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ORIGINAL RESEARCH

The Effect of Students' Perception on Learning Media in a Flipped Classroom on the Students' Learning Motivation at Riau University

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ABSTRACT

Background: To address limitations of traditional lectures, the flipped classroom model introduces students to basic material before class, thereby increasing students' mastery of basic material and reducing the limitations in medical education. One important factor in learning basic medical sciences, such as histology, is learning motivation. The learning media used in a flipped classroom can shape students' perceptions, which may, in turn, influence learning motivation.
Aims: This study aims to determine the relationship between student perceptions of learning media in a flipped classroom and their motivation to learn histology at the Faculty of Medicine, Riau University.
Methods: This is a quantitative correlational design using questionnaires administered to 118 first-year medical students in the 2024/2025 academic year following the flipped classroom. Students first engaged in independent study by watching instructional videos prepared by the researcher. Six days later, they participated in in-class histology learning activities, including question-and-answer sessions, discussions, and picture quizzes related to the studied content. After those stages of the flipped classroom, students filled out the questionnaire. Thirteen participants were excluded, resulting in a final sample of 105 students.
Results: Student perceptions of the learning media (instructional videos) were categorized as good, while their motivation to learn histology in the flipped classroom was high. A Chi-Square test ($p = 0.002$) indicated a relationship between student perceptions of the learning media and their motivation to learn histology ($p < 0.05$).
Conclusion: There is a correlation between student perceptions of the learning media used in the flipped classroom (in the form of learning videos) and their motivation to learn histology at the Faculty of Medicine, Riau University.

Keywords: perception, learning media, flipped classroom, motivation, histology

PRACTICE POINTS

- Improving the quality of learning media to foster better student perceptions could be a strategy to enhance motivation in histology learning.
- Implementing a flipped classroom with high-quality instructional videos should be considered.

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INTRODUCTION

The development of science and technology in the current era has produced various strategies to replace traditional learning models, one of which is the flipped classroom model.[1] According to Persky,[2] flipped classroom is a learning model that introduces the basic concept of material to students before class time, so that class time is used to apply and build the basic concepts of the material actively and practically. Therefore, it can reduce dependence on the teacher, which is one of the limitations in the traditional learning model.[2,3] This learning model has been widely discussed in research and used by various educational institutions in the world, including in medical education.[4]

In medical education, learning motivation is one of the key factors needed for students to study basic knowledge, such as histology. This is because the role of the basic science of histology, namely understanding the structure of tissues in the normal organ system, is the underlying science for histopathology, one of the important supports for diagnosis and prognosis.[5,6] In addition to that important role, motivation is also very necessary in learning histology because of the many difficulties faced by students.[7]

Medical students often do not know the importance of studying the structure of normal cells and tissues. Students see histology as a subject that is difficult to understand, abstract, and difficult to connect theory with its practice.[8] Histology terms also feel foreign to students, especially new learners.[6] At the Faculty of Medicine, Riau University, the histology subject still uses traditional learning methods. Traditional learning causes what is received by students to be limited to what is only explained by the lecturer in the classroom.[2] At the Faculty of Medicine, Riau University, this can be seen from the research of Soraya, which showed that the average grade of students of the 2021 batch in the histology practicum exam of the Skin and Integument System, Immunology, and Sensory Block was a D grade.[9] Therefore, factors that can increase student learning motivation need to be considered.

One way to increase learning motivation is by using learning media. Histology now has widely used technology-based learning media such as virtual microscopes, e-books, websites, e-learning platforms, social media, podcasts, online tutorials, and mobile applications.[10] This is because technology allows visualization of tissue microstructures, which is very necessary in histology.[11] Various choices of learning media can be considered to be used. Both the accuracy of choosing learning media and student perception affect learning outcomes.[12]

The use of each learning media will certainly give specific perceptions for each student. According to Marlina,[13] students will focus on learning because they understand the importance of learning if the students' initial perception of a certain object is good. On the contrary, students will consider learning unimportant and find it difficult to accept the material delivered by the teacher if the initial perception is bad.[13]

In the context of medical histology lectures, especially with the flipped classroom model, the examination of the link between students' motivation and their perceptions remains an area that has not been extensively addressed in scholarly literature. The flipped classroom model relies heavily on the use of technology-based learning media that are interesting for students to deliver basic material before learning in the classroom.[3,14] The flexibility of the flipped classroom allows students to view lessons according to the level of comfort and speed as needed, so that it can increase student motivation.[14] In addition, the research of Aristotle et al.[15] showed that the implementation of the flipped classroom in histology lectures improved student performance and positive feedback. Therefore, this study aims to determine the relationship between student perceptions of learning media used in the flipped classroom and the motivation to learn histology at the Faculty of Medicine, Riau University.

