## Oration of the 8th Academic Sessions

# Changing the direction of undergraduate learning: from teacher centered to student centered

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## Introduction

Among many challenges we face in the 21st century, increasing need to acquire new knowledge and new perspectives are prominent. Intense demand for learning and advances in technology are changing the nature of learning. In the past, the teachers' main role was to provide information to students but in this era of information technology, the teachers' role should not be limited to providing information to the adult learners in universities. Providing the basic content knowledge is essential, but teaching the methods of learning is more important than providing the content knowledge alone. Since knowledge and skills change from day to day, teachers cannot simply provide all the knowledge and skills required. What is most important today is to teach students how to learn. The teacher's role is shifting from a content provider towards a facilitator who promote student involvement, support student to acquire skills that help in learning throughout life, and facilitate students to take responsibility of own learning (Collins, 2009; Gwee, 2009; Wang and Li, 2010).

Continuous professional development is a well accepted requirement in the medical profession. Continuous professional development depends on doctor's ability to engage in self directed learning. In this process, he needs to analyse critically and reflect on his learning needs, formulate goals and evaluate his learning. Quality of continuous learning of medical professionals is mentioned as 'ability to manage their learning with respect to continuing professional development' in the subject benchmark statement for Medicine by UGC, Sri Lanka. Promotion of research work is also mentioned in the subject benchmark statement for Medicine by UGC, Sri Lanka (available at http://www.qaacouncil.lk/ qa_fw/SB_Reports/ SBS_Medicine.pdf.

Curriculum of Ruhuna Medical Faculty is disciplined based and traditional type. During the first and second years, students study Physiology, Anatomy and Biochemistry without clinical exposure. The teaching activities are mainly teacher centred and didactic consists of formal lectures, practical sessions, and tutorial classes during pre-clinical period. Medical education is moving towards the process with more student centred problem solving activities in the world as well as Sri Lanka (Editorial, 2005; Lam and Lam, 2009; Walker and Mouton, 2009).

Considering our undergraduate students as adult learners, we introduced few activities to the Physiology curriculum to involve them actively in the learning process by giving them the responsibility of their own learning and to make them lifelong learners (Somasiri *et al.*, 2006; Kommalage and Gunawardena, 2008a, 2008b, 2008c, 2010a, 2011; Walker and Mouton, 2009; Kommalage and Imbulgoda, 2010). I have involved in introducing these activities during the last five year period with the contribution and support from my colleagues in the department. These

activities have been evaluated and published as several peer review papers and presented in many conferences in abstract forms.

**What we did**

We introduced, assessed the progress and modified several teaching-learning activities to promote students' self directed learning, collaborative learning, communication skills, new knowledge searching ability and use of Information and Communication Technology (ICT) for learning. Our broad aim was to produce lifelong learners instead of preparing them for examinations

Following activities were used for this purpose.

1. Student-centered group classes (SCGC)
2. Short analytical essay writing activity (SAE)
3. ICT based assignments associated with lectures
4. Students' mini lectures (students' seminar)
5. Problem based Learning (PBL) tutorials

*1. Student-centered group classes (SCGC)*

Student-centered learning process was considered to improve certain skills and attitudes such as teamwork, self-directed learning, communication skills, cooperation, respect for colleagues' views, etc. (Wood, 2003). We introduced SCGC in which students conduct the class with active contribution from each student while staff member plays a passive facilitator role (Kommalage and Imbulgoda, 2010). In SCGC, a case/problem to be discussed was given at the beginning of the class. However, students were aware of the broad subject area of the case before the SCGC. Formal lectures (by staff members) were conducted parallel to the SCGC to help students learn the subject matter discussed in the SCGC. The cases used were broader and were more of problem solving type. The structure of the SCGC consisted of several segments: clarifying concepts and explaining difficult words, defining the problem or deciding the boundaries, brainstorming and systematic classification and identifying areas for further study or learning issues. The chairperson or leader who conducted the SCGC was appointed from among the students (a peer in the same class) at the beginning of each class while the staff member acted as a facilitator. During brainstorming, students generate different ideas/opinions and classified them systematically. Finally, further study areas related to the case or problem were identified. Important information discussed was recorded on the whiteboard by another student selected for that purpose. Students sat in a circle. The duration of one SCGC was two hours. Chairperson and the student who keeps records on the whiteboard were freshly appointed for each SCGC, providing opportunity for all the students to actively participate in conducting the SCGC.

