Medical students have a more deep learning approach in basic sciences

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**Background**: Students’ approach to learning depends, among other factors, on the learning context. Deep learning is associated with an intrinsic motivation to learn with an interest in understanding the subject, linking ideas and concepts while surface learners want to pass with a minimum effort and reproduce information learned by rote. There is a relationship between the strategies students adopt to learn and the curricular level. We aimed to compare medical students’ approach to learning in non-clinical and clinical-years.

**Summary of Work**: The Study Process Questionnaire (R-SPQ-2F) was applied to medical students of different years after knowledge assessment of different subject area, endocrine and nervous systems in the 1st and 2nd years and endocrinology and neurology in the 4th and 5th years. Means were compared using t-student test.

**Summary of Results**: In non-clinical years in-depth learning predominates when compared with clinical-years (p<0.001) but there is no difference for superficial study. When we analyze the determinants of these approaches to study, only for superficial study, the strategic approach predominates over the motivational approach, both in clinical (p<0.001) and non-clinical years (p<0.001).

**Discussion and Conclusions**: Contrary to what might be expected, clinical-years students learn in a more superficial way than in non-clinical years. This may be related to the teaching methods adopted but also to the importance the acquisition of knowledge can have on clinical years, since in these years other competencies are valued. We conclude that students’ approaches to learning are related to the curricular level and the learning contexts.

**Take-home messages**: We must adopt strategies to stimulate a more deep learning in clinical years.

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Improvement of teaching and learning principles for ENT

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**Background**: Teaching and learning of ENT for the 5th-year medical students was undertaken during the 3-week of the medical course. The main objectives were to improve teaching and learning ENT course.

**Summary of Work**: Questionnaire was used for comparing the teaching and learning principles of ENT. The methods were composed of lecture course, OR, OPD, and bedside teaching. Considering factors included 1) Knowledge undertaken, 2) simple and straightforward, 3) treatment plan, 4) problem solving, and 5) providing advice to patients and relatives. Analytical Hierarchy Process (AHP) was applied for evaluating the most applicable methods.

**Summary of Results**: Data was obtained from extern and intern working in Maharat hospital. The problem solving was the most important factor. Four methods course. The intern considered that the bedside teaching can provide more knowledge. The most students perceived that the bedside teaching has provide the best treatment plan. It gives simple and straightforward teaching. The extern considered that the OPD can teach the best problem solving skills. The intern perceived that the bedside teaching provide the best problem solving skills. The overall students considered that the OPD well assisting in providing to patients and relatives.

**Discussion and Conclusions**: The overall students perceived that the bedside teaching was the most effective teaching methods were compared. It was found that the extern perceived that the knowledge can be best acquired from a lecture hod.

**Take-home messages**: The teaching and learning methods were composed of lecture course, OR, OPD, and bedside teaching. Analytical Hierarchy Process (AHP) was applied for evaluation.
Factors Contributing to Medical Students’ Attitude of being “Good Doctors”

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**Background:** Buddhasothorn Medical Education Center (BMEC) has been established since 2010, and aimed to produce doctors for rural Eastern Thailand. The importance of producing ‘good doctors’ with good professional performance has been emphasized in our medical curriculum. We conducted a study to explore factors contributing to medical students’ view of being good doctors.

**Summary of Work:** A cross-sectional survey was administered to the 4th-6th BMEC medical students during their academic year of 2014. We used a Likert scale questionnaire towards attitudes in nine aspects. Attitudes for their future career were compared before and after becoming clinical students. The results were analyzed by linear regression model.

**Summary of Results:** All 78 students returned their questionnaires with 98.72% completion. Students with higher GPA (above 3.0) reported higher preference scores towards classroom studying, clinical studying and the attachment with instructors got the most scores, more than residents, interns, their senior students (12.4, 7.2, 6.3 & 4.9 times). Some who did not initially aspire to be doctors improved their positive attitudes during these clinical years.

**Discussion and Conclusions:** Engagement of senior clinical doctors can contribute changes in medical students’ attitudes to being ‘good doctors’.

**Take-home messages:** Successful medical education should be composed of a multilevel of medical staff to nurture their students in multi-modalities.

Medical students’ reflection on the effect of learning methods and cognitive achievement in congenital heart disease

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**Background:** Thai medical school curriculum required Congenital Heart Disease (CHD) to be taught in the clinical year of medical school training. There are concerns on the difficulty of teaching CHD in medical students because of its complicated content. This study aimed to assess medical students’ learning methods regarding to CHD knowledge.

