

THE RELATIONSHIP BETWEEN PREFERRED ANATOMY LEARNING MEDIA (ANATOMAGE AND CADAVER) AND STUDENTS' PRACTICAL SCORES

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ABSTRACT

Anatomical knowledge is essential for science and clinical skills. Learning outcomes can be influenced by the choice of learning media, such as the computer-based Anatomage and Cadaver-based methods. This study examines the relationship between students' preferred anatomy learning media and their practical exam scores. A correlative analytic method with a retrospective cohort approach was used, involving 372 medical students from the Faculty of Medicine, Muslim University of Indonesia, selected through purposive sampling. Inclusion criteria included students who had completed anatomy courses and participated in practical exams. Bivariate analysis using the Chi-Square test showed a significant relationship between preferred media and exam scores (p-value < 0.05). Students with a strong preference for Anatomage achieved a higher pass rate (95%) and demonstrated better comprehension of anatomical structures compared to those favoring cadaver-based learning. These findings emphasize the effectiveness of Anatomage as a learning tool in enhancing anatomy education. In conclusion, the choice of learning media significantly impacts practical exam performance, with Anatomage proving to be a highly effective medium.

Keywords: Anatomy learning media; Anatomage; Cadaver; Student interest; Practical scores

1. INTRODUCTION

Body structure is the knowledge that examines the structure of the

ordinary body, including its appearance, dimensions, location, and

the elements that support the interrelationships around it. Therefore, anatomy underlies the stages related to the biological and clinical transformation of the human body and is required in various clinical skills including emergency actions (Agustini et al., 2021; Anand & Singel, 2017).

A number of researchers have responded that there is an urgency in improving anatomical knowledge and there is concern about the low level of anatomical knowledge of students. Lack of anatomical knowledge increases the difficulty of diagnosing diseases, as it is the basis for recognizing normal and pathological changes in body physiology (Afsharpour et al., 2018; Brown et al., 2015).

An example of the influence of the level of anatomical knowledge is interest, a desire that can generate interest due to the existence of a compelling case and is influenced by the learning method carried out by the learner, the learning process, or the student's learning effort including the selection of appropriate learning media and techniques. (Adila, 2019).

Learning media is an important factor so that the right learning media is needed. A study shows that the prevalence of student interest in *Anatomage* learning media is still low compared to Kadaver. However, there was a significant increase in interest in *Anatomage* learning media from the previous year (Adila, 2019). Kadaver learning media is the main learning media. However, the development of technology has also influenced the development of anatomical learning media such as computer-based learning media (Allen et al., 2019; Azer & Azer, 2016). Cadavers are starting to be replaced by innovative electronic-

based learning tools. This is due to the shortage of organ donors, the increase in the number of students, the shortage of anatomists, and the transformation of ethical issues (Hernanda & Aji, 2024).

Body science, also known as anatomy, originates from the Greek language, combining the word *Ana* meaning "to separate" and *Tomos* meaning "to divide." The term *Anatome* was proposed by Aristotle and further developed in ancient Greece. The study of anatomy was first systematically introduced by Hippocrates (460–377 BC), a renowned ancient Greek physician and scientist who is widely regarded as the founder of medical science and anatomical studies (Fadlilah et al., 2020). Anatomy is the science of normal body structure. The anatomical structure of the body is divided into various systems, namely, the digestive, respiratory, reproductive, muscular, sensory, and nervous systems which are used as the basis for recognizing the physiology and pathology of the body (Gustin et al., 2018; Herdiman et al., 2018).

Cadaver in KBBI (Dictionary of Indonesian Language) is defined as a preserved human corpse. This is similar to the definition of cadaver according to other experts who say that a cadaver is a human corpse used to identify body parts, understand the location of disease, and understand the cause of death. Cadavers as a medium for students to learn the real anatomy of the body from the skin on the outermost part to the blood vessels, nerves, muscles, and internal organs (Fadlilah et al., 2020; Kurniasari et al., 2022).

Several previous studies have tested the effectiveness of anatomical learning media. *Anatomage* is said to increase engagement, interest in

learning, and tends to be more time efficient. Cadavers, on the other hand, show more variability in anatomical structures and only a few subjects stated that cadavers can be replaced by *Anatomage* (Anand & Singel, 2017; Baratz et al., 2019; Curlewis et al., 2021; Custer & Michael, 2015; de Lange et al., 2024)

A research result stated that there was no significant difference in the level of understanding of students who used *Anatomage* or Cadaver. The opinion of Afshapour, et al., 2018 states that there is a difference in the increase in student practice scores (Fredieu et al., 2015; Fyfe et al., 2018). The results of previous studies

concluded that further research is needed to test the level of student understanding. This is because the results of previous studies have focused more on student perceptions of anatomy learning media, and research on the level of knowledge, and the impact on it is still lacking (Baratz et al., 2019; Fadlilah et al., 2020).