Students' perception was assessed after the activity using a questionnaire. Several themes were identified appreciating SCGC by analyzing the student perception qualitatively: opportunity for discussion, quality of the knowledge, active participation, improvement of presentation ability, and increased breadth of knowledge etc. (Kommalage and Imbulgoda, 2010).

*2. Short analytical essay writing activity (SAE)*

We wanted to introduce mini-research project to preclinical students. However, we could not find a time slot for a project work within the already heavy preclinical academic programme. Therefore, we introduced an activity, 'Short analytical essay (SAE)' in which students are involved in literature search and scientific writing but not in bench-work of a research project. Each student prepared a critical analytical essay incorporating new research findings with existing

knowledge on a given medical topic. Students are expected to study on the given topic in detail from textbooks as well as from research databases/papers and write a descriptive and critical analysis. The idea is to enhance the active learning of students by stimulating them to read on a given topic and comprehend. This activity would help them to be aware of new developments in the field and understand the complexity and rapidity of change that occurs in the subject. This will also improve ICT usage of students since a major portion of work consists of ICT-based activities like searching electronic databases, using internet and preparing a document using a word processing software. In the assessment of the essay, ability to analyse and understand information derived from literature, essay construction, and relevance of the content were considered. Ten percent of the continuous assessment marks is allocated for this activity.

Perception of students was assessed about the activity. Results show that 'Learnt to use medical databases' and 'trained on scientific writing' were well agreed statements by students (3.96/5 and 3.76/5, respectively). Students also agreed that they acquired new knowledge on the given topic and it is an interesting activity (4.06/5 and 3.01/5, respectively). Writing an analytical essay is a successful active learning exercise which increases the searching ability of new knowledge and expressing it scientifically (Kommalage and Gunawardena 2008a).

*3. ICT based assignment associated with lectures*

Well-designed ICT-based components can be effectively used as active learning activities. It has been shown that active learning activities are more effective than most passive learning activities in medical curricula (Rao and DiCarlo, 2001; Krontiris-Litowitz, 2003; Shaffer and Small, 2004; Gallagher *et al.*, 2005).

We introduced information and communication technology (ICT) related active knowledge searching assignment associated with Physiology lectures. Aim was to improve ICT use for active knowledge searching process. After selected lectures, students were given a simple but specific ICT-based assignment related to the lecture, e.g., to read a content page of a website (exact URL was given) and summarize the contents in 5–10 sentences in MS Word and e-mail it to a given e-mail address. Some assignments included an internet search for specific information. All assignments were optional, and students were informed that everybody would receive feedback from the teacher after their answers had been assessed.

This assignment was a new exercise in this medical school and was not made compulsory. Participation was poor due to lack of available time, which was likely to be due to workload in parallel subjects, poor IT resources and poor IT knowledge (Kommalage and Gunawardena, 2008b).

*4. Students' mini lectures (Student seminar)*

Students mini lectures, popularly known as student seminar, was a teaching-learning process conducted by department of Physiology for years. 1st and 2nd year students participated in this peer-assisted learning process. A topic is allocated to a group consisting of four students. They work together to prepare a mini-lecture and present it to their colleagues and faculty. Usually, they do a 10-15 minute presentation. Activity promotes group work, active knowledge searching skills, presentation skills and the ability to handle questions from the audience. We introduced feedback and assessment process for this peer learning process.

We assessed the perception of faculty and students concerning the quality of 66 mini-lectures conducted by students. We compared the ratings given by students and faculty on the mini-lectures, mean ratings on different qualities of the lecture within each group and between the two groups.

Ratings for gesture, eye contact, language usage, illustration usage, audiovisuals, voice usage, and important points stressed were significantly different between students and the faculty. Multiple regression analysis was performed to assess the degree of effect of different aspects of a lecture on its overall quality. Aspects such as gesture, eye contact and language usage showed very low beta values suggesting poor contribution of these factors for the overall quality of the lecture for both students and faculty. Speed of the lecture, retaining the attention and clear introduction are qualities which faculty and students rated equally and these are the main contributors to the overall quality of the lecture (Kommalage and Gunawardena, 2011).

