

# Current Situation of the Teaching of Ophthalmology in General Practice Medical Education and the Application of TBL

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**Abstract:** Ophthalmology is an integral part of general practice education, and it is of great significance to have some knowledge on ophthalmology even if the general practitioner is not an ophthalmologist. The subject characteristics, the traditional mode of teaching, and the cognitive deviation of students have greatly influenced its teaching quality. The application of team-based learning (TBL) in ophthalmology education responds to the demand of modern medical education. Building a team, designing questions that combine theory and clinical practice, as well as employing a fair scoring system can stimulate students' learning interest and improve their learning autonomy and ability to ask questions and solve problems.

**Keywords:** Ophthalmology; General practice medical education; Team-based learning; Mode of teaching

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## 1. Introduction

General practice medicine is an emerging discipline that has developed rapidly in recent years. It is people-centered, focusing on serving families and communities, and it integrates multiple disciplines<sup>[1]</sup>. The goal of general practice medical education is to cultivate compound medical talents who are competent for community medical treatment<sup>[2]</sup>. Ophthalmology is an independent discipline that systematically grasps the structure and function of visual organs. It is an indispensable part of general medicine<sup>[3]</sup>. This study analyzes the current situation of ophthalmology in general practice medical education and discusses the application value of TBL in the teaching of ophthalmology.

## 2. Importance of learning ophthalmology for general practitioners

Ophthalmology is a medical science that studies the occurrence, development, prognosis, prevention, diagnosis, and treatment of visual organ diseases. It is an important part of clinical medicine. Although general practitioners are not ophthalmologists, learning ophthalmology is still of great significance.

### 2.1. The visual organ is an important part of the human body

Some eye diseases will lead to the decline of visual function or even blindness, and eventually affect the functions of other systems in the body as well as the quality of life of patients<sup>[4]</sup>. Understanding the anatomy and physiology of visual organs as well as the prevention and treatment of common diseases is helpful to

prevent and treat these eye diseases. Therefore, all medical students should have a basic understanding of this discipline.

## **2.2. The visual organ is the target organ of various systemic acute and chronic diseases**

The visual organ is closely related to various systemic diseases, in which they affect one another <sup>[5]</sup>. The eyes have always been known as the “window to the soul.” In fact, they are also the window of our physical and mental health. Many diseases can be diagnosed and assessed by looking at the state of the eyes. For example, the retinal blood vessels are the only small vessels that can be directly observed from the body surface. They are located inside the body and are free from external interference. A fundus examination can directly reflect systemic diseases, such as hypertension, diabetes, certain blood diseases, immune diseases, and other diseases <sup>[6]</sup>. Hyperthyroidism can lead to exophthalmos and ocular motor dysfunction, while vitamin A deficiency can result in keratomalacia. The initial signs of various illnesses might express themselves in the eyes; hence, neglecting ocular manifestations may lead to misdiagnosis and mistreatment.

## **2.3. Many eye diseases have systemic manifestations**

These systemic manifestations include severe headache, nausea, vomiting, and other symptoms, especially during the acute attack of primary angle-closure glaucoma. Due to serious systemic manifestations, patients may disregard their eye discomfort. If the attending doctor is unable to make a correct diagnosis and end up prescribing drugs such as diazepam and atropine to relieve pain, spasm, and vomiting, patients will not only experience more agony, but their condition will also worsen, resulting in visual impairment <sup>[7]</sup>.

## **2.4. The diagnosis, treatment, and nursing of diseases by other clinical disciplines may have adverse effects on the eyes**

The use of atropine during general anesthesia, for example, may trigger an acute attack in people who have a propensity for angle-closure glaucoma. On the other hand, exposure keratitis may occur in the nursing of comatose patients and those under general anesthesia if the attending healthcare providers do not emphasize on angular membrane protection. Therefore, mastering basic ophthalmic knowledge is helpful for general practitioners to carry out medical practice efficiently <sup>[8]</sup>.