METHODS

A correlational study examining the relationship between student perceptions of learning media in a flipped classroom setting and their learning motivation in histology was conducted in February 2025 at the Faculty of Medicine, Riau University. This research involved 118 first-year students of

the Faculty of Medicine, Riau University academic year 2024/2025 as samples taken with simple random sampling technique from a population of 140 students. This technique was chosen because first-year students of the Faculty of Medicine, Riau University academic year 2024/2025 as the research population are assumed to be homogeneous or equivalent so that it is expected to produce unbiased and representative results of the population, where the population is the only student having a histology course in the Riau University is the first year. Data of student perceptions of learning media in flipped classroom and learning motivation of histology came from data obtained from two questionnaires filled out by the students after the implementation of flipped classroom.

The researcher prepared learning media in the form of learning videos of histology subject matter according to the block curriculum of the Faculty of Medicine, Riau University which was ongoing at the time of the research, namely the block of Gastrointestinal System, Metabolism, and Endocrine. The researcher prepared learning videos about histology of endocrine glands.

The video was made using Canva application by displaying microscopic slide images of tissues with short writings containing related material about histology of endocrine glands. The material was divided into three videos: pituitary gland and pineal gland, thyroid gland and parathyroid gland, and the last is adrenal gland and pancreas. Microscopic slide images and learning materials referred to teaching materials from Riau University histology lecturers. Some images were taken from sources available online. Each video had a maximum duration of 5 minutes, accompanied by background music and narration. Before implementation, the instructional video underwent expert review by two histology faculty members to ensure the accuracy of the content, clarity of narration, and alignment with the learning objectives, after which minor revisions were made.

The researcher explained the research to be carried out to the research subjects. The research subjects stated their agreement by signing the informed consent form. The researcher explained the stages of the flipped classroom to be implemented so that the research subjects could follow the entire stages of the research procedure. The researcher explained the first stage, namely, the pre-class independent learning session. The research subjects studied independently, with the instruction of watching the learning videos prepared by the researcher, to understand the material in the videos. The independent learning session was carried out freely in terms of time and place according to the comfort of each research subject. The researcher explained the next step, namely, classroom learning activities as well as evaluation, which was the histology subject with the lecturer, according to the existing schedule, and explained the learning plan to be carried out in the class by the lecturer. The researcher then distributed the prepared learning videos to the research subjects through a Google Drive link. If the research subjects experienced difficulties, they could contact the researcher through the researcher's phone number.

The researcher ensured that the research subjects carried out independent learning activities by distributing a form through a Google Form link at a time determined before the classroom learning activity. This form contained a question whether the research subjects had carried out independent learning on that day, with answer choices yes or no. The research subjects were asked to attach a screenshot of the learning video that had been watched and fill in impressions and short review columns about the shared video as proof of having used the learning media. The research subjects filled out the form through their respective mobile phones or laptops.

The research subjects carried out independent learning using learning media in the form of learning videos that had been shared. In accordance with the basic concept of the flipped classroom, in the next stage, the research subjects carried out histology classroom learning activities according to the schedule of the histology subject. Learning and post-class evaluation were guided by the histology subject lecturer, integrated with the relevant block schedule and curriculum. This means that all students of block 4 were required to attend this subject hour. In this class, unlike lectures with traditional methods, the lecturer opened a discussion space for questions and answers about materials that had not been

understood from the shared videos. Then, the lecturer distributed clinical scenarios for discussion, picture quizzes, as well as questions and answers for the application of the learned knowledge.

