

Interventional Strategies to Improve Anatomical Knowledge in Nursing Students

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Bioscience Problem?

- The medical & allied-health students **worldwide** experience great difficulty in transferring anatomical knowledge to their clinical & future years of these disciplines.
- They lose approx. **50-80%** of their first-year anatomy knowledge into the final year of the discipline.
- Ninety-two (**92%**) of second year medical students reported that anatomical knowledge was very helpful.
- Only **14.0%** of students felt confident in their anatomy knowledge in the final year of medicine.
- Knowledge retention studies have not yet been assessed in nursing students.

Objectives

- Assess the anatomical knowledge acquisition in the first-year nursing students and its transfer/loss, retention, and application in the second year.
- Identify factors impacting knowledge acquisition, retention, and application.
- Discuss robust interventional strategies to bridge the gap between first-year theory and second-year of nursing.



Pre-assessment



- How do you evaluate knowledge acquisition in the first-year & its retention & application in the second year?



Kahoot Time!

Which of the animals below is a mammal?



Full Screen

Skip

12

0
Answers



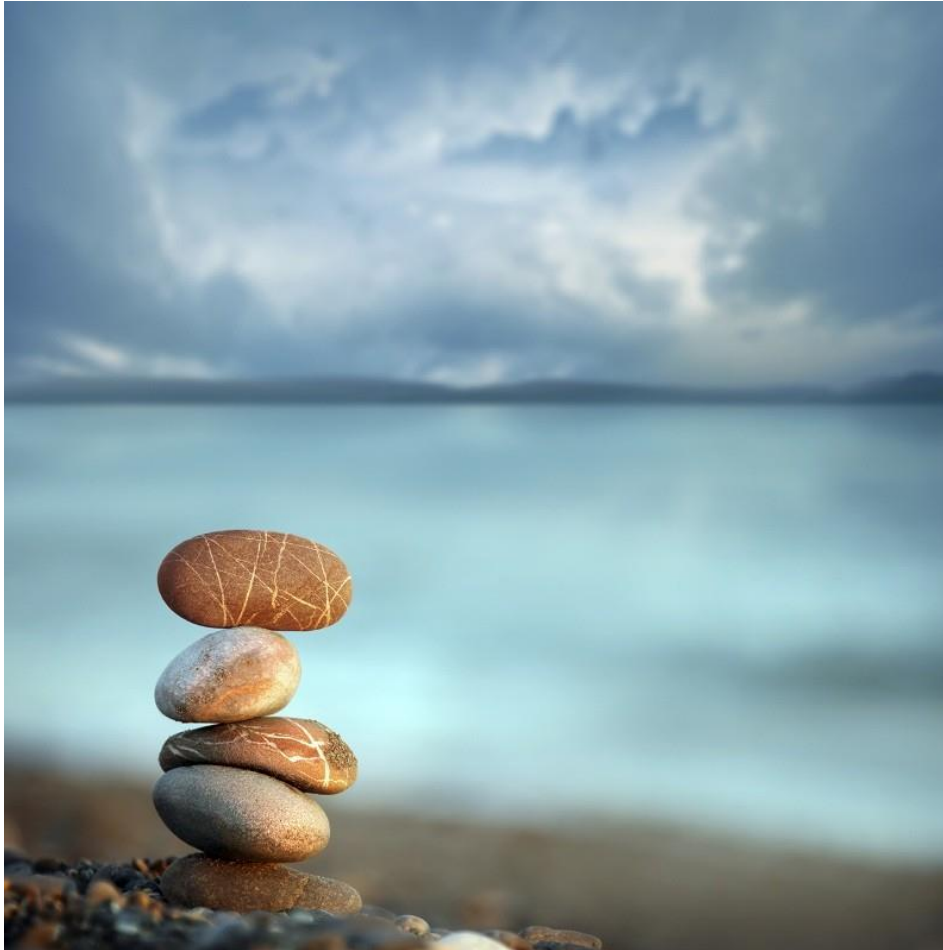
▲ Robin

◆ Gorilla

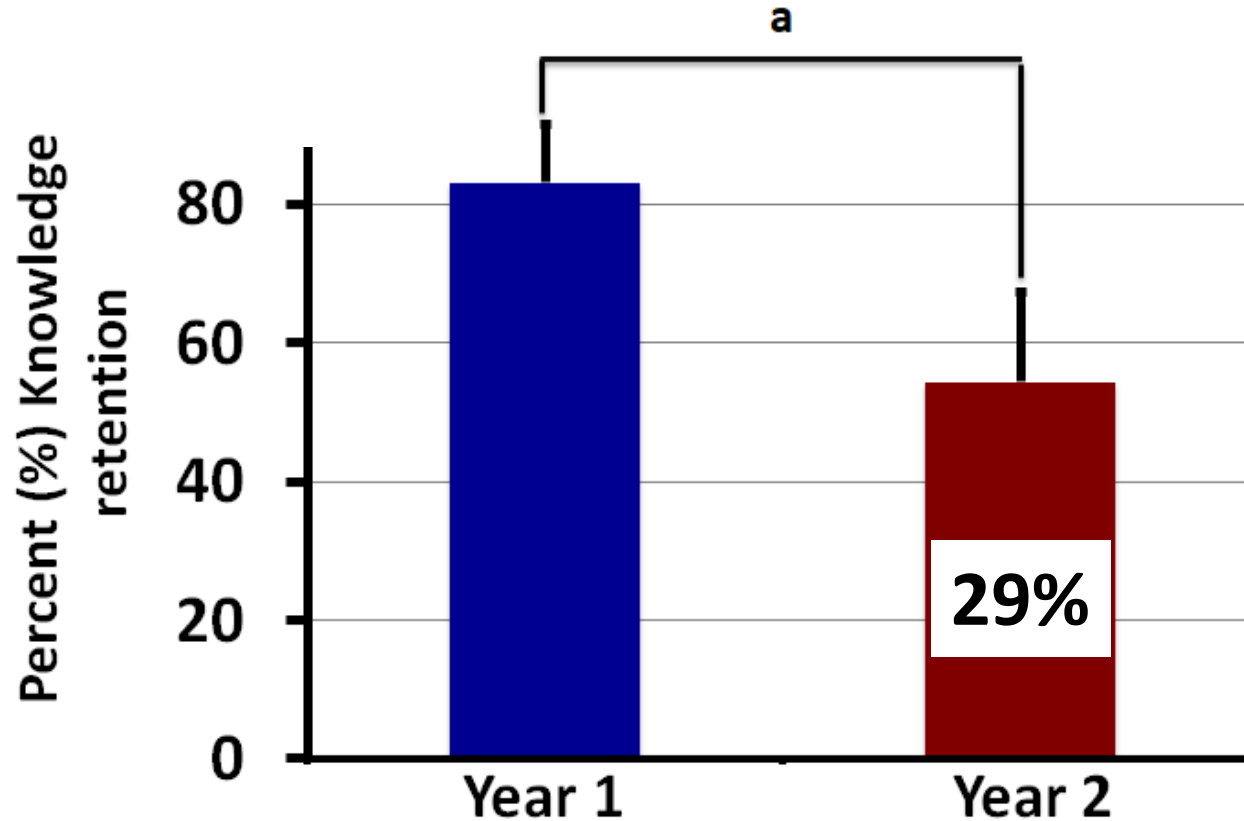
● Shark

■ Snake

Results



*Knowledge
Acquisition
& Retention*



Narnaware & Neumeier, *Anat. Sci. Educ.*, 2020

Knowledge Retention in Second-Year

Organ system	Year 1 Mean ± SD	Year 2 Mean ± SD	% Knowledge lost	P -values