So, researchers are interested in examining, the relationship of *Anatomage* and Cadaver anatomy learning media that students are interested in on the value of anatomy practicum which further reviews the learning outcomes received based on the level of student interest.

2. RESEARCH METHOD

This study used a correlative analytic method using a *retrospective cohort* approach. The location of this study was the Faculty of Medicine, Muslim University of Indonesia. The research was conducted from April 2024 to October 2024 based on the approval of the Ethics Commission Number: 519/A.1/KEP-UMI/IX/2024. The population of this study is all students of the Faculty of Medicine class of 2022 who are still taking anatomy practicum. As for sampling, the total sample method was applied, with a sample quantity equivalent to the entire group, namely all students of the Faculty of Medicine, Muslim Indonesia University class of 2022 who are still participating in the practical session of body structure in 2024. Meanwhile, the data collection instrument used in this study was a questionnaire.

The data analysis technique used consists of 3 stages, namely; a) taking the average of the practicum scores of each block undertaken by students, b) univariate analysis of variables which aims to describe each factor investigated and analyze the questionnaire answer

data that has been collected based on predetermined measurements, namely the highest value (100%), the lowest value (20%), and the interval (60%), c) bivariate analysis which aims to find the correlation between the independent and dependent variables, which in this study uses data analysis in the form of the *Chi-Square* test.

This study has two variables. First, the independent variable is the type of anatomical learning media that students tend to be more interested in, namely, *Anatomage* and Kadaver, which affects students' practicum scores. The measuring instrument in this independent variable uses the results of a questionnaire with a *Likert* scale in each answer choice, namely; 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree. As for the objective criteria, if $\geq 60\%$ then "fulfill", and if $< 60\%$ then "not fulfill". Second, the dependent variable is the practicum score obtained by students with objective criteria, namely, if ≥ 70 then "pass", and if < 70 then "not pass".

3. RESULTS AND DISCUSSION

Table 1. Characteristics of respondents according to gender

Gender	Frequency	Percentage
Male	97	25.1%
Female	275	73.9%
Total	372	100.00%

Based on Table 1 above, there was greater participation from women (73.9%), although men (25.1%) also contributed significantly. So that for the characteristics of the respondents of this study, namely students of the Faculty of Medicine, Muslim Indonesia University, Batch 2022 semester 4 who participated in the Gastroenterohepatology block with the gender of the majority of women compared to men.

Table 2: Learning media that students are interested in

Learning media preferences	Frequency	Percentage
Anatomage	200	53.8%
Cadaver	172	46.2%
Total	372	100.00%

Based on Table 2 above, technology-based *Anatomage* (53.8%) is the learning media that students are more interested in than Cadaver (46.2%).

Table 3. Recapitulation of student anatomy practicum scores

Value	Frequency	Percentage
Pass	250	67.2%

Table 5. The relationship between anatomy learning media that students are interested in and students' practicum scores

Test	Value	df	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson Chi-Square	151.63	1	0.000		
Continuity correction	148.915	1	0.000		
Likelihood ratio	168.866	1	0.000		
Fisher's exact test				0.000	0.000
Linear-by-linear association	151.223	1	0.000		
N of valid	372				

Based on the results of the *Chi-Square* statistical test in Table 5 above, it

Value	Frequency	Percentage
Not Passed	122	32.8%
Total	372	100.00%

Table 3 above shows that the recapitulation of anatomy practicum scores from 372 students obtained a percentage of passing (67.2%), while not passing (32.8%). Thus, the majority of students achieved the passing criteria, although almost half were not successful.

Table 4. Student pass rate based on preferred anatomy learning media

Learning media preferences	Did not pass (%)		Total (%)
	Pass (%)	Did not pass (%)	
Anatomage	190 (95%)	10 (5%)	200 (100%)
Cadaver	60 (35%)	112 (65%)	172 (100%)
Total	250 (67%)	122 (33%)	372 (100%)

The table shows that among students who preferred the *Anatomage* learning media, 95% passed the practical exam, while only 5% did not pass. In contrast, for students who preferred the cadaver-based method, 35% passed the exam, and 65% did not pass. Overall, 67% of students passed the practical exam, with the majority favoring the *Anatomage* method, highlighting its effectiveness in achieving higher pass rates.

was found that there is a significant relationship between learning media

preferences (*Anatomage* or Cadaver) and students' anatomy practicum scores. The *p-value* of 0.000 was obtained, which is smaller than 0.05, so that the type of learning media chosen by students affects the value or passing rate of practicum.

