

Students' Perception To Different Types Of Reasoning Questions For Histology Practical Training

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Abstract: Background: Educators world over are constantly looking for new ways to improve student understanding and performance. While the traditional methods of teaching are effective as is, introduction of newer, fresher methods may prove useful in providing an additional level of thinking and reasoning in students. Peer-framed reasoning questions is one such example that has been reported to show considerable improvement in student knowledge, and hence, performance. In a subject like histology, reasoning could prove useful to explain the microanatomy of structures and their relation to physiological functions.

Aim and objectives: To determine students' perception to different types of reasoning questions for histology practical training, and to assess their performance and response to the same.

Methodology: This study is conducted on 50 first year medical students of Saveetha Medical College. The students were given 2 questions framed with the help of two first year medical students for histology slides over a period of 6 histology hours. The answers to the questions were collected and corrected. The performance of the students was evaluated. To assess the perception of students towards the questions given in the above sessions, they were subjected to answer a validated questionnaire, the results of which were evaluated.

Results: The students showed considerable interest in the programme and participated diligently. The answers to the feedback questionnaire showed positive responses in the whereabouts of 60% to all questions, with negative responses in the range of 10-15%. The rest remained neutral. Hence, most students found this practice useful and interesting.

Conclusion: The participating students felt the programme was useful and refreshing, being a change from routine classes. The different approach to the subject helped them understand gaps in their knowledge as well as fill them. By going through the slides and information themselves, the students were able to understand how microanatomy of various body tissues goes hand in hand with their physiological functions.

INTRODUCTION

Histology is the study of microanatomy of tissues, organs and cells, as observed under a microscope. As it deals with the anatomy of microscopic structures, it is also often involved in the correlation between the anatomical structures and the function they perform.

A more practical subject, histology is studied by observing various slides under a microscope to differentiate the structures and tissues based on their anatomical structure, and how this is determined based on function.

A strong knowledge of histology, hence, helps separate the structure of a normal structure from an abnormal one, aiding in diagnosis. As the meeting point between anatomy and

physiology, it is also instrumental in understanding the functions of the numerous structures in the body.

Given its practical applications and those in diagnosis and research, the study of histology is of high importance for medical students. However, its vast field and sometimes confusing nature leads to it being considered more difficult to understand.

In this regard, the application of reasoning questions over fact-based questions has shown better approach to subjects. Student perception is that anatomy is endless memorisation, which leads them to approach the subject with the wrong attitude. Using understanding and explanation to make connections with the subject is more useful in the long run than just memorisation.i,

In other studies, no statistically significant difference was found between students employing reasoning and objective thinking into answering questions, and those using other methods. However, those using reasoning seemed to understand the topic better as well as enjoy it more.

As per the University of Chicago's teaching model, the subjects of histology and physiology were integrated to one course, in an attempt to improve the connection between the two subjects and clinical medicine. Surveys and tests were conducted to determine the outcome of this decision. It was found that students of the new curriculum were satisfied with it, and comparison of their attitudes with those of the old curriculum revealed several differences favouring the teaching of physiology in the new curriculum. The new curriculum students also outperformed the old curriculum students in four or five subdivisions of the knowledge tests conducted.

In most cases, teachers are reliant on presentations to aid their lectures. In such scenarios, students act as passive learners, with little opportunity to test their knowledge of the subject for any inaccuracies. Students attempted short answer type questions along with the same, but with the added requirement of justifying their answer. Resultant scores stated that the students performed much better in the questions where they were required to explain themselves than on the standard short answer questions.

The topics studied by medical students, and the method of study of the same was found to depend on its importance in examinations, and not its clinical significance. Student feedback showed a general positive attitude toward testing and assessments, but also laid emphasis on highlighting the relevance of examinations to clinical practice.

The introduction of student generated questions helps them feel more included in the subjects covered. It may also improve their knowledge and understanding of the subject. In two groups of midwifery students, it was found that those answering questions set by themselves and their peers showed a marked increase in performance over the group following traditional methods. However, the students also noted that although useful, question framing is unfamiliar, and hence, not very popular. Normalisation of this practice may see improvements in both student performance and interest in the subject.