*5. Problem based Learning (PBL)*

Problem based learning (PBL) is a well established teaching-learning method in many leading medical schools. PBL allows students to learn fundamental principles of the subject in the context of solving problems. We recently introduced PBL tutorial for our undergraduates to train them problem solving skills together with promoting active and collaborative learning Similar to SCGC, in PBL tutorials also students conduct the class with active contribution from each student while staff member plays a facilitator role. Each PBL session consisted of three sections and ran for 5 hours; (1) Defining the case and learning issues – one hour, (2) Independent/self study – two hours, and (3) Discussion on learning issues – two hours. Two PBL sessions were conducted. Fifteen teachers participated from two departments (departments of Physiology and department of Biochemistry). Student perception was assessed qualitatively and quantitatively while perception of teachers was assessed qualitatively.

For statements 'engaged in active knowledge seeking' and 'helped me to acquire wider knowledge' showed 91.3% and 91.9% student agreement, respectively. For statements ' helped me to understand the process of solving medical problems', 'read more related topics than other subject areas', 'helped me to learn cooperating with other students' showed 91.4%. 86.1% and 85.5% student agreement, respectively. For the statement 'I like PBL tutorials more than traditional tutorials' showed 79.7% student agreement (Kommalage and Gunawardena, 2010).

Qualitative data surfaced the following themes from students favouring PBL: less stressed, freedom to talk, active and wider participation, self studies, cooperative learning, broader subject area, soft skills/personality development, clinical exposure, better learning and remembering well. Following themes were found against PBL: less defined boundaries, not aligned with examinations, difficulties in preparation, problem of time management (Kommalage and Gunawardena, 2010).

Qualitative data surfaced the following themes from teachers: appreciation of good qualities of PBL, organizational strengths and weakness, problem associated with and suggestions to improve, possible influence of PBL on non-PBL studies (Kommalage and Gunawardena, 2010)

## Discussion

*Students' perception*

Student participation and their perception are important determinants for the success of any new activity. Students showed great appreciation for most of these activities which is highly encouraging.

Students appreciated the opportunity available for discussion in the student centered group classes (SCGC), which was offered to preclinical students for the first time. Some students considered discussion as a better knowledge acquiring process. Discussion of SCGC helped them to understand unclear areas in their previous studies. They felt that they remembered the subject well

after discussing it in the SCGC. The SCGC allowed students to discuss about previous knowledge and perceptions on the subject that they gained through books and lectures. It also allowed them to clarify misunderstandings on the subject. Learning can be further developed or sharpened from that point. The students decided the extent of the study area for the SCGC, and they led the discussion according to it. This provides responsibility in own learning, which is the adult approach towards learning. This skill is important for the rest of their professional life in developing as a continuing learner. In the preparation for the SCGC, students prepare for a wider area, such as reading the whole lecture notes or a whole chapter of the textbook, and some students considered it as an advantage rather than just preparing an answer to the given question in the traditional tutorials. Therefore, some students seemed to consider that the SCGC helped them to acquire wider knowledge than the traditional tutorials. Collaborative team work was an appreciated feature of the SCGC. Students with more knowledge helped more in the discussion and led the whole group to acquire wider subject knowledge. Students appreciated the opportunity to improve their presentation skills, which is one aspect of communication skills required as a medical professional. Active participation was an appreciated quality by students. They understood the difference between passive participation in the traditional tutorials in contrast to the SCGC. Students were involved in a critical-thinking process while solving problems related to the subject matter in the SCGC. It appears that SCGCs help to improve critical-thinking and problem-solving skills, which are much-needed skills for a medical professional (Kommalage and Imbulgoda, 2010).

PBL tutorials are also highly appreciated by students. Students mentioned PBL as less stressed activity with active and wider participation which help to remember well. It provided them opportunity to talk freely. PBL also facilitated self studies, cooperative learning, soft skills/personality development and positive behavioural changes for study. Students appreciated the clinical exposure and broader subject area covered with PBL (Kommalage and Gunawardena, 2010).

IT based assignment was also mentioned by students as interesting activity. The statement "Computer/IT activities are fun" showed the greatest agreement. 76.8% of the students gave a positive opinion for adding IT-based components to the curriculum (Kommalage and Gunawardena, 2008b).

*Teachers' perception*

About short analytical essay, teachers commented that content of essay and students' commitment was high. Teachers pointed out that there is relatively less content from new research areas compared to content from textbooks. Teachers emphasized that analytical aspect of the essay needs to be improved more.

