

# Cooperative Learning: Experiences of Implementing to an Undergraduate Health Sciences Program

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## Abstract

**Background:** Retinoscopy is one of the important clinical skills an undergraduate optometry student should learn. It requires time, dedication, practice and support to attain an acceptable level of proficiency. We report the process of implementing Cooperative Learning (CL) for Retinoscopy skill training in an Optometry program, focusing the preparation, implementation and our experiences.

**Methods:** Year-2 Optometry students were divided into heterogeneous groups to facilitate formal cooperative learning. Students worked together as cooperative units, regulated their own learning and contributed to the success of the group under faculty supervision.

**Results:** Participants positively responded to the supportive learning environment. Faculty felt the implementation and weekly skills training sessions were less cumbersome though the initial planning and preparation was more.

**Conclusion:** Students and faculty appreciated the promotive learning environment that CL offered to maximize learning Retinoscopy and develop social and communication skills.

**Keywords:** COOPERATIVE LEARNING, GROUP WORK, OPTOMETRY, UNDERGRADUATE STUDENTS

*Journal of Medical Education* Winter 2019; 18(1):16-21

## Introduction

Optometry is a healthcare profession that deals with the examination, detection, and management of various eye and vision disorders at a primary care level. An undergraduate optometry program aims to prepare its graduates to become competent eye care service providers by imparting a number of practical, clinical, and patient interaction skills. Retinoscopy— a method to objectively estimate the refractive status of the eye- is an essential skill in the repertoire of an optometrist, which requires a significant amount of time and practice to master it.

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In the modern era, the knowledge is getting channelized to learners in a more sophisticated and specific manner as seen in the higher education setting. Teachers have a greater responsibility to offer students with multiple opportunities that facilitate active learning and allow them to assimilate the content, participate in activities to enhance their understanding, involve in problem-solving, and eventually to reflect on their activities in different contexts of its application (1). Active learning is an instructional strategy facilitated by the teacher where “learners involve in doing things that help them to construct their understanding and develop skills during the process”(2). In this report, we share our experiences of implementing cooperative learning (CL) as an active learning strategy to one of the clinical skills training module of undergraduate optometry program.

### **Cooperative Learning**

It is a democratic pedagogical approach that utilizes small student groups while they work together toward a common target and in this process, they maximize their own learning and support other team members to learn as well (3). This supportive learning environment provides learners with opportunities to express their ideas, take up leadership roles, engage in meaningful discussions, and finally to make a decision with the common consensus (4). Literature supports the effectiveness of CL from elementary levels (5) to tertiary learning (6). Mere grouping of students to facilitate some activities does not qualify to be called as CL. The key to success for any CL strategy is to follow a structured approach from its conception through implementation and evaluation (7).

CL can be of different types based on the purpose it is intended to. It can be formal (to teach a specific topic or content wherein the activities can last for a session or more), informal (an activity organized either at the beginning, during, or after a lecture or a practical session aimed to facilitate cognitive processing of information), or a cooperative base group to support, encourage, and help for a long-term academic progress (8). Formal CL groups would be the ideal one to integrate with clinical skills training as it requires a series of sessions to acquire necessary skills and further advance to problem-solving. The preparedness and commitment of instructors are paramount for the success of formal CL. Pre-instructional preparations on learning objectives, student grouping, learning resources, student roles, etc. would ensure a smooth implementation of the process. Then the instructor provides student groups with specific instructions to teach basic concepts, explains the assignment, and shares sufficient descriptions to ensure positive interdependence and individual accountability. During the course of the process, the instructor monitors student groups, provides support, and makes a number of observations for critical,

but constructive feedback. The final step would be to conduct objective assessments as groups as well as individuals and the members are also given opportunities to reflect on their performances and make the plan for the next activities (8).

### **Theoretical Framework**

The principles of CL are explained mainly by three theoretical perspectives; constructivists learning theory, behavioural theory, and social interdependence theory. Social constructivism explained by Piaget (1926, cited by Tran, 9) and Vygotsky focused on the influence of socio-cultural interaction in the development of an individual including his/her thought processing, reasoning, and language skills (10). Vygotsky's concept of "Zone of Proximal Development (ZPD)" reiterated the importance of social interaction and cooperative activities in which each learner complements to the development of his/her team members as they interact in each other's ZPDs. On the other hand, behavioural learning theorists believed that learning was the acquisition of new behaviours as a result of interaction with multiple environmental factors. Bandura articulated that most of the learning happened through observation, modelling, and imitation. The key stimuli for learning and for its retention are by witnessing the preferred attitude, conduct, and responses of others (11). By far, most of the focused work on CL has been based on the social interdependence theory. *Social interdependence exists when the outcomes of individuals are affected by each other's actions* (12). Social interdependence provides opportunities for cooperative and competitive learning environments. But, an absence of interdependence or dependence results in individualistic efforts. Theorizing social interdependence dates back to early 1900 when a German psychologist Kurt Koffka (13) described that the interdependence between members in a dynamic whole group could vary. Later, Kurt Lewin (1948, as cited in Johnson &