From the above studies, the most common inference is that question framing by students is a fruitful exercise for everyone involved. Additionally, reasoning questions promote application of concepts over simple rote learning. Such a practice could prove useful in a subject like histology, where microanatomy is explained through functional physiology.

Allowing for framing of questions by peers may also lead to questions from a different perspective, seeing the vast difference in experience between students and educators. This all-around system of reasoning-oriented questioning might lead to an easier transition from classroom learning to clinical practice.

Aim

To determine the students' perception to different types of reasoning questions for histology practical training.

Objectives

- I. To assess the performance of the students to peer made reasoning questions for histology practical class
- II. To evaluate and analyse the students' perception towards these questions for histology

Need for study

Application of peer made reasoning questions in histology may be beneficial to both, the student framing the questions and the student answering them. It is a slightly unconventional mode of study as it is not common practice everywhere. The results of this study, if definitive, may be used to introduce this concept in other fields as well.

METHODS

This study is conducted on 80 first year medical students of Saveetha Medical College. The students were given two questions framed with the help of two first year medical students for histology slides over 6 histology hours. The slides chosen for this included those of cerebrum, sympathetic ganglion, dorsal root ganglion, cerebellum, spinal cord and placenta. These questions were framed from a reasoning perspective rather than from a rote learning point of view to assess the performance of students in answering peer made questions that encouraged objective thinking on the students' part over only studying from the prescribed books and textbooks.

Additionally, the students framing the questions were encouraged to do so according to their curiosities about the slide being discussed and not refer to preexisting questions from any reference books. The students answering the questions were given ample time to view the slide and discuss its features with their peers before decidedly answering. They were also asked to reason for themselves the microanatomy of the tissues and relate it to the functions. The answers to these questions were collected and corrected. The performance of the students was then evaluated and consolidated. Following this, they were made to answer a questionnaire to assess their perception towards the questions. The results of this were also evaluated and compiled, to form a meaningful report of how the student response was towards this reasoning oriented system of questioning and assessment.

In light of the circumstances involving the SARS-CoV-2 global pandemic, the questioning was done online making use of forms and video conferences. The slides were shown as pictures, with multiple, from different sources, being shown for each specimen to improve understanding of what was being shown and discussed.

RESULTS

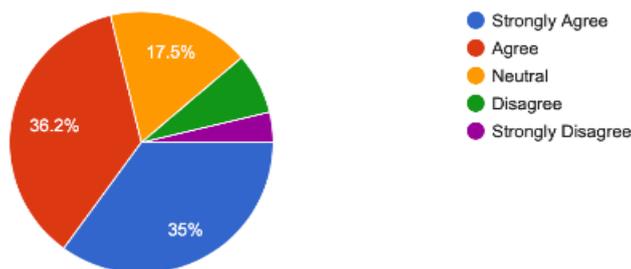
The initial round of questioning included 12 questions in total, given to each student (2 per specimen). The feedback questionnaire that followed this was of 7 questions, each testing the usefulness of this exercise from the students' perspective.

It was found that the students who attempted the peer framed reasoning questions spent more time with each slide than those not included in the study. Additionally, they took repeated looks at both the slide, and the reference textbooks in an attempt to learn more about the specimen being discussed. The feedback questionnaire was of 7 questions, to assess the students' perception to the different types of reasoning questions in histology. The results of this are as follows;

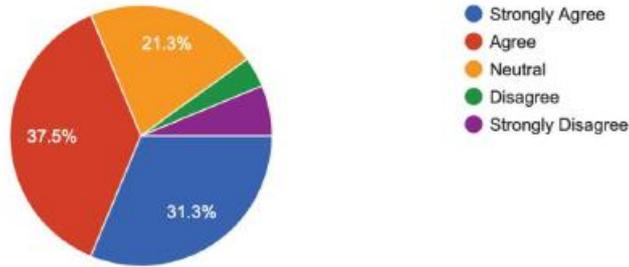
#	Question	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
1	The questions asked provoked interest in the subject	35	36.2	17.5	7.5	3.7
2	The questions asked improved understanding of the subject	31.3	37.5	21.3	3.7	6.3
3	Reasoning questions were more helpful than fact-based questions in understanding the subject	30	33.8	20	10	6.3
4	The questions stimulated thinking of logical responses, more so than factual questions	26.3	40	23.7	5	5
5	The questions helped in better understanding of the displayed slides	30	28.7	28.7	8.8	3.7
6	The questions helped improve performance in histology	26.3	38.8	22.5	8.8	3.7
7	Reasoning questions may be benefactory in future areas of study as well	28.7	37.5	25	5	3.7

