

Health sciences students' viewpoint on innovative approaches in histology courses

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Abstract

Background/Aim: It is crucial to improve histology education quality and train competent individuals in the fields of health and medical sciences. Feedback received from students can provide guidance to achieve these goals. This study aims to reveal the opinions of Faculty of Health Sciences students about histology education and to identify their need for innovative approaches to improve this course.

Methods: This study was conducted with 174 students who were enrolled in their first year of the general histology course at the Faculty of Health Sciences, Siirt University, during the 2021–2022 academic year. The students answered survey questions electronically at the end of the semester, and the students' opinions about the general histology course were obtained. A content analysis technique was used to evaluate the collected data.

Results: Half of the students thought that the histology course was difficult. More than half of the students (57.5%) stated that the length of the theoretical course was sufficient and that practical courses should be supported by various applications. Most of the students (63.8%) stated that the histology course was important for their profession and that it would be more efficient to teach this course by integrating it with clinical sciences. Most of the students (81%) reported that the histology course integrated with technological tools would contribute to their education. Nearly half of the students (49.4%) had a negative response to teaching this course via the distance education method.

Conclusion: Histology education is considered by students to be a difficult course to learn. For students to overcome these difficulties, it can be helpful to provide both theoretical and practical courses at close intervals in a holistic manner. Additionally, integrating this course with clinical sciences can also increase student performance. It is believed that for student success, it is important to integrate educational models with traditional methods supported by technological educational materials and distance education systems.

Keywords: Histology, Health and medical education, Technology-mediated learning

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Ethics Committee Approval

The study was carried out with the approval of
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All procedures in this study involving human
participants were performed in accordance with
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amendments.

Conflict of Interest

No conflict of interest was declared by the
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Introduction

Instructors need to use effective techniques to obtain health-related information [1]. To minimize the problems in health and medical education, correct educational practices that include adequate human resources and technology need to be adopted [2]. One of the important factors that directly affect health and medical education practices today is the Covid-19 pandemic. The role of distance education and practices, which includes various teaching technologies, has increased due to the impact of the pandemic [3].

Basic medical education is one of the practices that play an important role in health and medical education. The science of histology also plays a key role in this education [4]. Histology can be defined as the scientific study of the microscopic structure of cells and tissues [5]. This branch of science is considered by students to contain difficult-to-understand and abstract subjects, and students often have difficulty associating this theory with the practice thereof. Additionally, health sciences students often do not know the importance of learning the normal structures of the body for future clinical activities [6].

In histology education, which first started in the 13th century, innovative approaches emerged with the development of new techniques and methods [4]. In today's world, where classical optical microscopes are widely used in histology education, digital images containing histology preparation images are also now used [7]. Furthermore, the 'Digital microscope slide to improve microscope usage skills' [8], 'Educational set comprising smart preparations' [9], and the 'Education set consisting of smart interactive models and a software program' [10] are also among the innovations recently introduced in histology education.

It is crucial to improve histology education quality and train competent individuals in the fields of health and medical sciences. The education system can be further improved by obtaining feedback from students in these fields. Additionally, the number of studies addressing histology education with innovative approaches is increasing in the current literature. This study aims to reveal the opinions of the Faculty of Health Sciences students about histology education and to identify the needs for innovative approaches to improve this course.

Materials and methods

Study design and procedure

This study is qualitative research conducted to determine the views of students taking histology courses in health sciences. Because quite different analysis methods and techniques are used in qualitative research, it is not possible to talk about a common language in qualitative data analysis. Because the aim was to determine the existing opinions, the survey method, one of the qualitative research techniques, was used. The study, conducted as an online survey, began in September 2022 and lasted four weeks. In line with the collected data, the evaluation of the interviews was made by content analysis.

Sampling strategy and participants

This study was conducted with 174 students who were enrolled in their first year of the general histology course (two

hours of theoretical lessons per week) at the Faculty of Health Sciences, Siirt University, during the 2021–2022 academic year. Demographic data like gender was assessed. The random sampling method was used among the students of the Faculty of Health Sciences to form the sample of the study.

Data collection tools and methods

The data in the study were obtained by using a survey prepared by the researcher using Google Forms. The first introductory paragraph of the survey provided information to the participants about the aims of the study, its confidentiality, and that they may not participate in the study if requested. The study consisted of seven closed-ended questions under five categories based on students' views on histology education. The questions in the second and third categories were formed by combining two separate questions. Each question included examples of Likert-type questions with three or five possible answer options, considering the literature [11, 12]. The students answered the survey questions electronically at the end of the semester, and the students' opinions about the general histology course were obtained. Within the scope of this course, the structure and functions of epithelial, connective, muscle, and nerve tissues were taught to the students. The students were not asked to provide identifying information such as first name, last name, or student number to ensure the reliability of the responses.