After the histology lecture, learning activities according to the lecture schedule were completed, the researcher explained the instructions for filling out the questionnaire and distributed the questionnaire through a Google Form link. The research subjects filled out the questionnaire together for 20–30 minutes through their respective mobile phones or laptops. This instrument was filled out directly by the research subjects so that the data obtained were primary data. There were two questionnaires used in this research, namely the learning motivation questionnaire and student perception questionnaire. Both questionnaires were closed questionnaires and made in the form of Google Form.

The student perception questionnaire in this research was a questionnaire to obtain student perception data in this research, which was the Technology Acceptance Model 3 (TAM3) questionnaire that had been adapted and modified for the use of this research. Various versions of this TAM questionnaire have been widely used in various research on acceptance of information technology, and, along with time, many have also been modified for research on perceptions of information technology. Research by TAM3 developers showed all categories of TAM3 constructs met convergent and discriminant validity tests, with each assessment item having a value ≥0.70 and no cross-loading value more than 0.30. Reliability was also fulfilled with internal consistency reliability (ICR) value >0.70 for all construct categories at all measurement points. This questionnaire consisted of 11 assessment items in the form of statements included in three categories of assessment, namely Perceived Usefulness or student perception of the usefulness of learning media, Perceived Ease of Use or student perception of the ease of use of learning media, and Perceived Enjoyment or perception of enjoyment of the learning media. These three categories were chosen from 16 original construct categories in TAM3, with consideration of relevance and suitability of the method for this research.[16]

This questionnaire used a 7-point Likert scale, with answers between 1 (strongly disagree) and 7 (strongly agree) to the statement. For the assessment of this questionnaire, answer choice 1 was given a score of 1, answer 2 was given a score of 2, and so on until answer 7 was given a score of 7. The final score was divided with the Interval Scoring formula (I = R/K) into categories Very Bad (score 11—27.75), Bad (score >27.75—44.5), Good (score >44.5—61.25), and Very Good (score >61.25—78).

The learning motivation questionnaire of histology in this research was a questionnaire to obtain learning motivation data of histology students in this research, namely the Motivated Strategies for Learning Questionnaire (MSLQ) motivation dimension that had been adapted and modified for the use of this research. The learning motivation questionnaire was adapted and modified from the Motivated Strategies for Learning Questionnaire (MSLQ), which had been validated in various languages, including Indonesian, and widely used in various research on learning motivation, so that its reliability had been tested. One research showed the motivation dimension of the MSLQ questionnaire had the result of a calculated r in each assessment item having a value >0.142, which means all assessment items were valid, and the result of Cronbach's alpha of 0.89, which means high reliability.[17] This questionnaire consisted of 31 assessment items in the form of statements included in 3 assessment components, namely value, expectancy, and affective. The value component was divided into intrinsic and extrinsic goal orientation, as well as task value. The expectancy component assessed aspects of students' beliefs that their efforts to learn would produce positive results (control of learning beliefs) as well as self-efficacy for learning and performance in the subject. Self-efficacy was self-assessment of one's ability to master a subject. The affective component assessed student anxiety towards exam (test anxiety).[18]

This questionnaire also used a 7-point Likert scale between number 1 (very not in accordance with self) and number 7 (very in accordance with self) to the statement where answer choice 1 was given score 1 until answer 7 was given score 7. However, there were statement items marked as reversed scale

so that answer choice 1 was given score 7, answer 2 was given score 6, and so on until answer 7 was given score 1. The final score was divided with the Interval Scoring formula (I = R/K) into categories Very High, High, Sufficient, Low, and Very Low.

Data that had been collected were then processed and analyzed with descriptive analysis to find out student perceptions of learning media and learning motivation of histology students with the use of learning media in flipped classroom as well as analysis with Chi-Square test to find out the relationship between the two. During the study, thirteen students were excluded from the research sample because they met the exclusion criteria, namely missing at least one in-class session or providing incomplete questionnaire responses. The sample whose data were continued to be processed and analyzed amounted to 105 people.

This research had been declared passed ethical review by the Unit of Research Ethics of Medicine and Health, Faculty of Medicine, Riau University with number: 002/UN19.5.1.1.8/UEPKK/2025.