Johnson, 14) refined the concepts of Koffka and mentioned that the essence of a group was the interdependence among its members. This interdependence turns the group into a dynamic whole so that a change in the state of any member or subgroup initiates changes in other members or subgroups. Deutsch (1949, as cited in Johnson& Johnson, 14), a student of Lewin, extended his theory to conceptualize three types of interdependence (positive, negative, and none) based on the nature of the interaction between individuals that determines an outcome. Positive interdependence explains a promotive and collective interaction; whereas negative interdependence creates a competitive environment in which the failure of a member is the gain of another; and no interdependence yields an individualistic approach.

Johnson & Johnson (14) describe that “*placing people in the same room, seating them together, telling them that they are a cooperative group, and advising them to ‘cooperate’, does not make them a cooperative group*”. It requires a structured and guided approach to make the meaningful interaction between team members for an effective and active learning environment. It is important to ensure five elements in a cooperative classroom in order to attain student engagement, positive interdependence, face-to-face promotive interactions, individual accountability, interpersonal and social skills, and group processing.

## Methods

### *Preparation and Implementation to an Optometry Pre-Clinical Course*

Estimating the refractive status of an eye is an important procedure in the optometry practice. This can be performed with an automated instrument (autorefractometer) or manually with the help of a handheld retinoscope (retinoscopy). In an undergraduate program, the emphasis is given to developing retinoscopy skills of the graduates by preparing them to perform their tasks even in the absence of automated devices. Retinoscopy involves

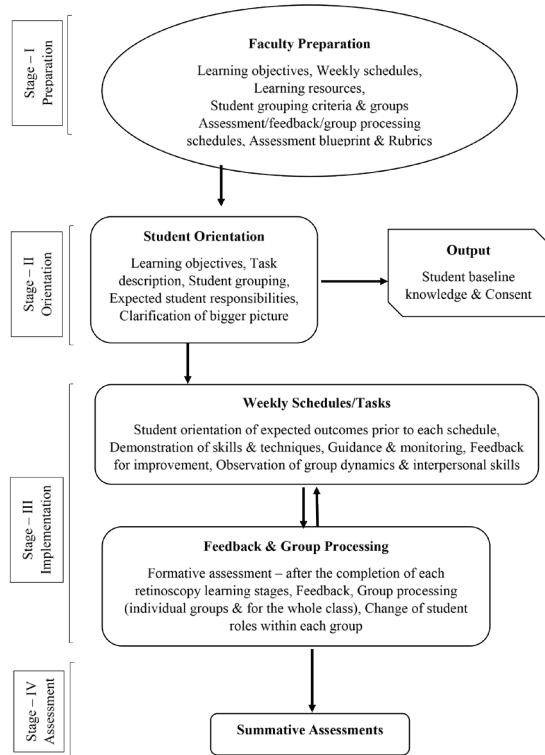
projecting a light from the retinoscope into patient’s eye and identifying the characteristics of light reflected from eye’s retina. Students then need to choose appropriate lenses with accurate power so that the reflected light characteristics can be examined to estimate the subject’s eye power. Students have to get a number of steps and procedures correct to obtain a precise estimate of eye’s refraction, which is crucial to prescribe accurate optical aids. When students get introduced to this clinical technique in year 2, most of the training is done on *Retinoscopy Trainers* that replicate eye’s optics. Later, they are allowed to perform the procedure on human eyes once they develop adequate speed and accuracy. At this stage CL strategy was applied to provide learners with an active learning environment to practice and learn retinoscopy. This study was approved by the Research and Ethics Committee of the College of Health Sciences, University of Buraimi, Sultanate of Oman.

#### **a. Student Grouping**

A formal CL strategy was implemented with teacher selected heterogeneous groups. The teams remained the same for the whole course duration under the same lead teacher. Literature endorses the idea of better student learning in heterogeneous groups (15) as well as if the groups remain unchanged for a longer period (7). The class strength of 24 was divided into six groups with four students each. Academic ability, leadership skills, and English language proficiency were the factors considered while deciding on group members. Prior faculty members of this student cohort were consulted before student grouping.

#### **b. Instructor Preparations**

The success of CL is based on its structured preparation and effective implementation by the faculty (6). Hence, the effectiveness and a potential positive outcome are heavily dependent on faculty efforts. A representative semester framework for the implementation of CL is shown in Figure 1. On the first day of the semester, the students were given information and instructions on CL and the importance of



**Figure 1:** The framework of cooperative learning pedagogical approach for training retinoscopy skills

acquiring team-work skills to excel in learning and in the modern workplace. A consent was obtained from the students in a designated format. Besides, the students were reminded of specific objectives to be met during each weekly session and were asked to maintain a task-completion logbook to ensure a systematic approach to meet their learning outcomes. A typical weekly session would start with a skill demonstration by the faculty or a revision of previous sessions presented by a student group. Once the students engage in their skill training activities, the faculty monitored each group closely, guided them, and provided them with necessary feedback.