The opinions of the students about the 'difficulty of the histology course, its importance and utility in professional life, its integration with clinical sciences and technological tools and equipment, and the feasibility of distance education for the course were obtained using the survey form. Additionally, the opinions of the students about the adequacy of the length of the theoretical histology course and the necessity of practical courses were also captured. The questions in the survey form were multiple-choice. The time required to complete the online survey was approximately five to seven minutes.

Data analysis

Descriptive statistics, including percentages, were calculated to summarize student response patterns for survey items. In addition, the content analysis technique was used to evaluate the data collected in this study. Content analysis is a systematic and repeatable technique in which the words that make up a text are coded within the framework of certain rules and converted into smaller categories, and the text is summarized. Content analysis is used to provide convenience to both researchers and readers in summarizing and making different research data meaningful for a specific purpose [13]. The data were analyzed under five categories within the scope of the study's research questions. The main factor in evaluating the research data using content analysis is the transformation of the collected data into concepts and associations that can be explained. In content analysis, similar data are brought together within the framework of certain concepts and themes. In this way, the data can be interpreted at a level that the reader can understand [14].

Ethical aspect

The study was conducted with the approval of the Ethics Committee of Siirt University dated 23 August 2022 and numbered 3198. A Research Permit Form was obtained from the institution where the study was conducted. Additionally, the

Survey Informed Consent Form was completed by the participants.

Results

Of the 174 students who participated in the study, 70 were male (40.2%), and 104 were female (59.8%). The content analysis results of the data collected from the students through the survey form are given below.

1. What are the opinions of the students about the ‘difficulty of the histology course’?

Within the scope of the study, the students were asked to rate the difficulty of the histology course from 1 to 5 (1: very easy, 2: easy, 3: normal, 4: difficult, and 5: very difficult). Among the participants, one student (0.6%) answered this question as very easy, eight students (4.6%) answered the question as easy, 78 students (44.8%) answered the question as normal, 65 students (37.4%) answered the question as difficult, and 22 students (12.6%) answered the question as very difficult (Figure 1).

Figure 1: The degree of difficulty of the histology course



2. What are the opinions of the students about the ‘adequacy of the theoretical histology course hours and the necessity of practical courses (microscope applications)’?

Within the scope of the study, the students were asked whether the length of the theoretical histology course was adequate. The length of the course was found to be sufficient by 100 students (57.5%) and insufficient by 42 students (24.1%). Thirty-two students (18.4%) reported that they were undecided (Figure 2).

Within the scope of the study, the students were asked about their opinions on the necessity of practical histology courses. Practical histology education was considered necessary by 127 students (73%), while it was stated that it was not necessary by 34 students (19.5%). Thirteen students (7.5%) reported that they were undecided (Figure 3).

Figure 2: The level of adequacy of the length of the theoretical histology course

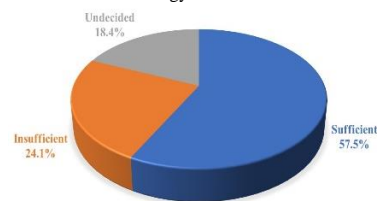
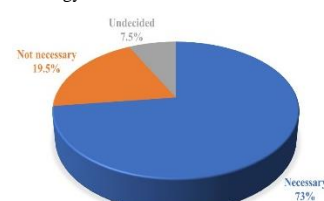


Figure 3: The necessity of practical histology education



3. What are the opinions of the students about ‘the importance of the histology course in professional life and its integration with clinical sciences education’?

Within the scope of the study, the students were asked about their opinions on the importance of the histology course in their profession. Among the participants, 111 students (63.8%) answered this question as important, while 26 students (14.9%)

stated that it was not important. Thirty-seven students (21.3%) reported that they were undecided (Figure 4).

