#10GG Posters: Flipped Classroom

**Location:** Hall 6

**#10GG01 (844)**

**Effects of a Flipped Classroom-based Instructional Approach on Nurse Practitioners’ Learning Motivation and Attitude in Clinical Skills Courses**

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**Background:** Previous study showed no significant difference of OSCE scores between flipped and traditional classroom in nurse practitioners learning. Following that, several learning activities and feedback were conducted in the class to encourage them to interact with peers and the instructor for discussing the treatments for clinical cases.

**Summary of Work:** The subjects were 34 nurse practitioners assigned to two groups: the experimental group learned with the flipped classroom approach, while the control group learned with the traditional instruction. Before and after the class, all of the subjects filled in the questionnaires of learning motivation and attitude for the evaluation purpose.

**Summary of Results:** The t-test results showed no significant difference between the learning motivation and attitude of the two groups. On the other hand, the intrinsic and extrinsic motivations of the experimental group were significantly increased after the learning activity. In addition, they had significantly higher satisfaction degree than the control group.

**Discussion:** It was found that the flipped classroom approach could improve the subjects’ intrinsic, extrinsic motivations, and learning attitude as well as their learning satisfactions. This implies that engaging students in applying knowledge and interacting with peers and teachers has great potential in improving their learning performances.

**Conclusion:** In this study, we demonstrated the potential of flipped classroom in clinical training. The findings can provide a reference for researchers and teachers of medical or nursing education. In the future, it is expected that follow-up studies can be conducted by leading in effective learning strategies in flipped classroom.

**Take-home Message:** The key a successful flipped classroom approach is to develop effective teaching materials and learning activities. Short videos with clear objectives enable learners to effectively acquire basic knowledge. Well-designed in-class activities encourage them to apply knowledge and interact with peers and teachers, and hence promoting their learning perceptions and performances.

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**#10GG02 (1184)**

**Is flipped classroom stimulating knowledge retention?**

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**Background:** Life-long learning is important skill that teachers wish to achieve for their students. The purpose of this study is to evaluate the effect of flipped classroom on knowledge retention of 2nd year dental students in anatomy of base of skull class at the Faculty of Medicine, Thammasat University.

**Summary of Work:** Thirty-two students who enrolled the neuroanatomy course were used flipped classroom model for anatomy of base of skull class. Students were provided with objective and lecture handouts before class. Evaluation was achieved by multiple-choice examination at the end of the class (post-test) and 6 month after the class (summative examination)

**Summary of Results:** Student’s learning performance on post-test (12.96) was significantly improved (p< 0.05) compare to summative examination (13.94) in anatomy of base of skull lesson.

**Discussion:** Flipped classroom is an efficient tool to stimulate student’s life-long learning and knowledge retention ability.

**Conclusion:** Flipped classroom model increased knowledge retention.

**Take-home Message:** Blending the new learning technologies with the interactive classroom may help to improve students’ performance including knowledge retention and creativity skill.
**Background:** The purpose of this study is to develop a flipped curriculum of clinical skills for Year-3 medical students in Taipei Medical University (TMU) with consensual assessment. The interdisciplinary experts evaluated two curriculum models, situated-flipped model and cooperative-flipped model in this study.

**Summary of Work:** This study developed curriculum with interdisciplinary experts team composed of two clinical teachers and one professor of online learning, and followed analytic hierarchy process (AHP). The experts evaluated flipped curriculums with 9-point bipolar questionnaire set according to Bloom’s taxonomy of learning domains including cognitive, affective, and psychomotor.

**Summary of Results:** The result was reliable with consensus.898, lambda 3.091, and consistency ratio .095. Weights of cognitive, affective, and psychomotor were .270, .077, and .653 in 1st layer. The weights in 2nd layer for situated-flipped curriculum were .045, .064, and .500; and .225, .013, and .153 for cooperative-flipped curriculum.

**Discussion:** AHP for curriculum development used was rarely seen in medical education, but other field education. For example: Tang developed curriculum of English as second language by AHP in 2011. Moreover, AHP honored as suitable method in curriculum planning may help us to find a better curriculum of clinical skills.

**Conclusion:** The situated-flipped curriculum of clinical skills show a better determination score than cooperative-flipped curriculum based on the pilot expertise in this study. Situated-flipped model may have more benefits on clinical skills learning in affective and psychomotor domains than cooperative-flipped model have.