<u>Integumentary system</u>	90.6 ± 6.8	70.7 ± 25.4	19.9%	.197
<u>Head and neck lymphatic</u>	91.4 ± 11.7	<u>34.02</u> ± 25.6	57.4%	.001
<u>Special Senses</u>	88.4 ± 6.9	67.08 ± 22.9	20.6%	.181
<u>Gastrointestinal</u>	63.6 ± 6.9	<u>53.34</u> ± 14.9	10.3%	.014
<u>Respiratory system</u>	72.9 ± 5.8	<u>61.43</u> ± 22.1	11.5%	.249
<u>Vascular system</u>	83.5 ± 5.4	<u>37.39</u> ± 21.4	46.1%	.003
<u>Nervous system</u>	83.9 ± 8.1	58.77 ± 19.6	25.1%	.0001
<u>Cranial nerves</u>	88.2 ± 4.4	<u>47.01</u> ± 19.5	41.2%	.0001
<u>Musculo-skeletal system</u>	88.0 ± 7.0	57.27 ± 32.9	30.7%	.007
<u>Genitourinary system</u>	80.4 ± 16.4	64.0 ± 28.1	16.4%	.097

Factors That Impact Learning



Student-Related Factors Impacting Teaching & Learning of Bioscience

- Inadequate time to study anatomy
- Class time & attendance
- Lab experience
- English as a second language
- Prior academic achievement in sciences
- Student factors
 - Prioritization
 - Previous experience
 - Self-efficacy

Faculty-Related Factors Impacting Teaching & Learning of Bioscience

- Course organization and methods of delivery
- Instructor self-efficacy
- Teaching style and strategies
- Experience in didactic, passive teaching
- Available curriculum time
- Own confidence & knowledge level

*Factors
Impacting the
Present Study*

Teaching/Contact hours

Body organ system	Teaching hours
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Integumentary system	1.2
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Head and neck lymphatic	1.2
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Special Senses	1.2
----------------	-----