**Summary of Work:** The 6th year medical students at Medical Education Center Chiangrai Prachanukroh Hospital were assessed by multiple-choice question (MCQ) test which focused on CHD knowledge: pathophysiology, physical examination, diagnostic criteria and treatment. Following of each question, medical students were asked to reflect on their learning methods deriving to the answer.

**Summary of Results:** There were 24 medical students completed the MCQ test. The learning methods that had an effect on medical students evaluated by getting the correct answer of CHD knowledge were bedside teaching (70.59 %), lecture-based learning (68.18 %), on-the-job learning (58.54 %) and self-directed learning (53.85 %). Lecture-based learning and bedside teaching were the most effective learning methods on the subject of pathophysiology, diagnostic criteria and treatment, while bedside teaching and self-directed learning were more effective on physical examination topic. However, the difference between the learning methods for each subject was not statistically significant.

**Discussion and Conclusions:** Lecture-based learning and bedside teaching were more suitable for CHD teaching for the medical students due to its complicated content. On-the-job learning and self-directed learning were also effective in the different aspect of knowledge.

**Take-home messages:** Designing of students’ learning methods should be properly arranged regarding to the complexity of the content.
Towards understanding informal learning in networks of healthcare professionals – Results of a qualitative empirical study

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Summary of Work:
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Background: With ever shorter cycles of innovation, most healthcare professionals adopt short-term, self-organised ways of informal learning. Compared to more traditional learning settings, the unstructured, creative and expertise-driven informal learning cannot be designed with standardized management approaches and cannot be easily supported by information and communication technologies (ICT).

Summary of Results: The main goal was to improve our understanding of how informal learning and knowledge sharing currently take place in healthcare and how supportive ICT can look like. Therefore, we conducted an exploratory study to investigate the state-of-practice with the help of 23 interviewees representing six healthcare networks.

Summary of Results: The key findings include detailed network demographics, rich descriptions of 13 informal learning and knowledge sharing practices and in-depth discussions of the results using the lenses: absorptive capacity, knowledge protection, localized learning, challenges and network maturity.

Discussion and Conclusions: Network members engage in multiple, overlapping networks, switch between networks, and create sub-networks in order to connect to other healthcare professionals and gain timely access to valued knowledge. Informal networks are used to complement formal networks and structures while localizing knowledge to the needs of the local healthcare practice. There seems to be a need for work integrated ICT solutions lowering the cognitive load, filtering the most relevant knowledge and ensuring that the high privacy and security demands of healthcare are maintained.

Take-home messages: Informal learning is the dominant way of learning in healthcare, takes place in multiple, overlapping networks and demands new organisational and technological responses.

Effects of squeezing ball to the short-term order memory

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Summary o Work:

Background: Chewing gum can improve short-term memory by increasing oxygen uptake. We wanted to find a new appropriate way to accomplish the same aim so we investigated squeezing a ball because it’s an exercise and can lead to increasing oxygen uptake.

Summary of Work: (1) Test the hypothesis that squeezing ball can increase heart rate; Recorded heart rate of 30 participants by heart rate monitoring while squeezing ball at baseline, 30, 60, 90 and 120 seconds.
(2) The subjects were 60 1st year medical students of Suranaree University of Technology. They were divided into 2 equal groups by score on the short memory test. One group squeezed the ball while remembering as an experimental group and the other group didn’t squeeze the ball as a control group. During remembering the word from the paper which take time total 2 minutes. Both groups have to write as many words as possible in 30 seconds. Statistical analysis by t-test

Summary of Results: No different in age, gender, IQ in both groups. Heart rate increased with the time (p value < 0.01). The average number of words that the experimental group and the control group remembered was 13.23 words and 11.23 words respectively, which differ statistically significantly (p = 0.002).

Discussion and Conclusions: Squeezing the ball technique increased heart rate and improved the efficiency of the short term memory. This finding is the choice for improve memory methods in the classroom.

Take-home messages: Should study in other samples.
**The Quest for the Holy Grail: Evidencing the impact of learning**

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**Background:** Often considered the ‘holy grail’ of learning, measuring the impact of learning has long eluded educationalists working in healthcare education and training. Evidence suggests that most effective learning takes place outside the classroom – the so called ‘water cooler conversations’ – as medical professionals start to put theory into practice.

**Summary of Work:** We set out to test if capturing informal learning interventions in an online portfolio could provide the solution to the age old problem of measuring impact of learning and that by providing access to a variety of learning experiences would help improve both the competence and confidence of learners.

**Summary of Results:** By assessing reactions of learners prior to and after completing a set of formal and informal learning interventions, we demonstrated that 75% of learners moved from being unconsciously incompetent (unaware of their behaviours and lack of knowledge) to consciously incompetent (aware of their behaviours and aware of their lack of knowledge).