**Take-home Message:** Situated-flipped model is a potential way in teaching clinical skills. However, it needs to be modified to increase the learning effectiveness in cognitive domain, and needs further empirical study to prove its effect. This study also suggested that AHP is able to be used in medical curriculum development.

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**AMEE 2017 Abstract Book**  
**Wednesday 30th August**

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#10GG04 (1813)  
The effectiveness of using flipped classroom method to teach “Professionalism” for PGY doctors---An experience of a teaching hospital in Taiwan

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**Background:** “Professionalism” is one of the ACGME core competencies used to evaluate a resident’s performance. It’s usually very challenging for clinical mentors to teach “professionalism” by traditional lectures. We’ve tried to use flipped classroom method to teach PGY doctors the concept of professionalism by “learning at home and discussion/practice at classroom”

**Summary of Work:** Our hospital has started new courses of ACGME core competencies since July, 2016. As to “professionalism”, we’ve made films mimicking the clinical scenarios for PGY doctors to watch at home first. Then teachers discussed with PGY doctors about the films in the classroom later. Pre- & post-tests were also performed.

**Summary of Results:** We’ve recruited 20 PGY doctors to participate new courses. During the discussion, we encouraged PGY doctors to analyze and debate the ethical issues in the films. Their average test scores significantly improved from 69.0±4.5 to 99.0±1.0 (p=0.001). Compared to traditional lecture, their satisfaction rate also increased from 53.4% to 90.5%.

**Discussion:** Flipped classroom method has been used in medical education for many years. Teachers usually need to spend more time in preparing the teaching materials than traditional lectures. However, our experience revealed PGY doctors could learn better by flipped classroom method, also with higher satisfaction rate while compared to traditional lectures.

**Conclusion:** More PGY doctors preferred the flipped classroom method to learn “professionalism”. Our films demonstrated several ethic issues, such as end-stage medical cares. Besides providing suitable films for PGY doctors to watch at home first, how to design the classroom activity is more important for flipped classroom method to work successfully.

**Take-home Message:** Using flipped classroom method to teach “Professionalism” instead of traditional lectures improved the learning effectiveness and satisfaction rate of PGY doctors. Although preparing the teaching material is very time consuming, it’s still worthwhile to use flipped classroom method for teaching ACGME core competences in residency training.


**#10GG05 (2636)**

**Flipped Classroom (FC) Intercalated Curriculum Development of Pharmacology for Overseas Students at SMU**

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**Background:** Southern Medical University (SMU) has begun to enroll international MBBS students with its rapid internationalization. Pharmacology is an important subject bridging basic medicine and clinical medicine. In order to ensure the quality of English-medium education, we have been endeavoring to develop a flipped-classroom intercalated curriculum of Pharmacology for overseas students.

**Summary of Work:** In our practice, the FC (20 hours) was carried out mainly by case-based discussion about drug mechanism, effects and application etc.. While the others (160 hours) were still traditionally lecture-based. This mode was applied in three different batches of MBBS students (total 424) respectively, with follow-up surveys carried out.

**Summary of Results:** Totaling our 2 paper-based and 1 internet-based surveys, among the 306 respondents, some positive findings of FC include the improvement/enhancement of: learning interests (82.73%), knowledge of clinical medicine (84.20%), critical thinking (78.92%), etc.. Also, embracing more student-centered teaching (78.76%), satisfactory with the overall curriculum (72.86%), etc.

**Discussion:** We initiated this FC featured course aiming to meet the world development. Evidence has shown quite satisfactory outcomes, which encouraged us to improve our English teaching ability greatly, and has facilitated the giant progress of this curriculum from a university excellent course to a national excellent course in 2016.

**Conclusion:** FC is quite effective for concerning improvement in MBBS students’ attitude, knowledge, and skills domains. It can also facilitate the overall development and implementation of English-medium Pharmacology course. More FC contend and measures could be intercalated into Pharmacology or other courses to further improve the quality of MBBS education.

**Take-home Message:** We should reinforce the website construction of this FC intercalated Pharmacology to facilitate more web-based interactive learning and teaching. Further strengthen faculty development under the international context to improve English-medium teaching competency. Adapt more advanced international experiences into our practice, implement even more student-centered teaching methods in our MBBS education.

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**#10GG06 (3320)**

**Exploring Medical Students’ Conception of Learning in the Flipped and Traditional Learning Contexts: A Phenomenographic Study**

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**Background:** Research has showed that student’s conceptions of learning (educational contexts dependent) are associated with learning approaches and learning performance. This study aimed to explore medical students’ conceptions of learning in flipped and traditional learning contexts through pre-clinical to clinical setting to bring educational insight of flipped learning in medical education.