Gastrointestinal	1.2
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Respiratory system	1.2
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Vascular system	2.4
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Nervous system and cranial nerves	1.2
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Musculo-skeletal system	9.6
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Lymphatic system	1.2
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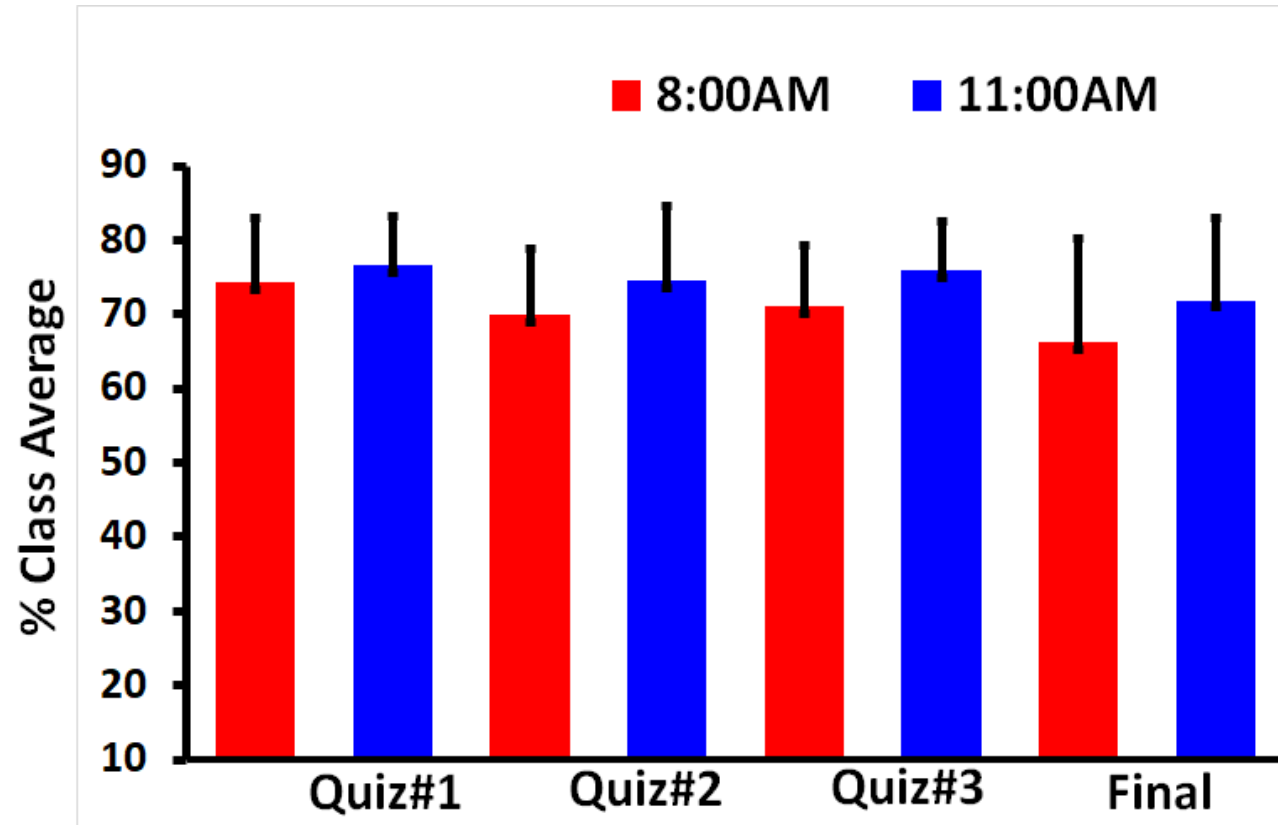
Genitourinary	2.4
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Review	1.2
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Total: 26.4

Class time

*Factors
Impacting the
Present Study*



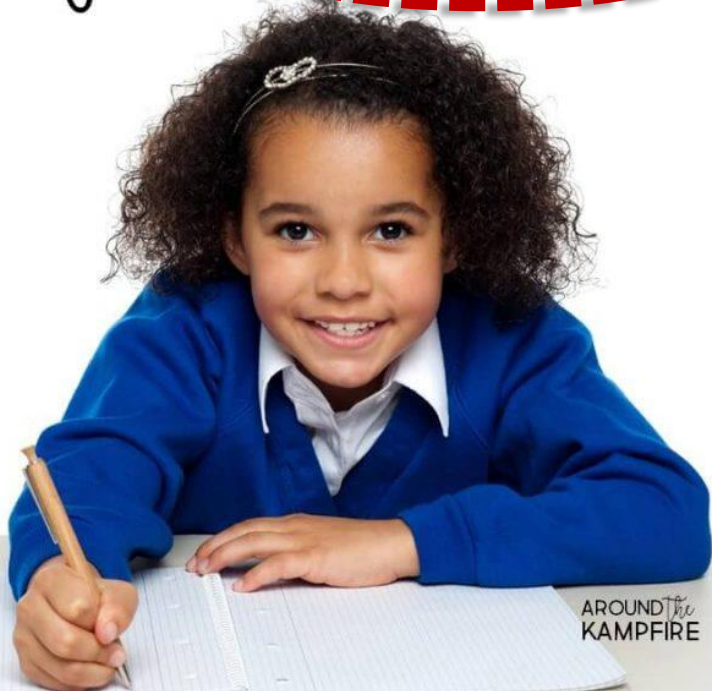
Factors Impacting the Present Study

Getting your class

BACK ON TRACK

after a break

A Mini Break & Humour in Classroom!