Students' mini-lectures were appreciated by staff with average 4.69 out of 6 rating for overall quality of min-lectures (Kommalage and Gunawardena, 2011)

*The product*

The product prepared by students in some of these activities can be considered as of high quality. Students' mini-lectures were appreciated by staff. Use of language, clear introduction, use of voice and audio-visual use were highly rated qualities by staff with average rating of 5.09, 4.96, 4.95 and 4.89, respectively (out of 6.00) (Kommalage and Gunawardena, 2011). Mean ratings given by students and faculty for speed of the lecture, retaining attention, and clear introduction were not significantly different nor were mean ratings for 'the overall quality of the lecture'.

Majority students scored well (60% students score over 60%) for analytical essay they prepared. However, some problems like direct copying of content from internet resources were identified in those essays (Kommalage and Gunawardena, 2010b).

*Impact on students*

Faculty of Medicine, University of Ruhuna continues to use traditional discipline-based curriculum while almost all other medical faculties in Sri Lanka changed their curriculum. However, major curriculum reform is not feasible in this medical faculty considering opinion of academic staff (Jayawardene, 2009). Therefore, introduction of major changes is very unlikely under the current system. One option we had was introduction of few activities which will help students acquire the well-recognized skills and attitudes of student-centered learning under the existing system. We can highlight some impact of these activities on students' learning.

SCGC was successful activity which we continued for four consecutive years. The process was modified later considering student feedback. Students requested notification of case/question to be discussed prior to class and incorporation of written answers to the process. We incorporated some features of the traditional tutorials to SCGC to make a hybrid that, we believe, is more suitable for the present curriculum in this medical school.

Short analytical essay activity was continued for four years. Process was appreciated by students and staff as shown by statements like 'trained on scientific writing'. Some skills acquired such as use of medical literature data bases and scientific writing were later used by students in other subjects (Kommalage and Gunawardena, 2008a).

Students' mini lectures were a good training to improve the presentation ability. Quality of presentation was of remarkably high quality according to the feedback of peer students and staff (Kommalage and Gunawardena, 2011). Students' mini lecture activity was continued for many years with some modifications and we hope it contributed to improve the presentation skills and active knowledge searching skills of students.

PBL tutorial was introduced few months ago. Students mentioned important influence on them such as soft skills/personality development and behavioural changes. Interestingly, some teachers suggested the possible effects of PBL on non-PBL studies (Kommalage and Gunawardena, 2010).

**Problems and solutions**

We faced several problems in introducing these activities. As mentioned early, broad aim of these activities was not to train students to pass examination, but to develop lifelong learning ability in them. We did not do major changes in the examination system. Since students are highly focused on examinations, they are less interested in some activities which are not aligned with examinations (Kommalage and Imbulgoda, 2008). ICT based knowledge searching assignment associated with lectures attracted poor response from students. This was an optional activity which was not assessed in any assessment process. Even though vast majority of students had a positive opinion for adding ICT-based components to the curriculum, participation to this ICT-based activity was poor (Kommalage and Gunawardena, 2008b). About PBL tutorials, students mentioned that 'not aligned with examinations' as negative aspect of PBL tutorials. To overcome these difficulties, we made some alterations. Formative assessment was introduced associated with the PBL in which each and every student was assessed on his or her performance during the process. Results of this formative assessment were displayed in the notice board as grades similar to other summative assessments. Marks allocated to the continuous assessment component was increased from 20% to 30% of the Physiology mark in the 2nd MBBS examination recently

increasing the contribution of the marks obtained from the short analytical essay by 50%. SCGC structure was changed to align with essay questions in examinations. Essay question was given at the end of the SCGC which serves as a training in answering essay questions in the examination.