From the table, it seems conclusive that in general, most students found the practice effective in the study of histology. For all questions asked, positive responses consistently attained a minimum of 60% of the total, with negative ones being in the approximate range of 10-15%. From this, we can infer that the students have an overall positive perception of the use of application-based questions in the field of histology.

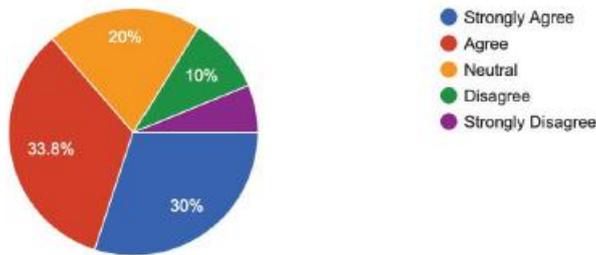
1. The questions asked provoked interest in the subject
(80 responses)



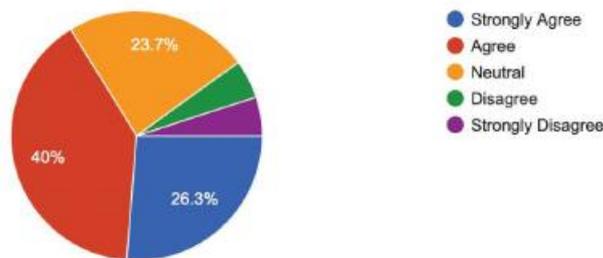
2. The questions asked improved understanding of the subject
(80 responses)



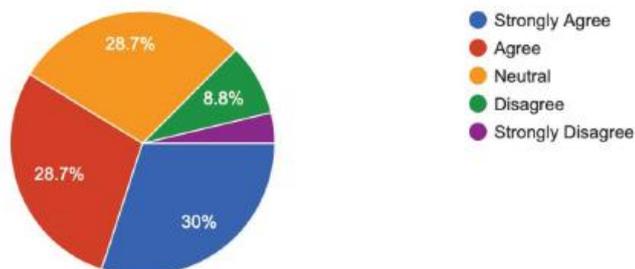
3. Reasoning questions were more helpful than fact based questions in understanding the subject
(80 responses)



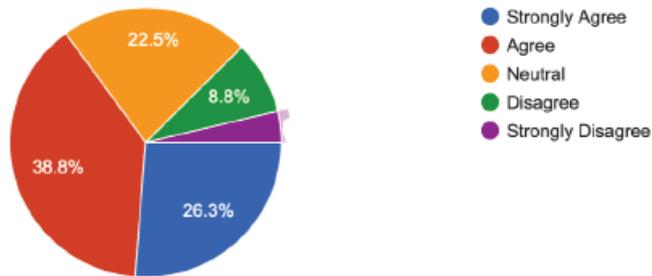
4. The questions stimulated thinking of logical responses, more so than factual questions
(80 responses)



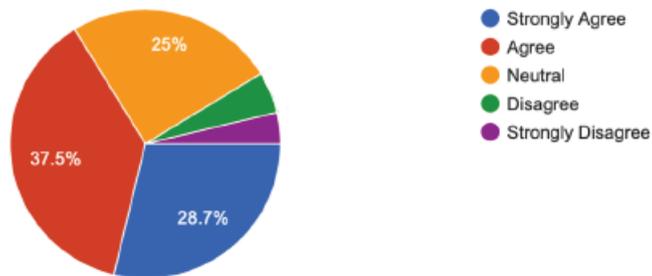
5. The questions helped in better understanding of the displayed slides
(80 responses)



6. The questions helped improve performance in histology
(80 responses)



7. Reasoning questions may be benefactory in future areas of study as well
(80 responses)



DISCUSSION

The study showed that all students who took part, as those framing questions as well as those answering them expressed a greater interest in the subject of histology after being allowed to exercise their capacity to think objectively and express their thoughts on the structures showed.