Interventional Strategies



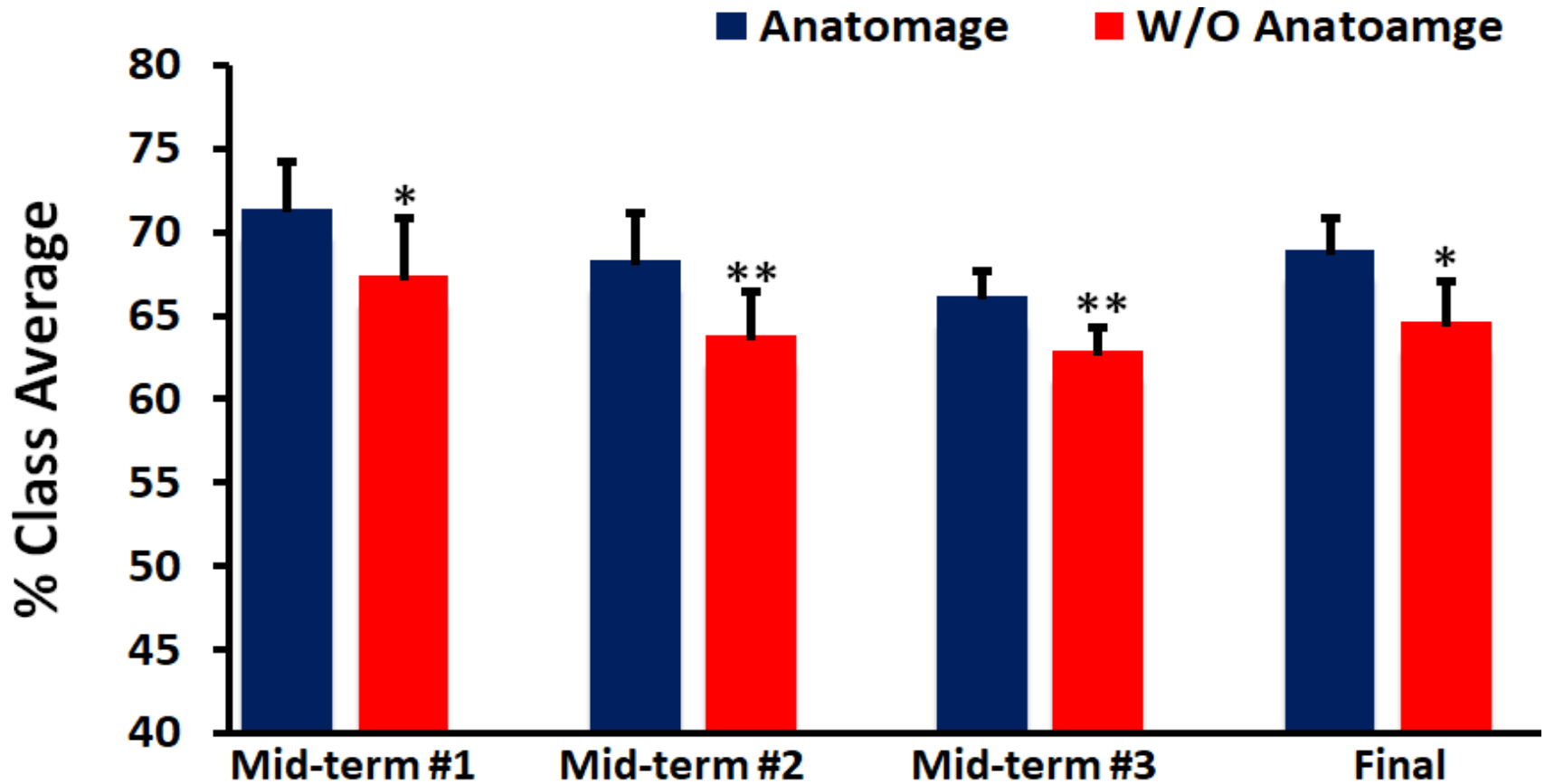
*Interventional
Strategies in
Present Study*

- Introduction of a Virtual Human Cadaver-Anatomage
- Inclusion of the Anatomical Images in Anatomy exams
- Various Online & In-class teaching activities.
- Content Reinforcement (On-line and In-class Activities)