RESULTS AND DISCUSSION

A. Description of Student Perceptions of Learning Media Used in Flipped Classroom

Student perceptions in this study are student perceptions of learning media in the flipped classroom in the form of three learning videos about histology of the endocrine system. This data was obtained from the results of the student perception questionnaire. The processed data were then analyzed to know the frequency distribution of each perception category, the results of which are in Table 1.

Based on Table 1, it was obtained that the perception of students toward videos as learning media used in a flipped classroom was the most common, with a good perception, with a frequency of 51 out of 105 students or 48.6%. As many as 48 students (45.7%) had very good perceptions of videos as learning media used in flipped classrooms. As many as 6 students (5.7%) had poor perceptions of videos as learning media used in flipped classrooms. No student had very poor perceptions of videos as learning media used in flipped classrooms.

Furthermore, analysis was carried out to find out the description of the average perception of students toward videos as learning media, the results of which are in Table 2.

Based on Table 2, it was obtained that the average perception of students toward videos as learning media used in flipped classroom was 60.53 which means the perception of students of the Faculty of Medicine, Riau University about learning media used in flipped classroom is in the good category.

Table 1 Frequency Distribution of Student Perceptions of Videos as Learning Media

Student Perception Category	Frequency		Total (n)	Percentage (%)
	Male (n=30)	Female (n=75)		
1. Very Bad	0	0	0	0
2. Bad	0	6 (5,7%)	6	5.7
3. Good	13 (12,4%)	38 (36,2%)	51	48.6
4. Very Good	17 (36,2%)	31 (29,5%)	48	45.7
Total			**105**	**100**

Note: Very Bad category: score 11—27.75, Bad: score >27.75—44.5, Good: score >44.5—61.25, Very Good: score >61.25—78.

Table 2. Mean Score of Student Perceptions of Videos as Learning Media

Sample	Total	Mean	Median	Mode	Std. Deviation	Min.	Max.
Male	30	62.97	64	77	8.98	45	77
Female	75	59.56	57	55	10.48	43	77
Total	**105**	**60.53**	**61**	**55**	**10.152**	**43**	**77**

Note: Very Bad category: score 11—27.75, Bad: score >27.75—44.5, Good: score >44.5—61.25, Very Good: score >61.25—78.

The lowest student perception was a score of 43 (poor perception) and the highest was a score of 77 (very good perception), with a median value of 61 and a standard deviation of 10.152. The most frequently obtained score was 55 which is in the good category. This result shows that students had good impressions or responses to the learning media used in flipped classroom, namely the three learning videos on histology of the endocrine system that had been shared.

This result is in line with the research of Sari[19] which stated that student perception was good for the use of PowerPoint-based learning videos. This is because the media conveyed the main points of the material by processing text, photos, colors, images, and the like in an interesting way. This media was also able to accommodate various kinds of student learning styles such as visual and auditory. The learning videos could also be uploaded on various sites so that it made it easier for students to manage time, be calm, and focus on independent learning.[19]

The histology course really requires good visualization in its learning, considering that one of the cores of this science is the recognition of the structure of human cells and tissues of microscopic size. At the Faculty of Medicine, Riau University, histology learning is by observing organ slide preparations using conventional microscopes. The facility is only available in the laboratory and its use is limited to class hours. The use of conventional microscopes requires practice, experience, and the development of core visual and motor skills, while the distributed microscopic tissue slides are limited because they cannot be re-cut or duplicated.[20]

Learning videos, which are a type of audio-visual learning media, have various visual advantages that can help students in this regard. Supported with audio and dynamic movements in the video, the advantages and usefulness can influence students' perception of the learning media used. This is in line with Cognitive Load Theory, which states that the presentation of material through appropriate audio-visual media can reduce excessive cognitive load so that it helps students to be more focused on the core of learning.[21]

Thus, the good perceptions of students in this study can be interpreted as the result of learning experiences that support more efficient information processing thanks to the design of learning videos in accordance with Cognitive Load Theory with the influence of easy access and flexibility of videos. Students can learn at their own pace, repeat material as needed, and use visualization to understand complex histology concepts.

In addition, this video learning media was also applied as learning media in the implementation of the flipped classroom. In this flipped classroom model, traditional lectures by lecturers were reduced, and certainly, there was more time to apply and practice basic concepts and do exploration.[14] The free time of students to interact with learning videos became more so that it could influence their perceptions of the videos.

