep learning and understanding of horses' 12 pairs of cranial nerves. I recommended it as a better learning method of cranial nerves before exposing a live sample."

Figure 3 represents the student's perception of the proposed model for learning cranial nerves. 100% students were easily able to visualize and understand the relationship, origin, and attachment of the 12 pairs of cranial nerves from this simple model. This simple paper model makes anatomy learning easier (85%) than cadaver dissection, according to the students' perception. The students require less time and effort (90%) to learn anatomical topics using the simple, easily sourced model or materials. According to students' feedback, this type of model might facilitate the student to acquire further deep knowledge (92%) through cadaver learning. Thus, this type of innovative model is always enjoyable and effective for students in learning anatomy [15].

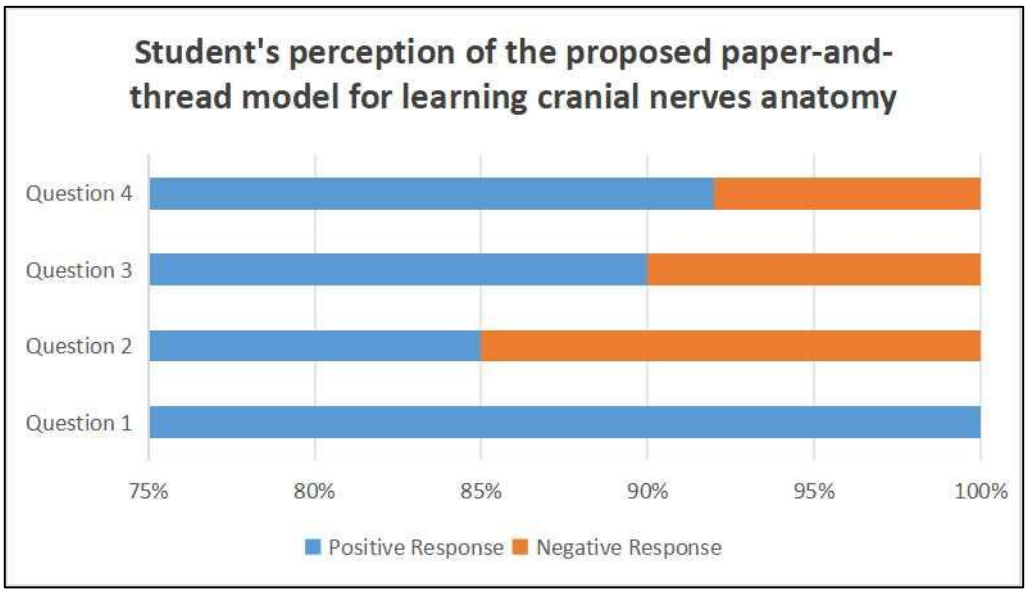

Fig. 3. Student's perception of the proposed paper-and-thread model for learning cranial nerves anatomy.

Here, **Question 1:** Does this model help visualize and understand the 12 cranial nerves' origin, attachment, and relationship? (Yes/No), **Question 2:** Does this simple paper model make anatomy learning easier? (Yes/No), **Question 3:** Does this model require less time and effort to learn anatomical topics? (Yes/No), and **Question 4:** Does this model enable students to acquire a deeper knowledge through cadaver learning in the future? (Yes/No)

4. Conclusions

It is easy to create a simple model with paper and colored thread to express the horse's 12 pairs of cranial nerves related to the brain and brain stem. From this model, students can easily visualize and understand the origin, attachment, and relationship of the 12 pairs of cranial nerves. Anyone can use this cranial nerve model or modify it for a better teaching and learning experience in veterinary anatomy.

In the future, this simple paper-and-thread model for teaching cranial nerves can be further developed into a digital interactive version to enhance the engagement. We are also planning to use this model along with the cadaver dissection in the anatomy laboratory to make it a standardized

teaching tool for students. Feedback from tutors and students will be gathered to improve its designs and educational value continuously.

Acknowledgement
The authors wish to offer a sincere gratitude to the students and tutors who willingly use this model in their scheduled gross anatomy classes.