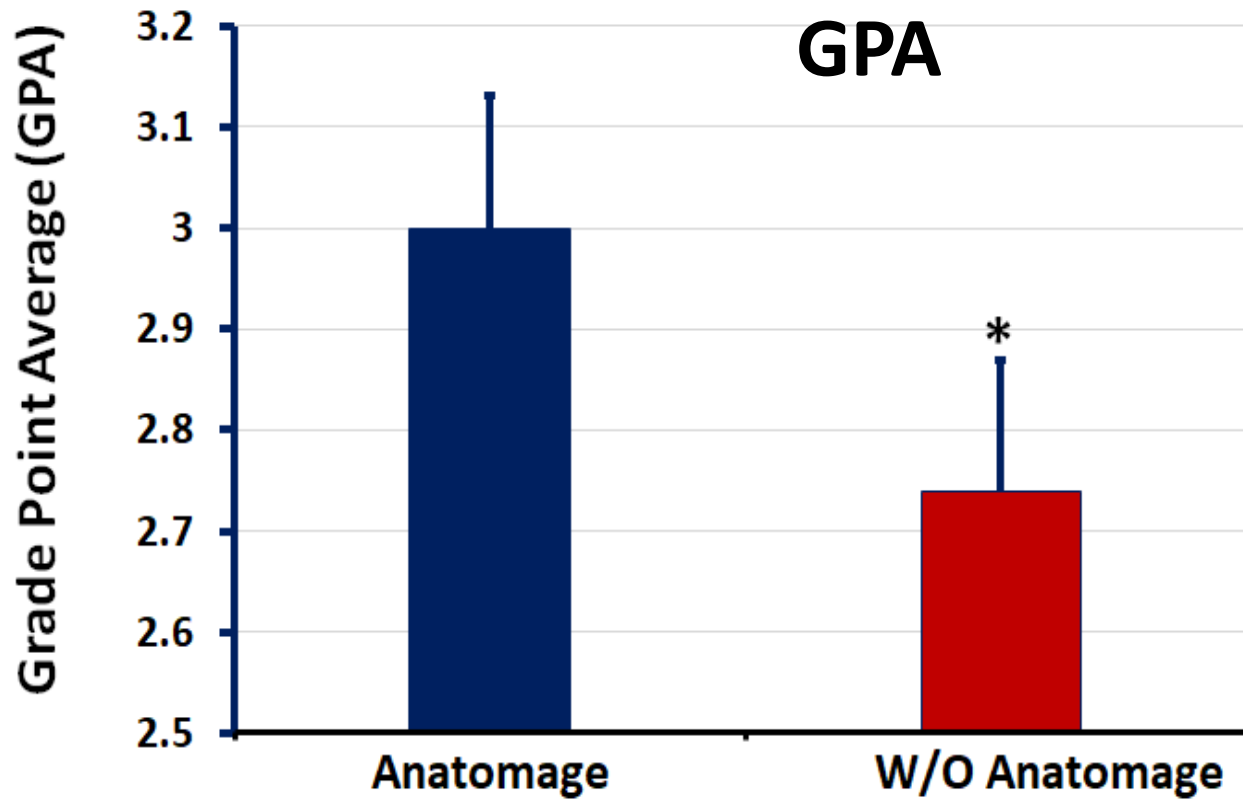
Strategy I: 3D Virtual Human Cadaver- *Anatomage*



Strategy I: 3D Virtual Human Cadaver- *Anatomage*



Strategy I: 3D Virtual Human Cadaver-*Anatomage*



Advantages of Using Virtual Human Cadaver

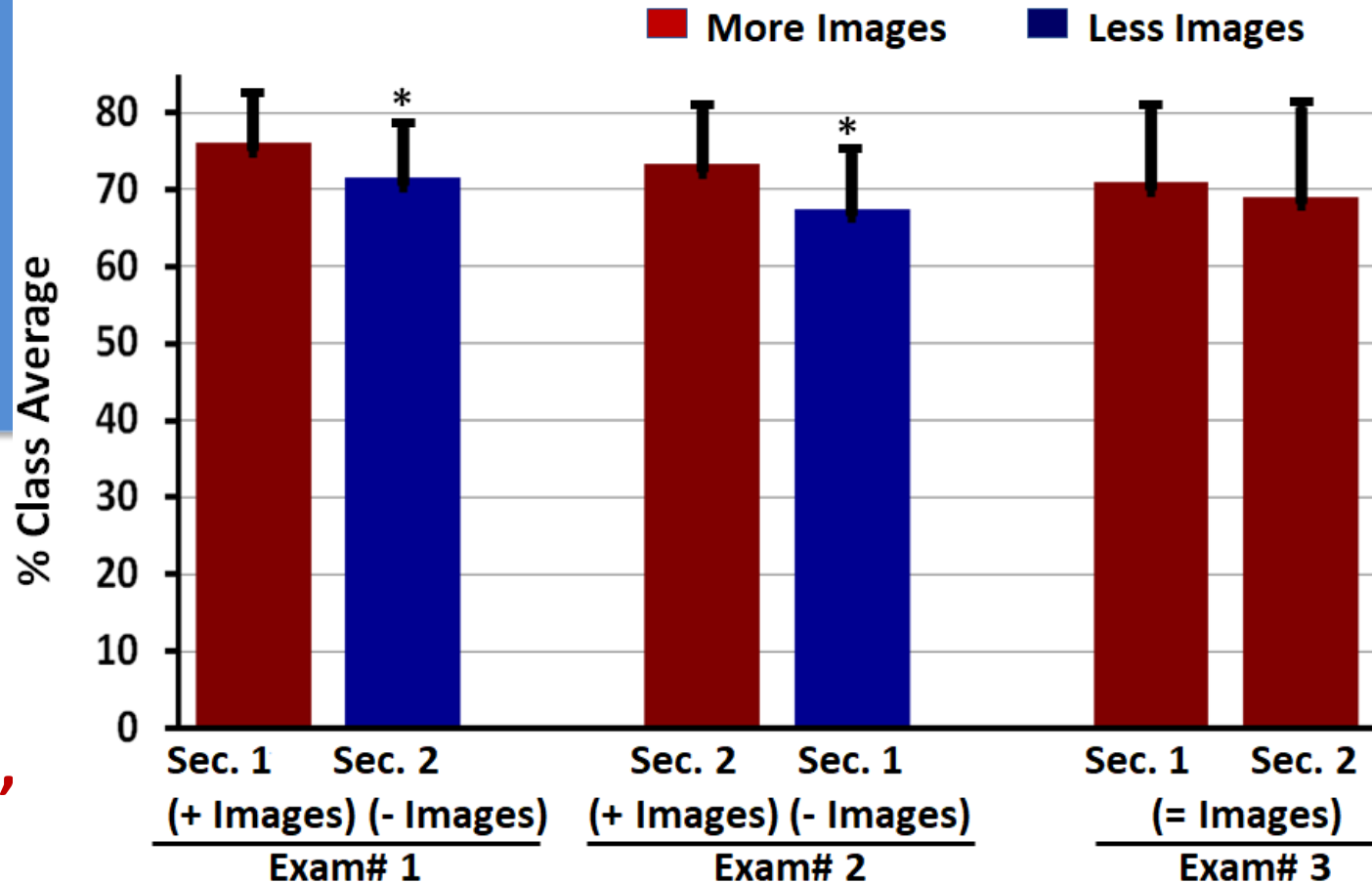
- Provides a **true perception** of the human body
- Stimulate **real-life learning** environments
- Provide a **social hub** for faculty-student interaction
- Help students to develop a social & communication skills
- Provide **visualizing effects** that increase learning and alter cognitive load (Custers et al., 2010)
- Help **recall** anatomical knowledge