**Summary of Work:** This study included 77 medical students (37/40, pre-clinical/clinical setting) who experienced both the flipped and traditional learning contexts. Semi-structured interviews were held individually. The verbatim transcripts were analyzed using phenomenographic method to classify students' conceptions of flipped and traditional learning in a hierarchical manner, and comparison was also made.

**Summary of Results:** Nine qualitatively different conceptions were identified in a hierarchical manner. They are learning as “preparing for testing,” “attendance,” “memorizing,” “review,” “preview,” “applying knowledge,” “understanding,” “extension of knowledge” and “seeing in a new way.” 68 students perceived higher level of conceptions of learning in flipped learning than in traditional learning contexts.

**Discussion:** The results showed significant difference when comparing with traditional one consistently from pre-clinical to clinical setting. This study may not only inform the insight of flipped learning but also bring a new direction to investigate learning context. Investigation about the associations between conceptions and performance of learning is next step.

**Conclusion:** We concluded that the flipped learning in medical education improve the conception of learning which means medical student hold more sophisticated academic epistemological beliefs toward learning when in flipped learning than in the traditional learning context. Students’ perception about conception of learning bring new perspective to investigate instructional design.

**Take-home Message:** 1. Students perceive conceptions of learning differently in different learning contexts
2. Flipped learning promote high level conceptions of learning for medical students from pre-clinical to clinical setting
3. Higher level conceptions of learning reflect more sophisticated academic epistemological belief of student in specific learning context may therefore influence learning approaches and performance.
Background: Recently, Flipped classroom (Fc) is a novel learning design for enhancing student engagement and inspiring self-inquiry learning. Clinical experience allow medical students to apply knowledge. Moreover, mobile group-chat application such as “Line App” can make interactive participation. Application of these in flipped classroom may enhance team-based learning and apply knowledge.

Summary of Work: Three Fc models were used in 43 of the 5th-year medical students in medicine. Each model contains 4 groups of 3-4 students. Model-A(Classical Fc), Model-B (Case-based Fc) and model-C (Case-based Fc facilitates with “LINE App”) were applied by assigned each group to create questions about laboratory investigations for classroom quiz.

Summary of Results: Model-C had significantly highest knowledge examination score (33.9±3.7, 39.0±3.5, 50±10.4 in model-A&B&C respectively, p=0.004) and facilitated students for peer tutorial. By rating scale questionnaire, Model B and C not only achieved higher self-inquiry and team-based learning level but also stimulated more participation and understanding learning contents during classroom attention.

Discussion: Case-based Fc models which assigned each group to create quiz from real patient, enhance student engagement for inquiry-learning owing to solve problems. Moreover, mobile group-chat application creates a continuous learning atmosphere such as peer tutorial, interaction between themselves and teacher in “every moment” leading to accelerate application of knowledge.

Conclusion: Clinical case based flipped classrooms enhance self-inquiry learning and promote team-based learning. Additionally, the facilitation with mobile group-chat application can create learning atmosphere of peer group and individual student for apply knowledge in clinical context.

Take-home Message: Appropriate use of mobile chat-group application technology facilitated with clinical case-based context in realized experience augmented powerful flipped classroom for team based learning and application of knowledge.

#10GG08 (2047)
Medical students’ perceptions of a flipped classroom for a freshman professionalism course: A mixed-methods study

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Background: It has been reported that the introduction of a flipped classroom results in improved class attendance and grades. We conducted a mixed-methods study on the students’ perceptions of a flipped classroom. The subjects were 25 freshmen students of Kagawa University, who attended the professionalism course that employed flipped classroom.

Summary of Work: A questionnaire using the Likert scale (5: totally agree) was quantitatively analysed. This questionnaire was designed to assess (1) readiness to learn, (2) activate knowledge gained from preparatory videos in face-to-face classes, and (3) introduce self-directed learning. Qualitative data were obtained from a focus group consisting of five students.

Summary of Results: In the questionnaire, the mean scores for (1), (2), and (3) were 4.3 ± 0.5 (mean ± SD), 4.5 ± 0.6, and 4.3 ± 0.6, respectively. A qualitative analysis of transcripts of the focus group identified 12 topics in six domains, including readiness to learn, activated knowledge, and self-directed learning.