## **3. Current situation of the teaching of ophthalmology in general practice medical education**

General practitioners should have basic ophthalmology knowledge, proficiency in conducting eye examinations, ability to diagnose and treat common eye diseases, provide preliminary treatment of acute and severe eye diseases, as well as in cases of traumatic injuries to the eyes, the understanding of the manifestations of other systemic diseases in the eyes, the knowledge of referral to ophthalmologists for certain eye diseases, and the understanding about the use of common ophthalmic drugs <sup>[9]</sup>. Due to the fine structural characteristics of visual organs and the complexity of their functions, the examination, diagnosis, and treatment of eye diseases have their particularity. Therefore, ophthalmology is a clinical discipline that attaches great importance to both theory and practice. The anatomy of the eye is delicate and complicated, the clinical manifestations and physical signs of eye diseases often vary, the teaching contents are diverse, and the class hours are limited. It is difficult to properly explain all the planned course contents in a short amount of time. Secondly, ophthalmology is a highly specialized field and is often neglected by students, placing it in a marginalized position. The diagnosis of ophthalmic diseases largely depends on the specialized examination equipment. It is difficult to comprehend and learn for novices. Moreover, since the clinical internship period is only for 2 weeks and its practical teaching also poses a challenge, it is often difficult to achieve satisfactory results <sup>[10]</sup>. In addition, influenced by the traditional mode of teaching, most teachers still use the traditional cramming-style teaching method to teach. In the teaching process, there is

a thinking pattern of specialists that does not intersect the overall theory and skills of general medicine and community health services. The majority of general medical students feel that ophthalmology will not be useful in their future careers, resulting in a significant shift in their perceptions of the value of studying ophthalmology, thus greatly affecting the quality of teaching. Therefore, it is worth our teachers' time and effort to think about how to make the most of the limited teaching time, ensuring that students would not only grasp the teaching focus, but also mobilize their learning enthusiasm and improve the quality of ophthalmology teaching.

#### **4. Application of TBL in general practice medical education**

How to enhance students' interest in learning is the essence of a subject to achieve good teaching results [11,12]. Traditional teaching methods are mostly lecture-based learning (LBL), in which they are teacher-centered and based on the passive acceptance of information by students. Students often feel bored because of the abstract content in ophthalmology, and their enthusiasm for learning is low [13]. Team-based learning (TBL) is a reform and innovation based on problem-based learning (PBL). It is a new teaching model. This model is becoming one of the main directions of medical education reform and has been widely used in medical colleges in Europe, America, and other developed countries [14]. TBL focuses on people's creativity, flexibility, and practical characteristics, which is helpful to promoting the cultivation of teamwork spirit. Compared with LBL, TBL can fully tap the potential of each student, mobilize their learning enthusiasm, encourage the cultivation of team spirit among group members, integrate students' cognition, psychology, and emotion into learning, as well as significantly improve learning efficiency. According to the characteristics of ophthalmology, our teaching and research department implemented TBL for general medical students, and the application of TBL is discussed in the teaching of ophthalmology.

##### **4.1. Application of TBL**

Two classes (30 students in each class) of general medical students from the 2015 batch in our university were randomly divided into two groups. One group adopted the TBL mode and the other group adopted the LBL mode [15]. The two classes were taught by the same teachers, using the same teaching materials (People's Health Publishing House, Ophthalmology 8th Edition), and with the same teaching hours (10 class hours). The students sat for a test that had the same questions. The TBL process was conducted as follows:

- (1) students who adopted the TBL mode were divided into three groups with 10 people in each group; students with good, moderate, and poor performances were divided into each group in turn, and the student with excellent performance in all aspects was selected as the group leader;
- (2) the syllabus and five questions were distributed one week prior to class, so that the students could prepare for pre-class preview; in regard to lens disease, the questions raised are the structure and function of lens, the pathophysiological changes that may be caused by the change of lens transparency and intraocular position, the concept and classification of cataract, treatment of cataract, and the types of refractive state changes caused by lens expansion;
- (3) the test paper was distributed before the class; it took 15-20 minutes to test the basic knowledge of students and investigate their mastery of basic concepts and key problems according to the outline; the team leader distributed and collected the test papers, and the scores were exchanged between groups; the test score accounted for 30% of the total TBL score, and it was primarily used to assess the students' preview effect and encourage them to preview the contents of the chapter prior to class;
- (4) the five questions prepared in advance were randomly assigned to each group and were used to discussed in groups for 10-15 minutes; after the discussion, a representative was selected from each group to present the question orally; each group was given an opportunity to present, and they were