References

[1] Cheung, Chun Chung, Susan M. Bridges, and George L. Tipoe. "Why is anatomy difficult to learn? The implications for undergraduate medical curricula." *Anatomical sciences education* 14, no. 6 (2021): 752-763. https://doi.org/10.1002/ase.2071
[2] Romano, Nicola, Margherita Federici, and Antonio Castaldi. "Imaging of cranial nerves: a pictorial overview." *Insights into imaging* 10, no. 1 (2019): 33. https://doi.org/10.1186/s13244-019-0719-5
[3] Lack, Christopher M., Joseph Pena, Elizabeth XL Grubb, E. Shen, Kevin D. Hiatt, Marc D. Benayoun, Fredrick S. Jones, and Thomas G. West. "Cranial Nerve Anatomy Using a Modular and Multimodal Radiologic Approach." *MedEdPORTAL* 18 (2022): 11261. https://doi.org/10.15766/mep_2374-8265.11261
[4] Youssef, Sahar. "Different approaches for teaching and learning anatomy and future directions." *Indian J Clin Anat Physiol* 8, no. 1 (2021): 1-6. https://doi.org/10.18231/j.ijcap.2021.001
[5] Adnan, Sharmeen, Amanda C. Benson, and Junhua Xiao. "How virtual reality is being adopted in anatomy education in health sciences and allied health: A systematic review." *Anatomical Sciences Education* 18, no. 5 (2025): 496-525. https://doi.org/10.1002/ase.70027
[6] McMenamin, Paul G., Michelle R. Quayle, Colin R. McHenry, and Justin W. Adams. "The production of anatomical teaching resources using three-dimensional (3D) printing technology." *Anatomical sciences education* 7, no. 6 (2014): 479-486. https://doi.org/10.1002/ase.1475
[7] Garas, Monique, Mauro Vaccarezza, George Newland, Kylie McVay-Doornbusch, and Jamila Hasani. "3D-Printed specimens as a valuable tool in anatomy education: A pilot study." *Annals of Anatomy-Anatomischer Anzeiger* 219 (2018): 57-64. https://doi.org/10.1016/j.aanat.2018.05.006
[8] Jones, David Gareth. "Three-dimensional printing in anatomy education: Assessing potential ethical dimensions." *Anatomical sciences education* 12, no. 4 (2019): 435-443. https://doi.org/10.1002/ase.1851
[9] Boillat, Thomas, Ivan James Prithishkumar, Dineshwary Suresh, and Nerissa Naidoo. "Integrating virtual reality to enhance remote teaching of anatomy during unprecedented times." *Anatomy & cell biology* 58, no. 1 (2025): 112-121. https://doi.org/10.5115/acb.24.197
[10] Küçük, Sevda, Samet Kapakin, and Yüksel Göktaş. "Learning anatomy via mobile augmented reality: Effects on achievement and cognitive load." *Anatomical sciences education* 9, no. 5 (2016): 411-421. https://doi.org/10.1002/ase.1603
[11] Park, Sang Kyu, and Dongsun Shin. "Desarrollo de un Modelo de Riñón de Bajo Costo Utilizando Tomates y su Aplicabilidad en la Enseñanza de la Anatomía." *International Journal of Morphology* 43, no. 1 (2025): 1-4. http://dx.doi.org/10.4067/S0717-95022025000100001
[12] Żukowska, Magdalena, Filip Górski, Radosław Wichniarek, and Wiesław Kuczko. "Methodology of low cost rapid manufacturing of anatomical models with material imitation of soft tissues." *Advances in Science and Technology. Research Journal* 13, no. 4 (2019): 120-128. https://doi.org/10.12913/22998624/113426
[13] Quinn, Lisa. "A crafty approach for learning the topographical anatomy of the cranial nerves." *Medical Science Educator* 32, no. 2 (2022): 279-281. https://doi.org/10.1007/s40670-022-01529-6
[14] Schmidt, Martin J., Carola Knemeyer, and Helmut Heinsen. "Neuroanatomy of the equine brain as revealed by high-field (3Tesla) magnetic-resonance-imaging." *PLoS One* 14, no. 4 (2019): e0213814. https://doi.org/10.1371/journal.pone.0213814
[15] Akgün, Remzi Orkun, and Ufuk Kaya. "Production and Perceptions of 3D-Printed Bone Models in Undergraduate Anatomy Practical Educations." *International Journal of Morphology* 43, no. 2 (2025). http://dx.doi.org/10.4067/S0717-95022025000200606