It was also observed that allowing students to speak their thoughts opened up new angles for discussion not covered before. This may lead to an easier transition from classroom studies to clinical practice in medical students.

Those framing the questions seemed to take a deeper look into the subject in order to find different points of questioning for the same slide being shown. Subsequently, the students answering were required to look just as deep to answer these questions. This improves the practical knowledge of the students, which is especially useful in a key subject like histology. The practice of framing questions for their peers induced a sense of healthy competition in the students. They showed additional interest in looking for questions that were harder to answer, while the others took deeper looks at the slides in order to answer these questions. This competition promotes the students to work harder. Answering a particularly hard question or framing one that others find difficult motivates the students to work harder toward that particular goal.

In accordance to the Medical Council of India's Code of Medical Ethics and Regulations, 2002, Chapter 1.2,

“Physicians should try continuously to improve medical knowledge and skills and should make available to their patients and colleagues the benefits of their professional attainments.” Applying this not only to physicians, but also to medical students may lead to an increase in the frequency of attempts to improve knowledge in the medical field later in the course of their career. Inculcating such practices in the early years of medical education can greatly impact the methods by which future physicians adapt to the rapid changes taking place in their respective fields. In an environment as dynamic as medicine, change is important, not only to benefit the patient, but also to improve a medical professional’s efficiency. The ability to change with the field is an asset that will ensure continuous betterment of the practice and introducing the concept at the early stages of education will set a strong base to continue upon.

One such method to bring about a change in the current systemic practices of medical education is the introduction of peer framed reasoning questions. The primary difference between such student framed questions and traditional instructor framed ones is that in case of the former, students read through the topic at hand, and decide for themselves what is important, rather than have the instructor do it for them. This clear distinction between what the student new to the field considers important, and what instructors who are experienced in the subject consider important provides an insight into the students’ train of thought.

Learning is only real when it promotes scientific thought and reasoning of its own. Rote learning ensures pre-established facts are stated once again, without promoting any real analysis from the students’ side. However, reasoning questions promote students to think for themselves to understand the working of the concept. , This may lead to significantly better knowledge retention as compared to just reading from books or papers.

Reflective, or reasoning thinking uses experience to change ideas, rather than add information to already established ideas. However, reflective practice is a singular practice, revolving around an individual’s thinking and experience. The greater one’s experience in the field, the deeper the reflection on it. As a singular practice, reason-based thinking suffers from inaccurate deductions. The more inexperienced the reasoner, the higher the chances of their reasoning being incorrect, which in some cases, may lead to the formation of inaccurate ideas. To combat this (in case of students), each point of reasoning can be discussed with peers and instructors to ensure no false notions are established. Discussion may also give the students a look into what their classmates think about the same topic.

About histology and anatomy in particular, reasoning over rote memorisation may be the key to better appreciation of the subject. Viewing different variations of the same specimen gives students a better understanding of the concept of “normal”. “Normal” could be any one of the most commonly occurring variations of the same structure.i Appreciation for this comes only with observation of the common variations, and not looking at a few pictures in textbooks. Reasoning is what may lead to a student previously indifferent to anatomy to enjoy it. Self-assessment is another concept that been reported to be of great benefit. As an integral tool in self-betterment, it gives the learner an insight into their knowledge and skill levels. By promoting deeper learning, it has been shown to better student performance and critical thinking.

Not all studies, however, have reported a positive impact of question framing practice on students’ learning. , This may be due to the differences in target population, study duration and question type among other factors.vii

From the students' perspective, on the other hand, reflective writing helps determine what they do not understand. , Among students as well, it was reported that lower performing ones found this exercise more fruitful than high performers. This can be attributed to the lower performing students taking more interest in the programme.

Limitations

1. As a result of the SARS-CoV-2 pandemic, histology slides could not be seen in person. Instead, they were shown over video.
2. The questions were asked online and not in person due to the above.

CONCLUSION

Overall, the students found the practice of framing questions and answering them useful to study. It helped them better understand the connect between the anatomical functions of a particular structure and its physiological functions. This leads to a better clinical understanding of the subject rather than just rote memorisation and may be applied in other fields or subjects as well.

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