Strategy I:
Virtual
Human
Cadaver-
Anatomage

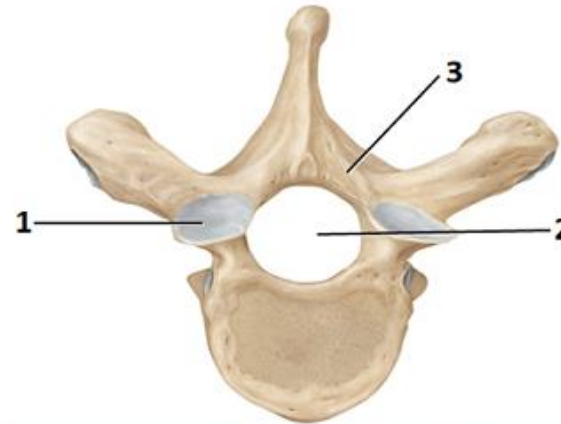
More Images Vs. Less Images

Strategy II:
Inclusion of
Anatomical
Images in
Exams

Narnaware &
Cuschieri, *CJNR*,
2022



Text + Images Vs. Text Only



Strategy II:
Inclusion of
Anatomical
Images in
Exams

Questions	% Score with Text + Image	% Score with Text only
1. Which structure serves as the attachment site for the 'facet for the head of the rib'?	56.9%	25.9%
2. Which structure serves as a passage for the spinal cord?	79.2%	68.8%
3. Which structure separates the transverse process from the spinous process?	68.0%	59.7%

Advantages of Images in Exams

*Strategy II:
Inclusion of
Anatomical
Images in
Exams*

- Increase visualization
- May reduce exam anxiety and stress in students
- Alter cognitive load (Custers et al., 2010)
- Help recall anatomical knowledge
- Provide a hint to an answer