**Discussion and Conclusions:** By capturing the informal learning activities and experiences, it appears that learners have the opportunity to reflect on their learning and demonstrate improved self-awareness. For training departments, this translates into a demonstrable impact of learning.

**Take-home messages:** Capturing informal learning activities and experiences provides measurable benefits for both learners and training departments.

**“To-learn is impossible” if the senses and the brain are not functional, as “not-to-learn is impossible” if they are: a compulsory corollary of basic Neurophysiology**

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**Background:** Learning is an everyday phenomenon that usually occurs without us even noticing. All kinds of incoming information from the senses are processed in the human brain and, after they correlate with a past experience or knowledge, they acquire a specific meaning. The only restriction to this process is self-evident: the senses and cognition are functional. This basic physiology knowledge can also be applied in education. Since mentally healthy students come across the information, receiving and digesting it is inevitable.

**Summary of Work:** Six groups of 25 third-year medical students were divided in two sub-groups. While the teacher raised his hand, the one group was asked to keep their eyes closed (C) and the other open (O). Group C was asked whether any of them did know what happened; group O whether it was possible for any of them not to know what happened. Then, group O taught group C what happened.

**Summary of Results:** None of Cs was able to describe what happened; none of Os was able not to know what happened. Teaching verbally, Cs captured a proportion of knowledge, increased by increasing the number of words, but never reached reality, much better approached (not 100%) by repeating teacher’s gesture.

**Discussion and Conclusions:** In this teaching-learning simulation, students who came across the information (hand’s raising) inevitably learned what happened. Students who never came across the same information inevitably didn’t learn, and it was very difficult to understand after the other students’ teaching.

Students concluded two learning axioms: see title.

**Take-home messages:** It’s impossible that mentally healthy students not learn.
You can lead a horse to water but how does it think? The study habits of fourth and fifth year Aberdeen university medical students

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Background: The study techniques medical students’ use during private study is poorly understood. By discovering how students use resources, faculties can tailor their revision material.

Summary of Work: Fourth and fifth year Aberdeen university medical students participated. A focus group was carried out. Questionnaires were given to all students. The questionnaire focused on the type of resources used, how students created notes and group study participation.

Summary of Results: 149 of 389 questionnaires were returned. Thematic analysis was carried out on the focus group audiorecording. Students used textbooks, notes, internet and questions most frequently. Video and discussion forums were used uncommonly. Websites used varied, but many used Wikipedia. Students used a variety of note-taking techniques from mind-maps to copying text. Some attributed their study preference to ‘learning styles’ they perceived themselves having although most did not recall being taught study techniques. Group study was popular, but students felt the groups needed to have the right balance of personalities.

Discussion and Conclusions: Private study is an essential part of learning and something tutors have least influence over. Students use similar resources and these should be targeted by faculties wishing to provide additional support. Guidance on reliable online resources may be helpful. Students develop study techniques, most do not remember being taught them and do not feel a study tutorial would be beneficial. However it may be useful for struggling students.

Take-home messages: When considering providing revision aids faculties should consider:
- Guidance on reliable online resources.
- Videos and internet forums used infrequently.
- Struggling students may benefit from revision technique advice.

Student Self-assessment in a PBL Subject, Faculty of Medicine Vajira Hospital

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Background: Project based learning (PBL) is an educational methodology that organizes learning around a project. The teaching method provides all students with 21st century skills which are important for their lifelong learning process. However, among country’s cultural characteristic differences, the outcome of PBL is vary. The aim of this study was to explore the perception of PBL by students.

Summary of Work: The questionnaire was conducted with pilot testing and distributed via e-mail. Seventy-six 3rd year medical students in Faculty of Medicine, Vajira Hospital participated in this study.

Summary of Results: The results from the multiple choice questions-based questionnaire are as follows. 71% agree that PBL urges learners to learn by themselves. 83% agree that PBL urges learners to use their knowledge and experience to search for any information they want know. 52% agree that PBL makes learners to feel more active and inquisitive. 76% agree that PBL supports learners to be confident and skillful in the topic that they search for. 70% agree that PBL enhances learners creativity.

Discussion and Conclusions: PBL is one of the most popular learning method which students gain knowledge and skill by working and completing task with challenging questions. Most learners accepted and gained the PBL objective, but the feeling of active and inquisitive was less than others. Although PBL encouraged students to concentrate as active learners, but they still wanted to know what kind of active teaching methodology will be used in their classroom. Thus, they can prepare themselves to participate in the selected method.

