

c20-STUDENTS'S PERCEPTION TOWARDS INTEGRATED LEARNING METHOD USING VIRTUAL MICROSCOPE

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STUDENTS'S PERCEPTION TOWARDS INTEGRATED LEARNING METHOD USING VIRTUAL MICROSCOPE IN HISTOLOGY COURSE

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Abstract

Objectives: This study was aimed at determining the perception of students of Sport Science on integrated learning method with virtual microscope in Histology course.

Methods: This research is a descriptive research with 33 students who took the subject of Histology. The instrument used was a questionnaire about students's perceptions of integrated learning methods with virtual microscopes. It covers some aspects namely methods, materials, and virtual microscopy. The data were analyzed descriptively.

Results: The finding shows that in general, the perception of students of Sport Science on the learning method applied very well (85%), about 15% have good perception, and no students have poor perception. When viewed from integrated learning method aspect, 3% of students have poor perception, 12% have good perception, and 85% have very good perception. While from the aspect of using virtual microscope 9.1% have poor perception, 42.4% have good perception, and 48,5% have very good perception. Perceptions of material aspects Histology, 72.7% have very good perception and 27.3% have good perception. In terms of the level of understanding of the material, as many as 57.6% of students stated that histology material is easy to understand and 42.4% have difficulty in understanding Histology material. Student perception towards integrated learning method using virtual microscope in histology course is very good.

Conclusions: In Conclusion, the method of integrated learning is considered effective in studying histology and the use of simple virtual slides is very helpful understanding of histology tissue structure.

Keywords: histology learning, perception, virtual microscope.

Introduction

Histology is a discipline that studies the structure of cells, tissues, and organs microscopically. In studying Histology, microscope is required as a tool to study the structure of the tissue. However, microscope quality is often a problem in understanding tissue structure. Unlike studying anatomy, in studying Histology, students often lose a macroscopic perspective while studying much smaller structures with a microscope (Ambardini, 2009). On the other hand, the development of information technology provides a limited solution of microscopes quality, namely by making a virtual microscope that provides powerful magnification so as to facilitate learning process (Anyanmu et al. 2012). There are a few problems with light microscope, such as: issues with procurement and costly maintenance of microscopes and stained tissues mounted on glass slides, not all sectioned tissues demonstrate all of the structures that should be identified during laboratory study, and finally due to the pressure to reduce curriculum density and time spent in laboratories (Weaker, & Herbert, 2009).

In Faculty of Sport Science, Histology learning method was divided into theory and practice separately. This method has weaknesses, for example the students do not fully master the Histology because the theory learned a few days before their labs class. It happened because of a gap between a theory and a practical class was quite long or a practical class was done before they learn the theory. On the other hand, labs are needed to verify and strengthen theoretical knowledge.

As part of basic science, Histology is expected to bridge the student's knowledge between basic and applied sciences in the next semesters, such as therapeutic, manipulative, and pathophysiological therapy courses. The ability to understand the structure of cells and tissues is able to support the students' understanding while studying pathological situations such as injury. With

their knowledge, students are able to interpret the symptoms and make the diagnosis. Integrating Histology learning between practicum-theory-practicum using a virtual microscope in Sports Science students needs to be done with the aim at improving the efficiency of learning. Histology Learning is based on the mastery of theory and practicum. By applying simultaneous integration of theory and practicum, students are guided to verify theories using practicum and carry out practicum using their theoretical knowledge (Lu et al., 2016; Heidger et al., 2002).

Histology Learning is based on theoretical mastery and is supported by practicum to identify the tissue. In histology learning, students are expected to be able to recognize the microscopic characteristics of four basic human tissues, namely epithelial, connective, muscle, and nervous tissues and also organ systems. Consequently, it is very important to pay attention to the tissue described. It requires concentration, an essential skill in the learning process. An introduction to specific features and tissue classification criteria is also taught, which is an observational skill. In addition, learning also links between structure and function (Ambardini, 2009). This can bridge the students' understanding with other subjects, such as Anatomy, Biochemistry, and Physiology, a synthetic and deductive skill.

Nowadays, the development of technology and information provides an alternative solution supporting the development of practice competence, which is digital picture of microscopic structure, known as virtual microscope. There are several advantages to a virtual microscope when compared to a light microscope. With the development of internet network, an easy access virtual microscope is provided, which is not limited by place and time. Access can be done anytime, anywhere as long as there is internet network. This is supported by the development of mobile devices, such as smart phones or tablets. Therefore, practicum learning should not only be done in the laboratory, but also in class setting (Hortsch, 2013).