Based on the results of the study, the selection of learning media has a significant influence on practicum grades and student academic achievement. Students who use *Anatomage* as a computer-based media have a higher pass rate (95%) than cadavers (35%). This shows that technological media such as *Anatomage* is more effective in improving students' understanding and practical skills and is considered more attractive to students' learning interests (Indah, 2018; Jallad et al., 2024; Khairunnisa, 2015; TL et al., 2017).

Anatomage (53.8%) is the learning media that respondents are more interested in. This is due to *Anatomage's* ability to visualize organs from various planes (2D and 3D), see *Superficial* to *Profundus* layers, available gender options and other modern features that increase engagement, understanding, motivation, interest and accelerate the learning process.

The difference between the interest level of *Anatomage* (53.8%) and Cadaver (46.2%) is not too different. This is because cadavers are still relevant in providing a learning experience by seeing, touching variations of details, textures of real anatomy. However, the effectiveness of cadavers may decrease, if the number of experienced tutors is minimal or the number of tutors and students is not balanced (Liao et al., 2024; Lorin et al., 2024; Luklukaningsih, 2014; Mogali et al., 2018; Rao, 2012). In addition, limited time, distinctive smells and textures and colors that are difficult to identify, add to the difficulties for students (Anand & Singel, 2017; Fadlilah et al., 2020; Komari et al., 2022; Romancenco et al., 2024; Sapriyah, 2019)

The pass rate was high among respondents who had an interest in *Anatomage* (95%). This is due to the appearance, workings and features appealing to students who rely on devices for learning needs. Students become more active and master the material faster. Finally, students are better prepared for the final stage of learning evaluation (Sbayeh et al., 2016; Shen & Khechornphak, 2024; Tenaw, 2020; Utami et al., 2021).

The use of cadavers makes it easier to see the variety, detail and texture of preserved human organs. Although it has several advantages, respondents who have an interest level in cadavers (34.9%) have a low pass rate. It is possible that these students have difficulty in identifying blackish colors (Bustamam & Purwaningastuti, 2021; Jones, 2002; Nugraha et al., 2019; Romi et al., 2019; Rosario, 2021). In addition, the time allocation for studying cadavers is not proportional to the number of preparations available, so the learning material has not been conveyed in its entirety. As a result, the level of readiness of students in facing the final stage of learning evaluation has decreased (Anand & Singel, 2017; Herdiman et al., 2018)

Students who have a high interest in learning will tend to be more active and enthusiastic in participating in lessons, so that better learning outcomes are achieved. This is supported by the selection of appropriate learning media during the learning process (Wahyudiati, 2016; Yuliana, 2023)

Anatomage which is more attractive has a high pass rate due to the visualization of images, text, audio and more attractive features. This is in line with the research of Wati and Valzon (2019) which states that the use of all five senses during the learning process occupies the best position in increasing interest and learning outcomes (Anand &

Singel, 2017; Fredieu et al., 2015; Wati & Valzon, 2019)

Anatomage is more interactive with multiple illustrations, namely Cadaver and Mannequin illustrations in one device so that its use is more effective and easier during evaluation. Unlike the cadaver which is only limited to one representation. This means that if

4. CONCLUSION

- a. The percentage level of interest in anatomage is 53.8%, and the percentage level of interest in cadavers is 46.2%.
- b. The majority of respondents successfully passed the anatomy practicum (67.2%), especially those who used *Anatomage* (95%) as learning media.

5. RECOMMENDATION

- a. Educational institutions combine technology-based learning media and traditional methods to optimize student learning outcomes.
- b. The use of *Anatomage* can continue to be encouraged as it is effective in improving comprehension and pass rates. However, *cadavers* also need to be retained as they provide an immersive authentic learning experience.

students are only interested and focused on cadavers, they tend to experience difficulties during the final evaluation using two learning media (Fadlilah et al., 2020; Fredieu et al., 2015; Gustin et al., 2018).

- c. There was a significant relationship between learning media of interest and practicum grades obtained. Students using *Anatomage* tended to achieve higher pass rates than those using Cadaver, suggesting that technology-based media has an important role in improving academic success.
- c. Periodic evaluations of student satisfaction and the effectiveness of learning media need to be conducted to ensure that the methods used match their needs and expectations. Further research with a wider scope and considering factors such as motivation and learning environment is also recommended to gain a more comprehensive understanding.

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