Take-home messages: In order to choose the effective teaching method, lectures should consider students’ outcome.
Quiz, the wizz. How to motivate students for progression through prior knowledge

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**Background**: In courses building on prior knowledge merged from various fields it is important to early clarify gaps and expectations to optimize the learning situation. Thus different ways to obtain information and make it visible is of interest for both parties. The aim was to study a model where prior knowledge was assessed at the beginning of the course.

**Summary of Work**: A digital introductory quiz was developed. Responses were made anonymous. After completion of the 5-week course the students were asked to respond to a written course evaluation about the use and impact of the prior knowledge quiz.

**Summary of Results**: Preliminary analysis of the responses revealed different themes in relation to learning, motivation and feasibility. The students’ opinion in general was that it was an excellent way to get an idea of what to expect and also during the course it made them more alert when the questions were discussed. A few of the students thought that it was too extensive or of limited use. The majority experienced the quiz as stimulating for their learning process. The teacher considered this an excellent way to get a “kick start” and improve motivation for the content.

**Discussion and Conclusions**: Prior knowledge is often invisible. The learning outcomes may function as lighthouses on desired achievement. Still they may be difficult to interpret. Through the work with questions it is possible to make them more concrete and visualize the gaps. An introductory quiz was a feasible way to direct the students attention and motivation. **Take-home messages**: Try this at home!

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The use of competitive learning enhances exam performance: an incentivized ECG teaching session

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**Presenter**: Robert Batley, St George’s University, Sidcup, UK

**Background**: Medical students are inherently competitive, often motivated by a desire to achieve more than their peers. Despite this, barriers to learning exist, including demotivation and apathy during lectures. We hypothesised that encouraging competitiveness and stimulating drive to perform would enhance learning outcomes.

**Summary of Work**: A structured ECG teaching session was carried out on 1st year students at a major London teaching hospital. The same lectures were delivered to two groups with a subsequent examination. A prize was offered to Group 1 for the highest scorer, but not to Group 2. Six ECG topics, consisting of 6 items each, were evaluated: normal ECG, STEMI, NSTEMI, hyperkalaemia, AF and WPW syndrome.

**Summary of Results**: 114 students (49% male) participated (69 students in Group 1, 55 students in Group 2). Group 1 (19.58 (6.54)) scored significantly higher in total than Group 2 (17.02 (6.19), p<0.05; figure 1), with greater scores on normal ECG (3.8(1.8) vs 2.7(1.9), p<0.0001), STEMI (3.4(1.4) vs 2.7(1.5), p<0.0001), NSTEMI (3.3(1.7) vs 2.7(1.6), p<0.001), AF (3.6(1.4) vs 3.5(1.5), non-significant) and hyperkalaemia (3.4(1.8) vs 3.4(1.4), non-significant).

**Discussion and Conclusions**: Adding an element of competition to teaching may motivate students to pay closer attention during lectures and perform better in evaluation. This may be more salient in a medical student population who have been through a rigorous and inherently competitive selection process. A difference in test scores exists in incentivised students compared to those to whom no incentive was offered; this may be because of a heightened competitive response. **Take-home messages**: Competition could play a greater role in medical student teaching. Utilizing medical students’ inherent drive could improve teaching outcomes.
Comparison of CBL and traditional seminar for introduction of complex multidisciplinary concepts in surgical curriculum

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Background: Case Based Learning provides better knowledge retention than a conventional seminar. A new multidisciplinary topic (ERAS, Early Recovery after Surgery) was introduced into our curriculum. The aim of the study was to verify the effectiveness of traditional and CBL format and assess students preferences since preferred learning method depends strongly on cultural background.

Summary of Work: 100 students were randomized into two group: a seminar (67 participants) and a CBL group (32 participants). All students were asked to answer 10 question MCQ about ERAS before and after the surgery course. We also asked students to provide us with feedback via questionnaire.

Summary of Results: Base-line knowledge was similar in both groups (p=0,45). Mean pre-test result was 3,88 points in the seminar group and 5,59 in the case group. Mean post-test result was result was 6,7 points in the seminar group and 7,8 points in the case group and did not differ statistically (p=0,10). The progression of knowledge was statistically significant in both groups (p<0,001). In the feedback questionnaire 72% of students answered, that CBL stimulates them to prepare better for the classes. 86% of all students wanted more CBL in their curriculum.

Discussion and Conclusions: CBL was confirmed to be an efficient and well accepted by the students way to introduce a new topic in the university curriculum also in Polish cultural environment. Students prefer CBL than traditional seminar, however both ways are efficient.