One of the main advantages is the saving cost: the optical microscopes and glass slides are expensive and require maintenance and reparations (Dee, 2009). The virtual microscope only needs a computer or tablet with a web browser (Rehatschek & Hye, 2011). Also, the single-use microscope laboratory can be converted into a multiuse computer laboratory (Dee, 2009). Other advantages cited are that the virtual microscope is easy to learn, and students and professors adapt very quickly to the use of the virtual microscope (Kumar et al., 2004). Respect to the higher resolution, the slides provides excellent image quality (Kumar et al., 2004) in part thanks to the improvement of the streaming (Afework et al., 1998) Virtual slides are always focused and with an adequate level of light adjustment (Harris et al., 2001). Also the exploration of the sample is much better in the virtual microscope: virtual slides enhance the ability of the students to grasp and explore morphological features better than optical microscope (Dee et al., 2003). They are able to magnify, scroll and take pictures of images of their samples for use them for their notes or presentations (Goldberg & Dintzis, 2007).

Another advantage of virtual microscope compared to a light microscope is that a number of users can study the same specimen at the same time. In addition to being more efficient, these advantages can be utilized in the context of learning in the form of collaborative learning, since it allows discussion of specimens studied at the same time (Mione Valcke & Cornelissen, 2013). The virtual microscopy system is an effective solution as to the limitations of traditional microscopes. It enables the implementation of collaborative learning. Students are able to use virtual microscopes on a regular basis and develop their knowledge and problem solving skills (Tian et. al., 2014). This study was aimed at determining students' perceptions of the application of integrated learning method using virtual microscope in Histology course on students of Sport Science

METHODS

Questionnaire-based survey research was applied in this study. The population was 33 students who taking histology class in Sport Science Study Program, State University of Yogyakarta. The questionnaire contained students' perceptions of applied histology learning, which consists of three parts, namely (1) the perception of integrated learning learning method, which relates between theory and practicum simultaneously, (2) histology material learned, and (3) the use of

simple virtual microscope in the form of digital slide. The task was in the form of Yes/ No question. The data were analyzed descriptively.

RESULTS AND DISCUSSION

Student responses towards histology teaching methods that have been applied are shown in Table 1.

Table 1. Students' perceptions of Histology learning

Students' Perceptions	Frequency	Percentage (%)
Poor	0	0
Good	5	15
Very good	28	85

In general, the perception of students of Sport Science on the learning method applied were very well (85%), while about 15% have good perception, and no students have poor perception.

Student perceptions of the integrated learning method in histology are shown in Table 2.

Table 2. Student perception towards integrated learning method

Students' Perceptions	Frequency	Percentage (%)
Poor	1	3
Good	4	12
Very good	28	85

Most students (97%) stated that the integrated learning method, which combines theory and practicum simultaneously was fun. Only 3% said it was not fun. The integrated learning method made it easier to study histology material. This method was also considered to increase the motivation to learn histology in 82% of students. This method was considered effective for studying histology in the majority of students (91%).

Student perceptions of histology material are shown in Table 3.

Table 3. Student perception towards Histology material

Students' Perceptions	Frequency	Percentage (%)
Poor	0	0
Good	9	27.3
Very good	24	72.7

About 72.7% of students had very good perception about histology material, 27.3% had good perception, and nobody had poor perception. Associated with histology material difficulty level, 42% expressed difficulties and 58% said no difficulty. The most easily understood type of tissue material was the epithelial tissue and the most difficult was the neural tissue. Most students stated that the histology material studied is important and 85% of students stated that histology material is beneficial to them. As many as 72% of students knew the relevance of histology with other courses, while 27% of students did not know the linkage. Quiz granting at the end of the material was important for 94% of the subject, only 6% stated that the quiz was not important.

Student perceptions towards the use of virtual microscopy are shown in Figure 1.

