Workshop report on “Linking Teaching and Learning Physiology” in Colombo, Sri Lanka (Nov. 7–8, 2012)

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THE INTERNATIONAL UNION OF PHYSIOLOGICAL SCIENCES (IUPS) Teaching Workshop entitled “Linking Teaching and Learning Physiology” was organized on Nov. 7–8, 2012, as a satellite meeting of the 3rd Biennial Conference of South Asian Association of Physiologists held in Colombo, Sri Lanka, hosted by the Physiology Society of Sri Lanka. The Organizing Committee, comprising Arif Siddiqui (Pakistan), Robert G. Carroll (United States), Mangala Gunatilake (Sri Lanka), and Shyamal Roy Choudhury (India), developed a program covering a wide range of topics relevant to the teaching of physiology in South Asia.

Fifty-eight physiologists representing Bangladesh, India, Iran, Nepal, Pakistan, and Sri Lanka participated in the workshop. Important to note is that this was the first ever teaching workshop organized under the platform of the South Asian Association of Physiologists in the region of South Asia. It was held at the Faculty of Medicine of the University of Colombo, Colombo, Sri Lanka. Participants were met on arrival at the airport and were served with excellent logistics arrangements throughout the workshop.

The goal of the workshop was to create a learning environment that is conducive to partnership between education and scholarship that is essential to prepare faculty members to fiercely compete in the neoglobalized market. Congruent with the needs of physiology of professional excellence and best practices of pedagogy, the workshop also allowed sharing of diverse learning experiences in practice and the opportunity to collaborate and learn from each other’s experiences.

The program included both plenary sessions and smaller breakout sessions. The plenary sessions covered the following topics:

1. Role of Faculty in Teaching and Learning
2. Educational Scholarship
3. Staying Competent and Relevant as Medical/Healthcare Educators: Beyond Paper Qualifications
4. Promoting Optimal Approaches to Learning and Studying
5. Evaluation of Student Learning
6. Integrated Practical Examination
7. Outreach Models to Promote Physiology Learning

In the plenary talk on the Role of Faculty in Teaching and Learning, Robert G. Carroll (Brody School of Medicine, East Carolina University, Greenville, NC) reviewed the impact of educational theories on the classroom and curriculum. The shift to assessing competencies requires the instructor to extend beyond content. Today’s mentor must also stimulate and mentor the professional development of their students and trainees. In the changing environment of learning, the essential role of the teacher remains unchanged so as to create an effective learning environment to provide direction for the learner and to model effective learning behaviors.

In a separate plenary talk on Educational Scholarship, Dr. Carroll drew an analogy that the steps of educational scholarship parallel the central nervous system control of voluntary movement as when asked to pick up a pencil. The first area of the brain activated is the sensory cortex (establishing where the pencil and hand are now) followed by motor association areas (planning and activity) primary motor output based on visual, proprioception, and tactile sensory information (assessing the outcome). Similarly, educational scholarship begins with the determination of the current state of education, planning for a desired outcome, implementing the change, assessing the outcomes, and refining the activities based on the data. Communication of these results in a peer-reviewed forum is the final step in the process and defines the movement from an educational activity to educational scholarship. Dr. Carroll emphasized that sharing the results of innovative and effective teaching activities improves both one’s own teaching and that of the discipline.

Dujeepa Samarasekera (Yong Loo Lin School of Medicine, National University of Singapore, Singapore) presented the plenary talk on Staying Competent and Relevant as Medical/Healthcare Educators: Beyond Paper Qualifications. This presentation emphasized that developing the skills and competencies relevant to one’s profession is important and, in many healthcare settings, is regulatory. However, for faculty members engaged in teaching medical or other health professional students, teaching skills are taken for granted. Dr. Samarasekera indicated that it is only recently that training institutes and medical regulatory bodies are taking measures to ensure that faculty members are adequately skilled to teach students. He also focused his plenary talk on best practices and the benefits of developing these relevant skills in teachers as well as the challenges and limitations when this process is instituted.