Based on the research data, there were six students who had poor perceptions of the learning media used in the flipped classroom. In the study of Ningsih and Fitriasari,[22] low scores in perception of videos were among others, in the statement that students liked to anticipate asking questions when watching learning videos. This was caused by learning videos still presenting material in a one-way manner or not yet being interactive.[22]

B. Description of the Level of Motivation to Learn Histology of Medical Students at the Faculty of Medicine, Riau University, with the Use of Learning Media in Flipped Classroom

Learning motivation in this study is the level of motivation of students to learn histology with the use of videos as learning media in a flipped classroom. This data was obtained from the results of the learning motivation questionnaire.

Based on Table 3, it was obtained that the level of motivation to learn histology with the use of videos as learning media in flipped classrooms that was the most common is high motivation, with a frequency of 61 out of 105 students or 58.1%. As many as 6 students (5.7%) had very high motivation to learn

histology with the use of videos as learning media in flipped classrooms. As many as 38 students (36.2%) had sufficient motivation to learn histology with the use of videos as learning media in flipped classrooms. No student had low or very low motivation with the use of videos as learning media in flipped classroom.

Based on Table 4, it was obtained that the average level of motivation to learn histology with the use of videos as learning media in a flipped classroom was 150.82, which means the level of motivation to learn histology of students at the Faculty of Medicine, Riau University, with the use of learning media in a flipped classroom is in the high category. The lowest student motivation score was 110 (sufficient motivation), and the highest was 185 (very high motivation), with a median value of 152 and a standard deviation of 17.283. The most frequently obtained scores were 159 and 161, which are in the high motivation category. This result means that by watching the learning media used in the implementation of the flipped classroom, namely the three learning videos on histology of the endocrine system that had been shared, students became motivated to learn histology.

Learning motivation is influenced by many different factors, both internally and externally. Examples of factors that influence learning motivation are goals or aspirations, learning ability, student condition, environmental condition, dynamic elements in learning, and teacher efforts to teach students.[23] The factor of learning media studied in this research also had a positive influence on learning motivation.

This result is in line with the research of Aprilia[24], which stated that the use of learning videos can increase student motivation because the learning videos used attracted attention and could be studied repeatedly. Another research by Humairah[25] also stated that the use of learning videos in higher education had significant effectiveness in increasing student motivation and participation in learning.

This result is also in line with the literature study of Sastramiharja et al.[26] which stated that there was an effect of the use of video media on student learning motivation. Based on this study, most research stated that the use of video media had a significant effect on student learning motivation, especially in adapting to different learning styles.[26]

In addition, the motivation to learn histology can certainly be influenced by the difficulties of this subject. These difficulties include the terminology or theory of histology itself.[8] After the implementation of flipped classroom by distributing learning videos of histology of the endocrine system, the motivation to

Table 3 Frequency Distribution of the Level of Motivation to Learn Histology

Learning Motivation Level Category	Frequency		Total (n)	Percentage (%)
	Male (n=30)	Female (n=75)		
1. Very High	2 (1.9%)	4 (3,8%)	6	5.7
2. High	16 (15,2%)	45 (42,9%)	61	58.1
3. Sufficient	12 (11,4%)	26 (24,8%)	38	36.2
4. Low	0	0	0	0
5. Very Low	0	0	0	0
Total			**105**	**100**

Note: Very High category: score >180.6—218, High: >143.2—180.6, Sufficient: >105.8—143.2, Low: >68.4—105.8, Very Low: 31—68.4.

Tabel 4 Mean Score of Student Motivation to Learn Histology

Sample	Total	Mean	Median	Mode	Std. Deviation	Min.	Max.
Male	30	150.57	157.50	163	18.40	121	182
Female	75	150.92	151	141	16.94	110	185
Total	**105**	**150.82**	**152**	**159, 161**	**17.283**	**110**	**185**

Note: Very High category: score >180.6—218, High: >143.2—180.6, Sufficient: >105.8—143.2, Low: >68.4—105.8, Very Low: 31—68.4.

learn histology of students at the Faculty of Medicine, Riau University was in the high category. The flipped classroom model can reduce the delivery of material in class so that students have more time to apply and practice basic concepts and do exploration. In addition, this model increases student active participation and involvement compared to traditional learning. This can increase self-motivation.[14]