Take-home messages: CBL is an efficient way of introduction new, complex concept in surgical undergraduate education.
Using concept maps to identify subject specific troublesome knowledge and threshold concepts in an undergraduate medical course

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Background: Threshold concepts are transformative, often leading to a more integrated understanding and forming a gateway to new conceptual areas of disciplinary knowledge. They are frequently associated with knowledge that is troublesome in some way for students. It may be useful, therefore, to identify troublesome knowledge and threshold concepts in order to better organise teaching resources and support students. Concept mapping is a powerful and concise knowledge representation tool, and as such could be useful in identifying threshold concepts and the associated troublesome knowledge.

Summary of Work: 24 medical students undertaking a year 2 pharmacology course were asked (after suitable training) to draw concept maps concerning core pharmacological concepts at the beginning and end of the course. Qualitative topological analysis of the maps was undertaken to identify the presence of previously identified morphological classifications that have previously been linked to student learning.

Summary of Results: Core concepts were identified via the frequency of their inclusion in student maps and potential threshold concepts revealed by areas of characteristic high interconnectivity. Potential troublesome knowledge was identified from map content that suggested student misunderstanding/loss of understanding.

Discussion and Conclusions: Topological and content analysis of student concept maps seemed to be able to identify disciplinary threshold concepts and troublesome knowledge. Changes in concept mapping post-course may reveal successful negotiation of troublesome knowledge and threshold concepts acquisition.

Take-home messages: Concept mapping can be utilised to identify subject specific troublesome knowledge and threshold concepts and may provide useful information for supporting students and in course design.

A crash course in metacognition: evaluation of a 5-week study skills programme for students in the first year of undergraduate medical education

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Background: Bridging the gap between secondary education and undergraduate medical education is challenging for many students, this is often reflected by poor performance in assessments throughout the first year of medical school. Ironically, while recent developments in medical education have seen a rise in curricular-level interventions to encourage student-centred learning, support at the level of student learning techniques to cope with this transition has been largely neglected in the literature.

Summary of Work: This study evaluates a 5-week course which aims to improve the metacognitive strategies and study skills of struggling students in the first year of medical school at Barts and The London School of Medicine and Dentistry (Queen Mary University of London). Outcomes are measured both quantitatively, in terms of student performance in summative in-course assessments throughout the year, and qualitatively, exploring student and teacher perceptions of the course.

Summary of Results: Preliminary work demonstrates that students attending the sessions have engaged positively with the course and have begun to adopt suggested metacognitive strategies in their individual studies. Students have also responded positively to measures that enhance the course’s specificity to the medical curriculum.

Discussion and Conclusions: The importance of fostering independent, lifelong learning in undergraduate medical education is well-recognised in the literature. This intervention supports this goal by facilitating medical students’ development of strategies that will allow them to learn effectively and independently throughout their training. It is hoped that this study will be developed longitudinally, to determine whether these positive effects of the course persist over time.

Take-home messages: A ‘crash course in metacognition’ undertaken early on in undergraduate medical education has utility in facilitating students’ workload management and therefore, in encouraging active, self-directed learning.
Distributed Test-Restudy: "Test" Is Not Always A Four-Letter Word In Undergraduate Health Education

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Background: Distributed test-restudy (repeated practice tests, integrated with restudy and distributed over time) has been proposed as a way to increase the durability and efficiency of learning.

Summary of Work: Purpose: to evaluate distributed test-restudy on learning in an undergraduate medicine/dentistry course. Method: 199 MD and DDS students were introduced to respiratory medicine through lectures, labs and problem-based learning. Students completed a pretest (week 3), a lab allowing for restudy of key objectives (week 3), a post-test (week 4) and a post-post-test (week 8). Correct responses were provided after the pretest and restudy lab to allow for formative feedback. Students completed a questionnaire.

Summary of Results: Results: 88% MD. Pretest: average: 50%; standard deviation: 12%; minimum: 17%; maximum: 75%; students achieving a perfect score (mastery): 0%. Post-test: average: 87%; standard deviation: 15%; minimum: 33%; maximum: 100%; mastery: 29%. Post-post-test: average: 90%; standard deviation: 9%; minimum: 75%; maximum: 100%; mastery: 29%. A significant increase in the average score occurred between the pretest and post-test (p < 0.001) and the pretest and post-post-test (p < 0.001). There was no difference between the post-test and the post-post-test (p = 0.126). 44% of students agreed/strongly agreed that the pretest was helpful. 99% agreed/strongly agreed that the restudy lab and post-tests were useful. 99% would recommend this to other students.

Discussion and Conclusions: Discussion: This study is consistent with published outcomes. Distributed test-restudy is acceptable to learners and appears to have a positive and sustained impact on learning.

Take-home messages: Distributed test-restudy has the potential to enhance learning within the health professions.