The Impact of On-line and In-class Activities

Strategy III:
On-line &
In-class
Activities

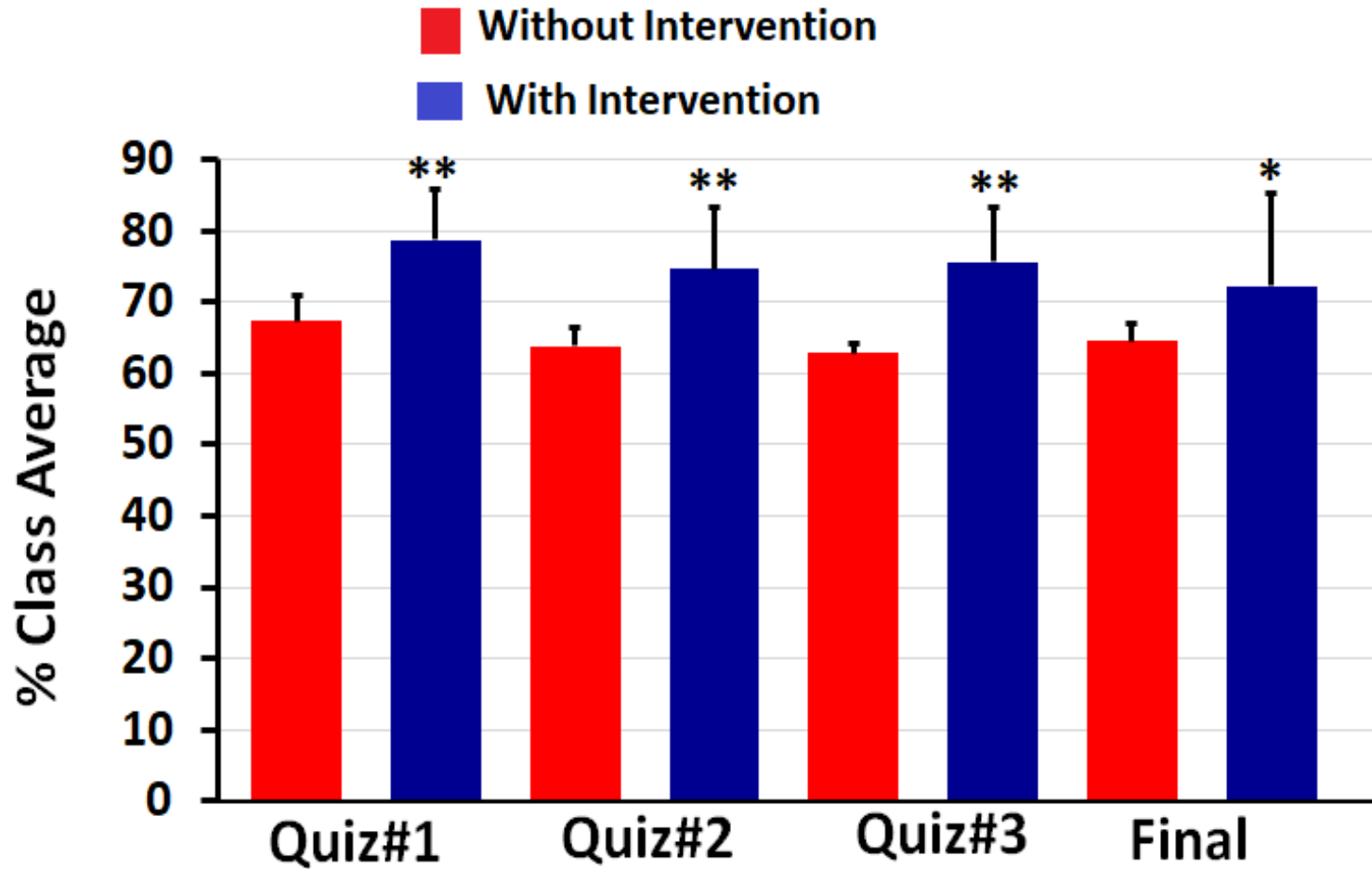
On-line Activities (outside the class):

- WileyPlus & Orion
- Muscle assignments
- Practice questions on anatomy contents

In-class Activities:

- Kahoot quizzes
- In-class quizzes, discussion & engagement
- Anatomical matching questions

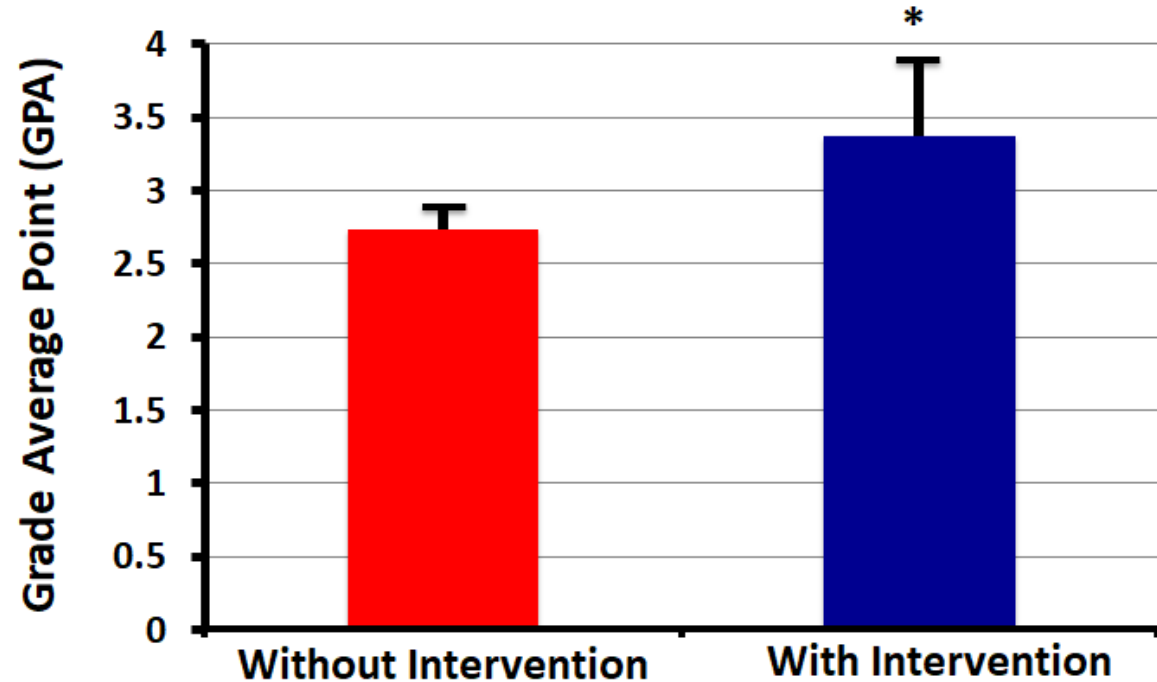
Strategy III: On-line & In-class Activities