supplemented or corrected by other group members in the form of questions or debates; the teacher motivated the students to look for answers to questions they had doubts about; at the end of the session, the teacher scored the accuracy and completeness of each group in answering questions based on their cooperation; the score accounted for 70% of the total TBL score, and it mainly assessed students' understanding of the contents of the chapter and their ability to analyze and solve problems.

#### **4.2. Comparing the teaching effect between TBL and LBL**

A questionnaire was used to gauge students' pre-class preview. The results showed that 95% of the students under the TBL mode would preview the contents of the chapter prior to class. They believed that they must be conversant with the teaching contents before they could sit for the exam and answer the questions raised by their teacher. On the other hand, only 15% of the students under the LBL mode carried out pre-class preview; majority of them claimed that pre-class preview is unnecessary, and that they could keep up with the pace of the class without any preview. The analysis of the examination results demonstrated that most students' TBL scores were positively correlated with their final examination scores, indicating that TBL scores can reflect students' mastery of knowledge to a great extent. The final examination paper is divided into two parts: basic questions and discussion questions. The results revealed that there was no statistical difference between the TBL class and LBL class in the basic questions part, but the TBL class's score for the discussion questions was 50% higher than that of the LBL class. Since the discussion questions not only require students to have book knowledge, but also a certain level of comprehensive analysis and problem-solving ability, it shows that TBL does improve students' comprehensive judgment ability, which is the same as the conclusion drawn from previous research <sup>[16,17]</sup>.

#### **4.3. Advantages and requirements of TBL in the teaching of ophthalmology**

In LBL, students are passively accepting information; their feelings and experiences are often neglected, and there is a lack of two-way communication, which is not conducive to maximizing their subjective initiative and innovation skills <sup>[18]</sup>. Ophthalmology is a clinical discipline that pays special attention to practice. It not only requires students to master theoretical knowledge, but also to apply what they have learned to analyze and solve practical problems in clinical practice. During the implementation of TBL, teachers and students communicate in an equal, harmonious, and joint discussion manner, which transitions students' passive learning to active learning, exercising their unity and cooperation, as well as stimulating their autonomous learning skills, clinical thinking skills, and problem-solving skills. Through self-conscious preview, students will look for materials, discuss, and analyze them in groups, which not only makes basic knowledge easier to understand, but also improves their capabilities in analyzing, judging, and applying theory to practice <sup>[19]</sup>.

In TBL, the traditional teaching method of "cramming" can be transformed into an "active and cooperative" style, which requires teachers to become the disseminators of knowledge and the guides for students to gain knowledge. In ophthalmology teaching, teachers must establish new teaching concepts, enrich their knowledge reserves, spend more time designing problems closely related to theoretical knowledge and clinical practice, respond to various views and problems put forward by students in a timely manner, change their roles from being lecturers to instructors and directors of students' learning, as well as pay attention to mobilizing the enthusiasm of each student in class, so that students will come to think and solve problems together as a team <sup>[20,21]</sup>. For students, they are required to have good learning consciousness and to transition from passive listeners and receivers to active participants. The division of labor and cooperation among group members allow students to fully experience the fun of learning, thus realizing the value of the course.

## 5. Conclusion

In short, TBL is a “lively” teaching method in ophthalmology, which can render boring teaching contents into a vibrant environment, stimulating students’ interest in learning and attracting students to actively participate in discussions and interaction. It is a method worthy of implementation in the teaching of ophthalmology in view of its strong practicality.

## Disclosure statement

The authors declare no conflict of interest.

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