

## Problem-solving sessions as an effective learning method in Medical Parasitology: Ain Shams School of Medicine initiative

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### ABSTRACT

The Medical Schools in Egypt have witnessed a recent reform that requires implementation of student-centered learning strategies, such as the problem solving approach which involves the students in assessing the parasitic disease, its differential diagnosis and management. The present communication is an assessment of the effectiveness of problem-solving sessions, as a new learning method for the enhancement of Medical Parasitology curriculum at Ain Shams University, School of Medicine, in terms of gained knowledge and students' satisfaction; after one year of implementation. The study included 3<sup>rd</sup> year students (no. = 560) in the academic year 2018/2019 at Ain Shams University, School of Medicine, Egypt. Problem-solving application was given as one-hour session on assigned weeks over the academic year. Pre and post knowledge tests were done to assess knowledge acquisition, in addition to a questionnaire to measure students' satisfaction.

There was statistically significant improvement in knowledge acquisition when analyzing the grades of the pre- and post-session quizzes ( $P = 0.000$ ). The medical students' feedback regarding the improvement of their problem-solving skills, rating of the new learning experience and the qualification of the senior staff was positive (71%, 69% and 79%, respectively).

The problem-solving sessions showed success in boosting the gained knowledge and was accepted by students as an instructional tool for learning Medical Parasitology. Therefore, problem-solving sessions are worth adoption as a learner-centered approach for the enhancement of students' engagement.

**Keywords:** medical education, parasitology, problem-solving sessions .

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Implementation of student-centered learning strategies is an essential requirement for the current medical education reform, from traditional to the competency-based curriculum. Student-directed learning demands the ability to identify and solve problems. Additionally, medical students as adult learners process information better if they discuss, ask questions, and are challenged by problems<sup>[1]</sup>; as attested by the former statement "Tell me and I forget, show me and I remember, involve me and I understand" (Benjamin Franklin, 1706–1790)<sup>[2]</sup>. Furthermore, Acholonu<sup>[3]</sup> recommended that in teaching Parasitology for Medical students we need to offer intellectual activities, so that students could learn and practice by combining traditional and problem-solving approaches in Medical Parasitology curriculum. During these interactive sessions, students apply knowledge and understanding to solve problems<sup>[4]</sup>. To do that, students must understand the patient's complaints, and apply them to analyze the case scenario to reach a diagnosis and solve the problem. Also, we noticed that it was confusing for pre-clerkship students to differentiate between parasitic diseases that share

similar clinical presentations. This prompted us to sustain students' interest, by stressing on clinical significance of parasitic infections<sup>[3]</sup>. Hence, the application of problem-solving sessions by medical-related professionals is worthwhile to help students improve their learning experience and utilize their higher thinking levels<sup>[5]</sup>. Students-centered teaching approaches proved to be most effective in small groups. Accordingly, stimulation of deep learning and development of the students' higher intellectual skills, such as reasoning and problem-solving are achieved by using small group discussion teaching methods. Such sessions intend to include all the students in active discussion and thus facilitate active learning<sup>[6]</sup>. Besides, grouping of the students solved the problem of assigning a large number of students to a limited faculty facility. Starting from the academic year 2017-2018 Ain Shams University School of Medicine adopted a temporal system-based curriculum for Basic Medical Sciences in which Medical Parasitology was delivered in parallel coordination with other disciplines<sup>[7]</sup>. At the same time in addition to the traditional lectures and practical classes, problem-

solving based sessions were introduced to supplement teaching Medical Parasitology for the undergraduate students.

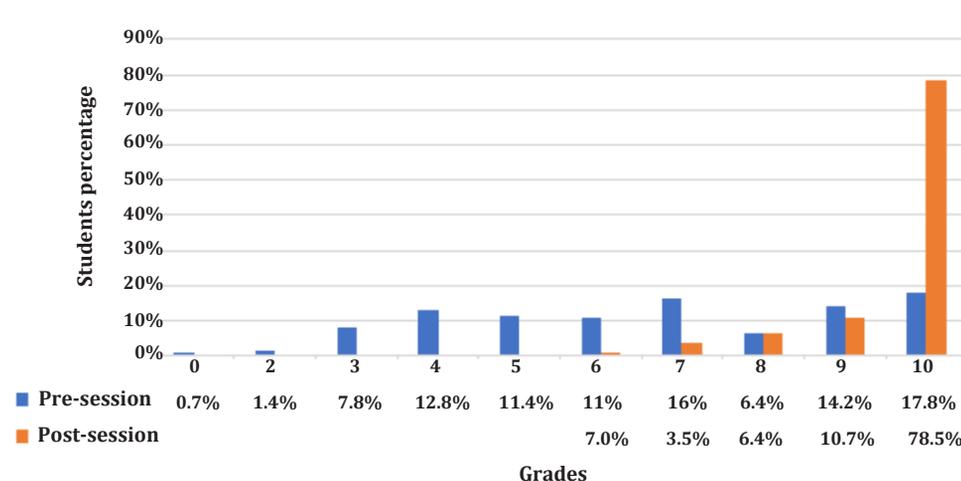
The objectives of our descriptive analytical study included the application of a self-learning problem-solving approach, enhancing active student participation and helping students to acquire group interaction skills. For assessment and continuous improvement, which is important for proper implementation, it is necessary to receive feedback and input from the students regarding the teaching methodology. Therefore, this study aimed to assess the effectiveness of problem-solving sessions as learning methods in terms of gained knowledge and students' satisfaction. The 3<sup>rd</sup> year medical students were distributed into 18 groups per week in the Parasitology department computer lab, each group was further divided into subgroups of 4-5 students.