Narnaware & Chahal, *FASEB*, 2019

*Strategy III:
On-line &
In-class
Activities*

GPA

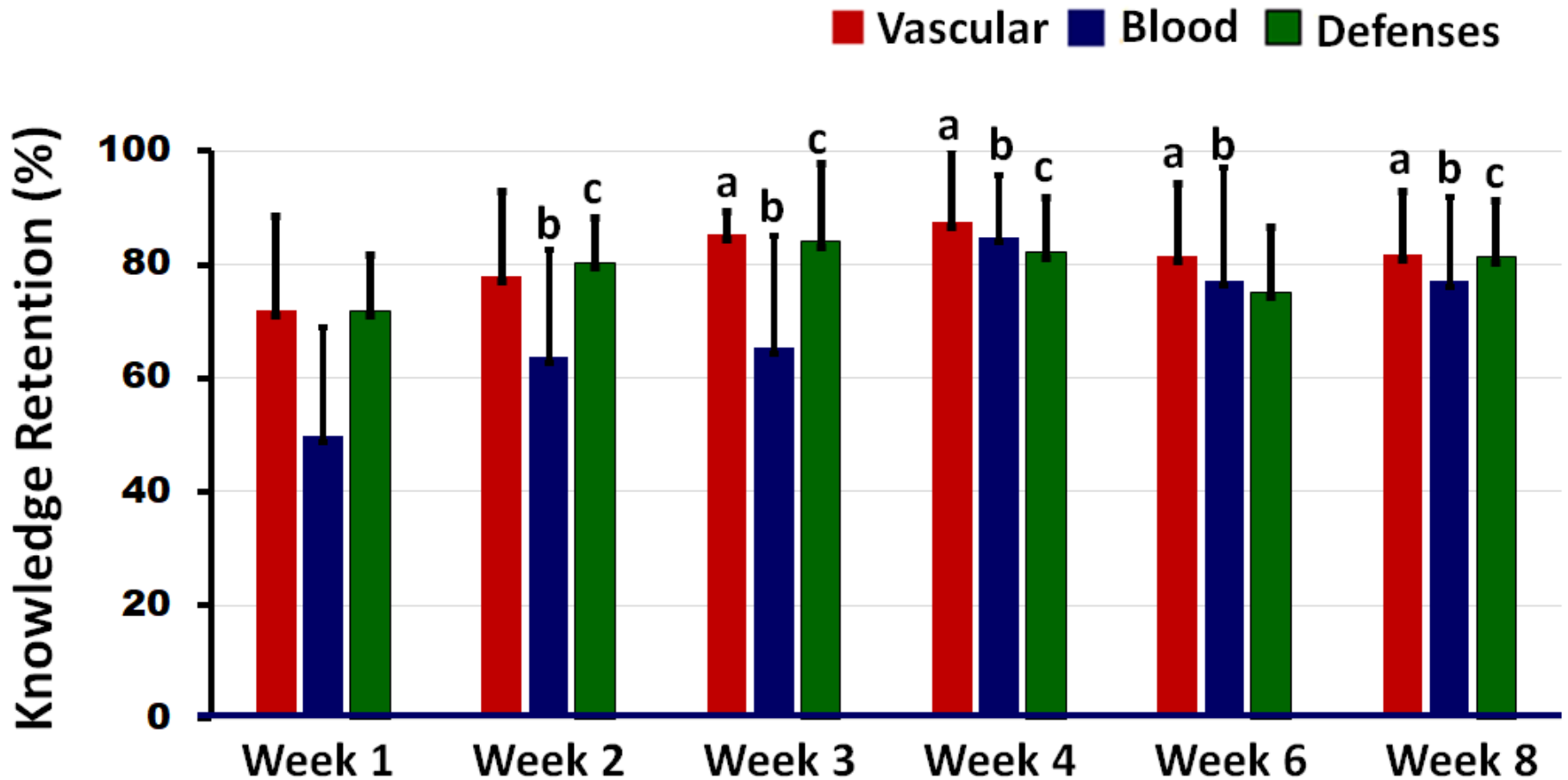


Advantages of On-line & In-class Activities

- The academic performance (Class average & GPA)
- Help gain communication and social skills
- Promote active learning
- Improve class attendance and engagement
- Develop critical thinking
- Retain long-term anatomical knowledge

Strategy IV:

Content Reinforcement (Repeated Knowledge Testing)



Future Directions



Post-Assessment



Conclusion



- Multi-modal, blended pedagogical approaches may foster students engagement, improve academic performance, provide social & communication skills, promote critical thinking, & may help retain a long-term knowledge in nursing students.

Thank you