Another major problem that we faced was the availability of poor resources for certain activities. Students mentioned it related to many activities. One main reason for low participation for ICT based assignment associated with lectures was poor resources (Kommalage and Gunawardena, 2007, 2008c). ICT resources are a main requirement for some activities such as ICT based assignments associated with lectures, analytical essay writing activity, PBL tutorials and students' mini-lectures. Poor internet connection, low computer availability and lack of access to online journals were mentioned by students. Unlike traditional teaching-learning activities, these new activities can lead to discrepancy among students depending on the availability of these ICT related resources such as own computers with Internet connections. Availability of library books was a concern related to analytical essay writing activity and PBL tutorials. Those two activities need wide subject knowledge. Therefore, students need to refer many books other than ordinary textbooks on the subject. The poor availability of classrooms and other physical resources was also a problem in conducting SCGC and PBL tutorials which need many class rooms due to small group size (Kommalage and Imbulgoda, 2010). As previously described by other researchers, student-centered leaning activities are expensive and adopting them in developing countries is not easy (Donner and Bickley, 1990)

Students are busy with activities related to three main subjects (Anatomy, Physiology and Biochemistry) while engaged in these activities we introduced in Physiology. One main complain was insufficient time for these new activates. Students seem to spend more time on examination driven activities. It is not easy to remove components from the current traditional curriculum. New components were included to the curriculum continuously without removing a comparable amount from the existing components or curriculum revision (Review-Team, 2010). As a solution, we try to replace some activities. We introduced SCGC and PBL tutorials replacing certain number of traditional tutorials. We allocated dedicated self study time form time table for PBL related self study.

In addition to instructions we provide to students, set of informal instructions which are formulated by students are being circulated among them. These informal instructions can sometime undermine expected outcome of these activities. This can be considered as an influence of informal curriculum which is very prominent with deep social bonding among our students (Kommalage, 2011). Students tried to find easy methods related to some activities. One good example is the detection of considerable amount of plagiarism in short analytical essays prepared by students (Kommalage and Gunawardena, 2010b). As a solution, we decided to introduce an awareness program on plagiarism before the activity so that students will be discouraged from doing such activities.

Poor ICT skills and English knowledge have some influence on the newly introduced activities. Students entering this medical faculty are having different levels of ICT skills (Kommalage and Gunawardena, 2007). Students mentioned that English knowledge influences their contribution to SCGC (Kommalage and Imbulgoda, 2010) and IT knowledge influences on several IT related components in these assignments Kommalage and Gunawardena, 2008c). As a solution, we introduced skills such as medical database searching in introductory ICT training program at the entrance particularly targeting students with poor ICT skills

Poor training of staff on some of these activities was a problem. Some students believed that tutors did not handle the SCGC properly compared to traditional tutorials. Tutors were poorly trained and less experienced in the SCGC. Traditional tutorials have been conducted in this medical school for years, and the tutors were familiar with traditional teaching methods.

Therefore, there were difficulties in terms of the tutors adapting to new teaching methods where they have to act as facilitators rather than traditional tutors (Kommalage and Imbulgoda, 2010).

Numbers of students we had per group were higher than what have been suggested for SCGC and PBL like student-centered activities. Recommended number of students per group was 8 to 10 students (Wood, 2003). Department based administrative structure in the university is an obstacle to use staff form other departments for teaching-learning activities. To overcome this barrier, we introduced PBL tutorials and students mini-lecture activity as collaborative activities with the participation of academic staff members from more than one department.

Perception of some academic members on these students centered activities was another obstacle for further development of these activities. Traditional teacher centered activities were appreciated as the sole mode of teaching-learning by some academics. Therefore, these academics are reluctant to accept student centered active teaching-learning activities as a successful method. That was one of the problems when taking decisions in some governing bodies (Jayawardene, 2009).

## Sustainability

Some of these activities have been conducted for few years continuously. SCGC, short analytical essay, student mini-lectures can be considered as established activities. These three activities require contribution mainly from one department. Therefore, administration and monitoring is easy with current administrative system in the university. 'ICT based assignment associated with lectures' was less successful. However, short analytical essay activity which was introduced later covered the main objectives of this ICT based assignment associated with lectures. PBL tutorial was introduced recently under a module with integrated components from two departments. Since integrated module is facilitated and monitored by a faculty committee, we can expect sustainability of PBL tutorial.

## Conclusions and recommendations

Newly introduced student centered teaching-learning activities show good progress considering student perception, impact on students and sustainability. Most of the problems encountered with introduction of these activities into the long established traditional system were able to overcome. Some of the activities were modified considering the feedback received from students and staff.

Teaching-learning process in universities was changed dramatically with new demands, advancement of technology and development of new methods. These changes are not limited to medical education but to other streams also. We need to change our system to adopt these new developments. Therefore, physical and human resources, administrative structure and most importantly attitude of teachers need to change toward students centered active learning to produce graduates with lifelong learning abilities to face challenges in the 21st centre.

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