Piyusha Atapattu (University of Colombo, Colombo, Sri Lanka), in her plenary talk on Promoting Optimal Approaches to Learning and Studying, emphasized that it is necessary to understand the learning processes that make high-quality learning outcomes possible. The entire teaching-learning environment, particularly the assessment procedures, has a significant impact on how students learn. She reminded that approaches to learning and studying constitute an important aspect contributing to the quality of learning achieved in the university. Elaborating the three main approaches to learning and studying, i.e., the deep approach, surface apathetic approach, and strategic approach, she emphasized that the deep approach is...
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more likely to be associated with higher-quality learning and the combination of deep and strategic approaches is known to be more academically rewarding in courses such as medicine. Dr. Atapattu also explored factors influencing approaches to learning and studying that included students, the curriculum and learning environment, teacher-related factors, and assessment procedures. She emphasized that academics have the responsibility of promoting optimum learning and studying approaches among the students they teach. Using appropriate teaching-learning methods, providing students with more time for studying, and instructing students on study skills and designing assessments to reward deep learning are some key aspects in promoting optimal approaches to learning and studying that Dr Atapattu emphasized.

Dee U. Silverthorn (University of Texas at Austin, Austin, TX), in her plenary talk on Evaluation of Student Learning, reminded the audience that the goal of a physiology course is to teach students the content and skills that they need to be successful healthcare providers, scientists, or citizens. She made the point that usually the determination of student achievement is restricted to periodic examinations, but if students do poorly on these exams, then it may be too late to remediate them. To prevent this problem, instructors can use various methods of informal, ungraded assessment (formative assessment) in between the graded examinations. Formative assessment is highly variable and can be adapted to nearly every classroom situation, whether in large or small classes. High-tech assessment can be done using personal response systems, but a variety of “low-tech” alternatives can be equally successful. Time for formative assessment during the lecture period can be made using the “upside-down lecture,” also known as the “flipped classroom.” The evaluation of student learning should take place continuously, in lecture as well as during formal examinations.

Muhammad Aslam (Tameer e Millat University, Islamabad, Pakistan), in his plenary talk on Integrated Practical Examina-
tion, presented a study examining horizontal and vertical inte-
gration across various disciplines in undergraduate medical curriculum. He presented the use of an integrated practical examination (IPE) as a tool to assess basic sciences laboratory skills integrated with clinical skills for the preclinical years. The IPE was conducted in a modified objective structured practical examination format where each station comprised tasks related to performance and communication skills asked in a clinical context. The development of a blueprint and an extensive review were conducted to ensure the validity of the study. Competencies related to performance skills, communication skills, reasoning skills, and humanistic qualities/professionalism were incorporated by developing an IPE construction template. Simulated patients consisting of a series of “timed” stations were incorporated into the IPE with a focus on different tasks. The observing faculty member used a checklist of specific behaviors or a global rating form to evaluate the student’s performance. A minimum of 12–15 stations, which students usually visited over the course of 3–4 h, was found necessary to achieve a reliable assessment.

A case scenario, videos, images/photographs/models/specimens, or standardized patients were used as triggers at each station. Usually, three to four tasks relevant to the trigger were given, and each station included tasks that were both interactive and static and were observed and rated by trained faculty members. The IPE was noted as enhancing the integration of practical aspects of the disciplines of basic health sciences and their relevance to clinical applications.

In the last plenary talk on Outreach Models to Promote Physiology Learning, Barbara Goodman (University of South Dakota, Vermillion, SD) shared her experience on outreach models to promote the learning of physiology. She described various models to promote physiology to K–12 teachers and their students and to the general public. She mentioned that the American Physiological Society (APS) and the Sanford School of Medicine of the University of South Dakota have been involved in a number of programs to enhance outreach both nationally and locally, including local outreach teams, the frontiers in physiology program, physiology understanding week, physiology awards for students projects at science fairs, summer research teacher relationships with physiology researchers, etc. In addition, as the chair of the APS Communications Committee, she recommends the use of bloggers, tweeters, and a pending website (physiologyinfo.org) to feature their podcasts and others that highlight physiology.