Research by Naciri et al.[27] which showed that the motivation scores of all students (n=20) increased positively with flipped classrooms compared to traditional methods. This was because learning activities in the form of varied exercises (video worksheets, multiple choice quizzes, and open-ended questions) created a sense of competition and competitiveness in the class group (good grades and satisfactory rankings in class). In addition, in flipped classroom students were actively involved in acquiring knowledge. Students believed that their academic performance was directly related to their efforts, which is one of the components of motivation assessed. Students also believed in their ability to adapt and control the behavior needed to achieve the required performance in learning. This was due to an adaptive and flexible learning environment.[27]

According to Deci & Ryan's Self-Determination Theory, intrinsic motivation can be increased if the needs for competence, autonomy, and relatedness are fulfilled.[28] This can be seen with the implementation of flipped classroom learning using learning videos that support student autonomy in managing their learning time and place. The sense of responsibility and motivation of students to understand the material can increase because of this.

C. Relationship Between Medical Student Perceptions of Learning Media in a Flipped Classroom and Their Histology Learning Motivation at Riau University

The average perception score of students and the average level of motivation to learn obtained through the two questionnaires were analyzed using the chi-square test to see the relationship between the two.

Based on Table 5, the Chi-Square test obtained p value = 0.002. This result means that there is a relationship between student perceptions of videos as learning media in flipped classroom with motivation to learn histology at the Faculty of Medicine, Riau University ($p < 0.05$). The value of $p < 0.05$ indicates that there is a relationship between student perceptions of learning media in flipped classroom and motivation to learn histology ($p = 0.002$).

With perception as an impression or response, a person can perform various responses as a result of that perception. In this case, a student's response to a good perception of histology learning videos is a level of motivation that is proportional to the good perception.

Based on the positive relationship between perception and motivation in this study, it can be interpreted that good perceptions of flipped classroom learning media can increase student learning engagement. This supports Keller's ARCS theory (Attention, Relevance, Confidence, Satisfaction).

Table 5 Chi-Square Test

Perception		Motivation			Total	p value
		Very High	High	Sufficient		
Very Good	Frequency (n)	5	35	8	48	0.002
	Percentage (%)	4.8	33.3	7.6	45.7	
Good	Frequency (n)	1	24	26	51	
	Percentage (%)	1	22.9	24.8	48.6	
Bad	Frequency (n)	0	2	4	6	
	Percentage (%)	0	1.9	3.8	5.7	
Total	**Frequency (n)**	**6**	**61**	**38**	**105**	
	Percentage (%)	**5.7**	**58.1**	**36.2**	**100**	

This theory mentions points such as the importance of attention and relevance to motivate learning.[29] Learning media that attract attention and are relevant to student learning needs, such as learning videos, can contribute positively to increasing their intrinsic motivation.

This research used learning videos as the learning media used by students during the independent learning session in the implementation of flipped classroom in the histology course. One type of learning media can result in different perceptions, as shown by the very good, good, and poor perceptions in this study. Other types of learning media may result in different perceptions.

CONCLUSION

Medical students' perceptions of instructional videos used in a flipped classroom were generally positive, and their histology learning motivation was predominantly high. A significant association was found between students' perceptions of the learning media and their motivation to learn histology (Chi-square, $p = 0.002$). These findings suggest that improving the quality of flipped classroom learning media may support student motivation in histology learning.

RECOMMENDATION

This study has several limitations, including the limited number of topics covered, the short intervention period, and the absence of a control group. Future studies should (1) implement the flipped classroom across multiple histology topics and sessions to evaluate consistency of the effect, (2) include additional variables that may influence motivation (e.g., prior academic performance, learning preferences, and digital access), and (3) consider mixed-method approaches to explore why certain students report lower perceptions of video-based learning media.

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COMPETING INTERESTS

The authors declare that there are no competing interests related to the study.

AUTHORS' CONTRIBUTION

Fathiya Inayah Az Zahra Nares – developing research proposal, collecting data, data analysis, and publication manuscript.

Winarto – developing a research proposal, collecting data, and preparing a manuscript for publication.

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