Figure 4: The importance of the histology course in professional life

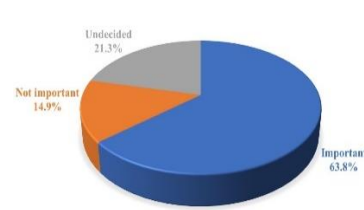
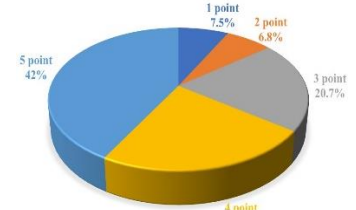


Figure 5: The necessity and utility of the histology course for clinical applications

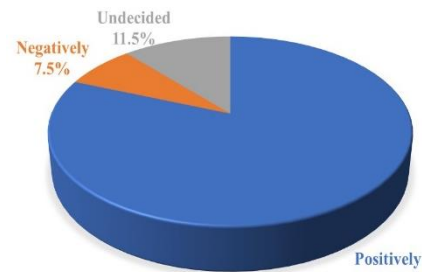


Within the scope of the study, the students were asked about the necessity and utility of the histology course for clinical applications. The students were asked to rate a statement from 1 to 5 (1 = somewhat necessary; 5 = very necessary). Among the participants, 13 students (7.5%) rated the statement as 1, 12 students (6.8%) rated the statement as 2, 36 students (20.7%) rated the statement as 3, 40 students (23%) rated the statement as 4, and 73 students (42%) rated the statement as 5 (Figure 5).

4. What are the opinions of the students about ‘the contribution of histology courses integrated with technological tools to this branch of science’?

Within the scope of the study, the students were asked about their opinions on using innovative approaches such as technology-adapted auxiliary course tools (education sets, mobile applications, and smart and digital devices) in histology education. Among the participants, 141 students (81%) answered this question positively, while 13 students (7.5%) answered negatively. Twenty students (11.5%) reported that they were undecided (Figure 6).

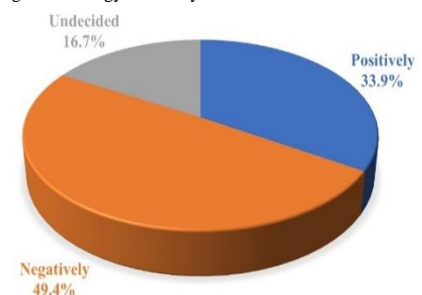
Figure 6: The contribution of technology-adapted auxiliary course tools to histology education



5. What are the opinions of the students about ‘the histology course delivered by distance education’?

Within the scope of the study, the students were asked about their opinions on delivering the histology course using ‘distance education.’ Among the participants, 59 students (33.9%) answered this question positively, while 86 students (49.4%) answered negatively. Twenty-nine students (16.7%) reported that they were undecided (Figure 7).

Figure 7: Delivering the histology course by the distance education method



Discussion

The purpose of histology education is to train individuals who know the vital processes taking place from the molecular and cellular level to the whole organism and can use this health information effectively. Today, advances in technology have enabled this branch of science to gain momentum in its development [12]. In this study, the opinions of the students about histology education and their ideas about the necessity of integrating clinical sciences with technological tools were discussed. In this regard, the feedback received from the students contained information about the current education system and provided guidance on how this education should be implemented in the future.

Histology education, which is an important part of health and medical education, is considered by students to be a difficult course to learn. The reason for the difficulty of this course is that theoretical and practical courses are not delivered with a holistic approach [10]. In this study, half of the students (37.4% difficult; 12.6% very difficult) thought that the histology course was difficult, which is consistent with the literature. Additionally, more than half of the students stated that the length of the theoretical course was sufficient (57.5%) and that practical courses should be supported by various technology applications (73%). Therefore, delivering theoretical and practical courses in an integrated manner may help students overcome the difficulties experienced in histology education. In another study, it was found that the success rate was higher in a group in which theoretical knowledge and practical applications were delivered in an integrated manner in the respective histology course [15], which supports this idea.

In terms of clinical applications in professional life, it is crucial to have good basic medical science education [16]. In studies conducted on anatomy education, which is one of the important components of basic medical sciences, it was reported that this course would contribute to professional life, and that it was necessary for clinical applications [14]. Similarly, most of the students in this study (63.8%) described the histology course to be important for their profession. Additionally, the students also stated that it would be more efficient (42%, 5 points; 23%, 4 points) to facilitate the course by integrating it with clinical sciences. Today, educational systems that integrate basic and clinical sciences are becoming increasingly widespread [17]. For example, in a study in which histology was integrated with clinical applications, students stated that the histology course contributed to their learning, their approach to patients, and their general medical practices [18]. Therefore, given the students' approaches to these issues, it can be concluded that it would be better to integrate basic medical sciences courses such as anatomy, histology, and embryology with clinical sciences, and that it should not be limited to the first years of education.

It has become inevitable for the technological developments of our century to be implemented in education. These developments facilitate new applications in the field of education. The use of technology also increases the delivery of basic medical sciences courses such as histology, physiology, and anatomy [19, 20]. Studies show that applications integrating technology increase academic achievement, histological identification skills, interactive learning, and student satisfaction

in histology education [21, 22]. In this study, most of the students (81%) stated that the histology course integrated with technological tools would positively affect the quality of education they received. Innovative technological educational models may provide more alternatives in histology education. Thus, technological educational materials supported by traditional methods can enable students to learn more quickly and efficiently.