The workshop also incorporated smaller breakout sessions on various topics to expand the discussion on diverse issues of linking teaching and learning of physiology in South Asia. The major areas covered were the following:

1. Interactive Teaching (including the use of audience response software during e-learning)
2. Practical Laboratories Converting Traditional Experiments to Inquiry-Based Laboratories
3. Moving From Learning Objectives to Competencies
4. Engaging Our Students for Thinking Through Physiology
5. Motivating Students’ Learning of Physiology Concepts: Use of Clinical Correlates as Effective Tools
6. Assessment Systems in Physiology
7. Multiple-Choice Questions: Design and Evaluation
8. Adapting OSCEs to Assess Physiology Competencies
9. Evaluation of Faculty Teaching Effectiveness

In the breakout session on Interactive Teaching, Mario Vaz (St. John’s Medical College, Bangalore, India) discussed how traditional didactic lectures, which were the mainstay of teaching in medical schools in the past, have given way to more interactive forms of teaching and learning. Participants agreed that, to a large extent, these remain unevaluated formally in the South Asian region and recognized that interactive teaching engages learners more actively, making the learning process more interesting and lending itself to a more comprehensive discussion of the subject matter and to a greater recall of information. The group also opined that interactive teaching involves a range of methods including question-and-answer sessions, debates, seminars, role plays, small-group teaching, computer-assisted learning, student projects, and clinic visits, among others. While these methods have the potential to enrich the teaching-learning process resulting in the growth of both the teacher and learner, the group agreed that the extent to which these methods are used and the challenges that are faced in the South Asian context need to be explored. This breakout session allowed participants to share their experiences of the extent to which different interactive teaching methods are used, the impact of these methods on the learning process, and the perceived barriers and facilitators to interactive teaching in the local context. The role of e-learning and computer-assisted technologies in interactive teaching remained a primary focus.
The breakout session on Practical Laboratories Converting Traditional Experiments to Inquiry-Based Laboratories by Barbara Goodman used the resources of the APS as a guide to transform a laboratory experiment from a “cookbook” laboratory to one that incorporates inquiry and technology and addresses the learning needs of diverse students. Key questions considered about the laboratory to be transformed included the following: the purpose of having the students conducting the laboratory, the learning skills or techniques that could be transferred to new situations, what objectives were enlisted in the original laboratory, could these objectives be changed to incorporate more inquiry, and could students be asked to collect and analyze data. The group indentified internet sites that could be incorporated and emphasized the role of the teams of individuals who should work together to transform one of several laboratories provided as models into higher level inquiry-based laboratories.

In the breakout session on Moving From Learning Objectives to Competencies conducted by Dee U. Silverthorn, the group defined competencies as the knowledge, skills, and behaviors that students should acquire during their training. Courses were identified that have clearly defined learning objectives related to the knowledge aspect of the course, but often in basic science classes, instructors didn’t apply enough thinking through the skills and behavioral competencies that students need. This breakout session also discussed defining competencies and mapping of competencies onto an existing curriculum.

In an interesting breakout session on Engaging our Students for Thinking Through Physiology by Hwee Cheng-Ming (University of Malaya, Kuala Lumpur, Malaysia), it was recognized that teaching is an activity where the teacher’s and learner’s minds meet. Students are stimulated to discover and learn physiology when they are not merely imbibing information but also processing it. Both in the large lecture class and especially in small-group sessions, carefully prepared questions can provide “pause-and-think” points with our students. How do we, as educators, gain insights into how students learn or do not learn physiology? Taking note of common misconceptions among students, from responses in tutorials and from written test answers, is an invaluable channel to perceive students’ understanding. This approach fine tunes the teaching process with “negative” learning feedback from our students. There can certainly be a beneficial “homeostatic” interaction between physiology teachers and students, and the approach inculcates the learning environment conducive to thinking, integrating, and enjoying physiology. Some of the diverse, creative ways and questions that have been used to engage students learning physiology in the University of Malaya were shared during this session.