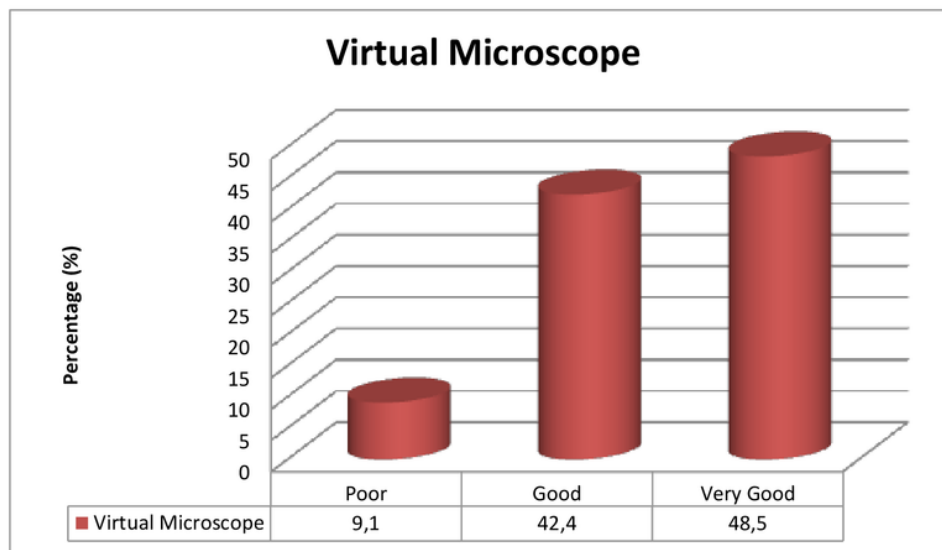


Figure 1. Perceptions of students towards the use of virtual microscope

From the aspect of virtual microscope usage, 9.1% had poor perception, 42.4% had good perception, and 48.5% had very good perception. Slide quality used among others related to magnification and resolution. About 61% of students felt that the slide enlargement was good and 39% said it was not good. Associated with resolution, 48% of students stated that the resolution was not good and 52% stated that the resolution of the slides used was good. The various magnifications used in the virtual microscope were felt by 82% of students. It was helpful in understanding the structure of the studied tissue. In addition, 82% of college students stated that the use of virtual microscopes made it easier to study small tissue structures. As many as 76% of students felt that the use of Virtual Microscopes allowed them to study the structure of the tissue independently. While 24% felt that virtual microscopes did not make them independent in studying tissue structure.

Histology is a branch of Anatomy. Histology is often called microanatomy because the structure of cells, tissues, and organs is studied by observing using a microscope. In the study of conventional histology, the study of cell and tissue structures is a slide glass seen under a microscope in the laboratory. Histologic preparations are preparations with very thin and flat slices, made from tissues or organs, on top of glass through a series of manufacturing and staining processes. In the tissue or organ, cell, fiber, channel has various orientations and is a three-dimensional structure that has a depth or thickness. However, in histologic preparations, thin slices do not have depth. The difficulty faced by sports science students is to understand the two-dimensional picture of the three-dimensional structure. In addition, the quality of the microscope is very important in studying histology. The availability of good quality microscopes is an obstacle to studying existing preparations.

On the other hand, today's virtual microscopy technology is growing rapidly. Virtual microscopy is used as a new tool for displaying histology slides in the learning process in various places. Virtual microscopes have advantages over conventional methods. Ease of access, ease of use, and can be used in a long time without losing the quality of staining (Anand & Pushpa, 2016). Virtual microscopes are accessible in web browsers, simulating conventional microscopes. This technology can overcome the limitations of students in interpreting histology preparations. At high magnification, it will make easier for students to study the cell structure and network. For large

classroom learning, the use of virtual slides can also overcome the variability of histology preparations as well as facilitate the maintenance and prevent the breaking of glass slides (Kumar, 2004).

The virtual microscope used in this study is a simple virtual microscope that is displayed through the LCD in the classroom. Student perception towards virtual microscope use were 90.9% in range good until very good and only 9.1% have poor perception. This finding is in line with Anand & Puspha (2016), which found that 62% of students had perceptions in the range of good to excellent relating to the use of virtual slides. Students with poor perceptions may have difficulty in understanding the microscopic structures and possibly with resolution issues and virtual slide enlargements used. Resolution and zoom issues can be solved by using better resolution and magnification. Anyanwu, et al. (2012) study shows a high choice of histology learning with virtual slide (67%), although most students also want a combination of conventional methods and virtual microscopy. While research conducted by Becerra et al. (2015) resulted that the combination of optical microscope and digital system provides better performance when compared with the use of digital systems only. The use of microscope improves students' perceptions when compared to using only digital systems (Becerra, 2015). The replacement of the optical microscope by the virtual microscope in the courses of histology not only implies an improvement in costs, also results in a better understanding of the samples by the students, helps them to have a more functional, detailed and defined vision of the tissues (Alegre-Martinez et al., 2016).

The integrated learning method in this research integrates between theory and practice. Theory and practice were given simultaneously. The advantage of this method is shorten the distance between theory and practice so that the mastery of the material improved. Most of the students stated that the method of integrated learning in Histology was fun and easy for studying Histology material. The method of integrated learning is also able to increase student motivation in studying Histology. In addition, this method is considered appropriate and effective for studying Histology.

CONCLUSIONS AND SUGGESTION

Students' perception of integrated learning method with virtual microscope in histology course is very good. The method of integrated learning is considered effective in studying histology and the use of simple virtual slides is very helpful in understanding of the histology tissue structure.

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PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6