Today, there are innovative educational materials that are believed to have potential benefits for histology education. The use of virtual microscopic images created by transferring real microscopic images to digital media is one of the most common examples of this in histology education [23, 24]. Such methods enable students to continue their education in a comprehensive and effective way outside the laboratory, while also being an effective solution to today's problems [24, 25]. Additionally, the fact that digital content can also be shared with other anatomical, radiological, and clinical sciences courses allows for multidisciplinary learning in medicine and health education [26]. Similarly, models that deliver histology education through gamification have also been introduced recently [27], and it is believed that such methods will provide benefits in the preparation of a holistic curriculum between health disciplines [28].

An example of innovative products that can be used in histology education is technology such as 'Digital microscope slide to improve microscope usage skills.' This device is related to a digital slide system, which eliminates the need for the physical use of a slide and the need for sample tissue to be examined together with the slide to provide convenience for those who need to receive microscope usage training. Thanks to the device being integrated into the table part of the microscope, students will be able to examine the images of these preparations, which have been digitized and uploaded to the device, under the microscope, instead of the classical preparations. Thus, there will be no need to prepare thousands of ready-made preparations and use them in laboratories. Only the presence of this device with a microscope will suffice [8].

The 'Educational set comprising smart preparations,' in which the QR code technology is integrated into conventional preparations that have been examined in detail in this study, can also be useful in histology education. This education set basically consists of 'preparations with QR codes' and a 'display device' that allows for scanning the QR code on a preparation. When the QR code on the preparation is scanned, all written and audiovisual information about the stained tissue on the preparation (e.g., the lung, heart, or kidney) can be accessed easily via the display device. Thus, students can learn independently without any instructor or histology atlas book [9].

Health and medical education is one of the fields still affected by the ongoing Covid-19 pandemic [29], which necessitates the need for alternative methods of education rather than face-to-face and practical applications for this education [30, 31]. The most significant alternative methods of education include 'distance or online education' practices [31]. In this study, students were asked about their opinions on the delivery of the histology course using distance education, and 49.4% of the students answered this question negatively. This finding is

important in that it shows that distance or online education methods alone are not considered sufficient in health and medical education. As a matter of fact, in a study in which a neuroanatomy course was given by distance education method, it was stated that students had difficulty understanding the course with this method, and preferred face-to-face education [32]. Additionally, the fact that approximately one-third of the students had a positive opinion of such methods suggests that these methods can be used to support face-to-face education and practical applications. In a study conducted with pharmacy students, the histology course that was delivered remotely was found to be successful despite the lack of face-to-face interaction with instructors, which supports this idea [33].

Technology-supported materials have significant contributions to the implementation of distance or online education [34]. It is stated that technology-enhanced learning is more widely used than other methods in distance education practices in health and medical education, especially today, when the Covid-19 pandemic continues to impact our lives. These new technologies used in education have advantages such as being more cost-effective, more easily accessible, and more flexible compared to traditional methods [31]. In another study, an 'Education set consisting of smart interactive models and a software program' was applied to measure the success of the histology and anatomy course, which was found to be more successful than the traditional method. In this education set, each tissue or organ is designed as a separate smart model. Additionally, in this education set, students had the opportunity to observe histological and anatomical formations on the same model. The touch and voice keys on the formations allowed the students to learn the formations independently. Moreover, when students scanned the QR code on the smart model using their smart devices, they were able to access all the information about the relevant tissue or organ online. The accessed information enabled the students to receive distance education outside of the laboratory [10]. In light of this information, it is believed that remote and technology-enhanced methods will provide more effective results when integrated with traditional methods.

Limitations

The study was conducted with students of the Faculty of Health Sciences, Siirt University. The study can be expanded by adding students from different universities and faculties (such as medical and veterinary) to the research. Additionally, the survey questions prepared for the students can be further diversified to analyze the expectations of the students more comprehensively. Moreover, by conducting prototype studies for innovative technological tools mentioned in the study, their direct impact on student success can be revealed.

Conclusion

It is believed that it would be more effective to combine theoretical knowledge and practical applications in histology education, which is considered by students to be a difficult course. Additionally, it can be concluded that these courses are important for the future profession of these students, and it would be more beneficial to deliver them integrated with clinical sciences. Today, as technology is developing in all areas of life, there is a need for educational materials integrated with technological tools. Therefore, it is believed that adequately

designed technological educational materials can change students' perspectives on this subject in histology education in cases where distance education alone is not considered sufficient.

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