Tehsin Iqbal (Khwaja Safdar Medical College, Sialkot, Pakistan), in the breakout session on Motivating Students’ Learning of Physiology Concepts: Use of Clinical Correlates as Effective Tools, deliberated that learning happens best when it is relevant, situated, and contextualized within the development of professional practice. The session provided an opportunity to identify clinical correlates that can be used in motivating students. Clinical correlates of physiology concepts were regarded as a good source of motivation for the students. Referring to them without going into their details encourages self-learning in students. The group identified clinical correlates of physiology concepts using specific topics in different areas of human physiology and also discussed how these clinical correlates could be effectively incorporated into lectures, tutorial discussions, and problem-based learning sessions or be part of some practical assignment.

Another breakout session, Assessment Systems in Physiology, facilitated by Ruhul Amin (MAG Osmani Medical College, Sylhet, Bangladesh), evaluated the validity of assessment systems in the physiology curriculum. The group emphasized that instead of the traditional examination system, modern assessment techniques, e.g., multiple-choice questions, short-answer questions, short-open-ended questions, objective structured practical examinations, and summative and formative methods of assessment, were introduced in the present curriculum. The matter was reviewed thoroughly and highlighted that the lack of an adequate number of trained and experience faculty members and technicians, lack of modern equipment and modern laboratory facilities, availability of more textbooks and reference books, study guides, and supporting assessment materials are critical learning tools. Furthermore, the group emphasized that a central monitoring mechanism could be an important tool to evaluate all faculty performance on a regular basis.

Multiple-Choice Questions: Design and Evaluation was a breakout session facilitated by Sheilla Pinjani (Aga Khan University, Karachi, Pakistan). This session provided the springboard for a novice as well as experienced teachers to make exams more valid and reliable. At the end of the session, participants were able to conduct a simple analysis and make decisions for keeping, amending, or discarding questions. The session remained informal and interactive with many opportunities to interact with peers and share viewpoints. It also provided guidelines and confidence to participants for “doing the thing right.” The aim of the session was for participants to develop a clear understanding of planning an exam, developing good multiple-choice question, and making informed decisions on the basis of the analysis. Each participant had the opportunity to apply the principles learned during the session as a take-home exercise.

In the breakout session on Adapting OSCEs to Assess Physiology Competencies conducted by Ahmed Badar (University of Dammam, Dammam, Saudi Arabia), the group deliberated on the changing trends of medical education. In the last two decades, subjective evaluations have given way to more objective evaluations. It was emphasized that other important aspects of clinical expertise, such as physical examination skills, interpersonal skills, technical skills, problem-solving abilities, decision-making abilities, and patient treatment skills, must also be assessed objectively. The objective structured clinical examination (OSCE) was recognized as a form of a multistation observed and evaluated examination for clinical subjects. It was identified as an approach for the assessment of clinical competence in which the components of competence are assessed in a planned or structured way with attention being paid to the objectivity of the examination. The method was identified as widely adoptable for clinical skills assessment in medical schools and licensure bodies across the world. The session was regarded helpful in refreshing knowledge, attitudes, and practices of an OSCE or its modified versions.
The breakout session on the Evaluation of Faculty Teaching Effectiveness was conducted by Dujeepa Samaraekera. This session emphasized that as part of the continuous quality improvement processes in education, evaluation of faculty members regarding their teaching effectiveness is an important and relevant process. The group agreed that to evaluate and then quantify the effectiveness of teachers is a difficult and complicated process. The lack of a proper structure or tools to institute robust evaluation, transparency in the process, and engaging teachers in this process were regarded as challenges for many institutions around the globe. It was also recognized as a sensitive issue, and careful handling was therefore proposed specially if one wants to maintain a good teaching culture and promote student learning. The workshop also focused on hands-on practices developing relevant evaluation processes highlighting contemporary best evidence practices.

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author(s).