### c. Applying Cooperative Learning Components in the Learning Environment

**Fostering positive interdependence:** In a CL setting, the success of an individual is dependent on the success of the group. Each member has a distinctive role to play to support the team efforts and at the same time, they are responsible for their own learning (16).

Three types of roles were assigned to members

of each team; task leader, learning space organizers, and communicator with the faculty. These roles were interchanged when they moved from one task to another. A provision was made to receive better group scores corresponding to individual performances motivated students to work individually and for the team.

**Face-to-face promotive interactions:** Positive interdependence promotes positive interaction. It provides learners with avenues where they can exchange their opinions, explain others, learn from others, and share their understandings (17).

At least for few students, English was a barrier for confident communication with the faculty. Cooperative learning environment provided them with an opportunity and convenience to communicate in their language (Arabic) with peers. This interaction and peer-support in learning and sharing were very evident throughout their group tasks, and discussions, and during group processing.

**Individual accountability:** It is the degree to which individual's performances linked to the groups' achievement. The learning environments ought to be designed in such a way that each one of them does their best as well as works together to get the best out of the team members (17).

The selected group size was small (four members) to ensure better communication and cooperation. During their formative assessments and feedback sessions, individuals' and group's performances were separately monitored and discussed. Moreover, before moving from one task to another, individual team members had to demonstrate the skill. These approaches created a sense of responsibility as individuals and collectively as a group.

**Interpersonal and social skills:** These skills determine the success of a cooperative group and make it complex compared with competitive and individualistic approaches. Group members should either possess or they must be taught to develop attentive listening,

cooperative questioning, and respectful negotiation skills (9).

Students knew each other well for more than a year prior to this course. However, they were yet to work together as a team and hence needed time to improve their group dynamics. Furthermore, the group remained the same for the whole semester, which helped them to acquaint themselves and identify one another's strengths and limitations.

**Group Processing:** These sessions are organized to reflect on the students' group work experiences. It helps to improve the effectiveness of members in contributing to group objectives. Group processing was done within each group individually and for the whole class together.

Students' experiences, suggestions, and modifications on students' group work were discussed within the group after the completion of each target. Further, faculty feedback on group performances was shared with the students in the same meeting. Good practices were appreciated in the whole class sessions and areas identified by the faculty that needed further effort and enhancement was communicated constructively.

## Results

CL was a different experience for the students in this cohort. At the end of the semester, the students were asked to respond to two open-ended questions to learn about their experiences. The excerpts of their responses are noted in Table 1.

### Lessons Learned & Recommendations

- The students expressed a better learning

experience as they knew their tasks, group members, and learning objectives from the beginning of the semester. This establishes the importance of having an organized preparation by the faculty ahead of implementing cooperative learning.

- Academically challenged students were not side-lined by the prominent and influential groups in the class. This was an advantage of faculty decided groups over student preferred groups. Initially, there was resistance from students as they did not see their friends on their team; but they were ready to cooperate after the objectives were made clear to them.
- Arabic culture and traditions have an influence on openness in student behaviour; especially for female students. Adding to that, few were just improving their English language skills since a good number of them started to learn English after they joined higher education institutions. These students found the new learning environment interesting and motivating. As the semester progressed, the students seemed to interact more with their group members and they developed more confidence while asking questions and interacting with the faculty.
- The faculty members experienced CL strategy less strenuous as they did not have to monitor and guide each student individually. A part of the faculty's responsibility was covered once sufficient care was taken to ensure individuals' and group's accountability.
- The students with good academic standing and those who learned the skills faster found it a bit boring and time-consuming as they had to wait for others. They felt some of the sessions were repeating and unduly overemphasized.

**Table 1:** Students' feedback after attending cooperative learning sessions

Student Responses	Q1: What did you like about working in/as a team to learn?	Q2: What factors did hamper your learning experience?
	Same team members throughout the semester helped us to know each other	Some team members were not cooperative always
	Comfortable to discuss freely within the group	Had to wait for others in the team to complete the designated tasks before moving to the next
	Group members supported to learn when it was difficult	Latecomers and absentees sometimes affected our teamwork
	We could interact in our language of comfort	

## Conclusion

CL is a student-centered approach that promotes deep learning in any types of learning environments. Based on our experience, CL was found to be an effective strategy to maximize learning in clinical skills training and develops social and communication skills. Moreover, it provides students and faculty with an interactive and relaxed learning environment and makes learning fun.

**Conflict of Interest:** None Declared.

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