Each one-hour session was structured as follows: (a) distribution and presentation of case scenario of a certain clinical presentation, (b) discussion among students to achieve a better solution to the problem and answer the given questions, (c) a student representative from each group presented the answer to a question to his peers, and (d) explanation and discussion from facilitators for the right answers. The structure of the session was explained to the students. Ten different problem-solving sessions were delivered throughout the academic year on assigned weeks, in coordination with the related Medical Parasitology lectures. The assigned problems were ectoparasites, opportunistic parasites, and parasites causing hepatosplenomegaly, anemia, eosinophilia, diarrhea, dysentery, eye lesions and CNS diseases, as well as cestodes affecting tissues. The students received the problem scenario with some questions to be answered. The problem case scenarios were clinical presentations caused by parasitic diseases under the themes stated earlier. Recommended textbooks and websites for Medical Parasitology were allowed. After analyzing and solving the problem, each group assigned one student to present the answer to one of the given questions to the other groups. The students

attended the scheduled sessions in the assigned weeks. Seven marks were allocated for the problem-oriented sessions in the blueprint.

The gained knowledge was assessed using pre- and post MCQ tests. Students satisfaction was assessed using a questionnaire<sup>[8]</sup>. The questionnaire tackled the qualification of the staff member, rating the new learning method experience, and improvement of their problem-solving skills. In addition to a question that required the student to describe in his/her opinion the best aspects of the sessions. Data was collected and analyzed using SPSS version 19. Student's t-test was used to detect the statistical significance and was significant when *P* value was <0.05. The results of the gained knowledge were per one session and the satisfaction of the students was over the whole experience of the problem-solving sessions.

Results revealed statistically significant difference when comparing the means of grades of the pre- and post-session quizzes (*P*= 0.000). All students (100%) showed improvement in the post-session quiz scores; 74% achieved the highest score (10/10); and 26% of students scored from 6 to 9 (Figure 1). Five hundred and twelve out of 560 students responded to the feedback questionnaire (91% response rate). Students' feedback regarding the improvement of their problem-solving skills, rating of the new learning method experience, and the qualification of the facilitator recorded 71%, 69% and 79% respectively. The students' responses to the question of describing the best aspects of the session revealed that they found it challenging, and that it presented a sensible link between basic knowledge and clinical applications. From the students' perspective, the best practices during the sessions were the teamwork collaboration with group members and communication with the senior staff. Example quotes from students on the best aspects of the problem-solving session were: "Staff interaction with us; searching for the information by ourselves"; "Development of our problem-solving skills"; "Giving us the chance for self-learning"; "Working within a team and discussion with colleagues".



**Fig. 1.** Comparison of pre- and post-session quizzes for 560 third-year faculty of medicine ASU students' scores.

Currently, it is widely approved that medical education should become much more student-centered, with encouragement of undergraduate students to become active and self-directed participants in their learning. Likewise, to make Medical Parasitology interesting and more engaging, innovation is required to cope with the students' learning styles diversity and to create varied opportunities for learning. Furthermore, students may ignore the introduced knowledge if they did not grasp its clinical relevance. Thus, to increase students' interest in Medical Parasitology, it needs to be introduced in a setup of interactive diagnostic processes<sup>[9]</sup>.

The current implementation of problem-solving sessions was introduced to comply with the requirements for clinical case discussion of specific topics in medicine in early clinical education that is crucial for pre-clerkship medical profession students<sup>[10]</sup>. During these sessions, students worked in groups using the available resources to solve real life-based health problems and then present their solutions to the other groups.

The present study showed that there is an improvement in knowledge acquired by the students after active involvement in the problem-solving sessions. This was in accordance with Than *et al.*<sup>[5]</sup> who reported that significant knowledge gain occurred during the problem-solving exercise in medicine and this gain in knowledge was closely related to practicing clinical solving skills.

Sixty-nine percent of the students gave a positive impression of the overall experience. Throughout the sessions, the students led the discussion and obtained feedback from the other groups. Senior staff served as facilitators guiding the students in the direction of self-directed learning and made sure that all students were actively involved in the session. Senior staff probed the students' knowledge by asking questions and stimulating reasoning. This study also demonstrated that the problem-solving skills of students were improved by using this instructional model. In agreement, Dovganych<sup>[11]</sup> stated that the case solving approach in Parasitology promotes students' ability to work as a team, to develop research skills at the preclinical stage, to generate interest and self-motivation for active learning. In the same context, Ghosh<sup>[12]</sup> concluded that problem-solving as a learning tool was effective in encouraging students to sustain their knowledge and learn to work in groups. In his view a careful mixture of both instructive lectures and problem-solving learning modules improves training undergraduates' medical students to undertake self-directed learning and develop the skills of correlating basic science with clinical science in the later years of their training.

**Conclusion:** The problem-solving sessions showed success in boosting gained knowledge and was accepted by students as an instructional tool for learning Medical

Parasitology. Therefore, problem-solving sessions are worth adoption as a learner-centered approach for the enhancement of students' participation.

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