Discussion: The results of the questionnaire and the focus group included similar concepts: readiness to learn, activated knowledge, and self-directed learning. These concepts were important for active learning, and the flipped classroom model can serve as an active learning strategy.

Conclusion: From the students’ perceptions, the flipped classroom model leads to the introduction of readiness to learn, activated knowledge, and self-directed learning. These concepts were important for active learning, and the flipped classroom model can serve as an active learning strategy.

Take-home Message: The flipped classroom model can serve as an active learning strategy, introducing readiness to learn, activated knowledge, and self-directed learning.
Student behavior and feedback in undergraduate orthopaedic teaching using flipped classroom model in Thailand

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Background: The flipped classroom teaching model has recently gained more popularity due to its positive impact on student satisfaction and promoting active learning. There are a number of successful implementation of this model in medical education. However, data is lacking for this model in orthopedic class teaching.

Summary of Work: In 2015-6, a 3-week orthopaedic block in the fifth year was redesigned. All 18 lectures were delivered online prior to the class. The in-class sessions were case discussion guided by facilitator with approximately 24 students per group. Self-developed questionnaires were distributed and collected at the end of the studying year.

Summary of Results: The feedback from 203 students revealed diversity of learning nature of students. A part of them had passive and strategic nature in studying, which their behavior depended on character of facilitators in class sessions. There were some relevance of student gender and cumulative grades with their behavior.

Discussion: The implementation of flipped classroom model in orthopaedic teaching is still unfamiliar to Thai students requiring student adaptation. Consequently, the response are various, which may be affected from student background, such as gender and cumulative grade. Influence from in-class facilitators is also important on learning nature of students.

Conclusion: Even though the flipped classroom model has more benefit than traditional teaching format in theory, it can bring unfamiliarity and result in uncooperative behaviors that hinder the achievement of expected outcome. Character of facilitators as well as student background must be considered in implementation of this model.

Take-home Message: Variety of responses can be expected and uncooperative behaviors can occur in the flipped classroom model, partly related to character of facilitators and student background. Thorough consideration before implementation and continuous assessment are essential.

Integration of flipped classroom and high-fidelity simulation to improve ICU residents’ ability with respect to brain death evaluation and organ procurement

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Background: The organ donation rate in Taiwan is about 7.2 per 1 million populations, far lower than that in Spain (35.1) or the USA (25.8). The reasons for the low donation rate include the fact that doctors sometimes fail to recognize potential organ donors or explain brain death.

Summary of Work: We created a flipped-classroom with a high-fidelity simulation that included giving information about the donor candidate’s state, explaining the brain death, showing respect to the family’s point of view, and explaining the concept of organ donation and its related problems. Nine ICU-residents, two examiners, and one standardized patient were participated.

Summary of Results: The pre-assessment score revealed 50% residents were unfamiliar with brain death evaluation and organ procurement. The results of the simulation revealed a high-score in giving information about the donor candidate’s state and showing respect to the family’s point of view (3.95/5), and the lowest-score in explaining the brain death (3.48/5).

Discussion: One of the examiners was a consultative psychologist who gave immediate feedback. The residents’ reflections included understanding the importance of brain death evaluation and their shortcomings in communication attitudes and skills. The overall satisfaction in the flipped classroom was 4.89/5 and that in the simulation training class was 4.78/5.

Conclusion: In this workshop, we found that 50% of the ICU R3 residents had reduced ability with respect to brain death evaluation and organ donation concepts. This finding can help develop a teaching program to improve their ability with respect to brain death and organ procurement.

Take-home Message: This flipped classroom with high-fidelity simulation can be used to train the ICU residents to become more familiar with brain death evaluation and organ procurement.
#10GG11 (3106)
Finding the Perfect Balance between Flipped Learning and Lecture-Based Instruction

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Background: The flipped learning approach is gaining popularity among modern medical schools. Questions remain about how much of the curriculum to flip, and whether the in-class sessions for flipped lessons should be mandatory. Our study investigated whether medical students prefer flipped or lecture-based formats, and under what conditions.

Summary of Work: A 2016 study was conducted the School of Osteopathic Medicine in Arizona in the U.S.A. We surveyed 108 first year students about their learning preferences, using an online survey, with a response rate of 99%. Likert ratings were analyzed using a statistical package: open responses were analyzed using open-coding processes.

Summary of Results: Students indicated their preferences for how the curriculum should be balanced. Nearly half (44%) of the students wanted more than 50% of the curriculum to be lecture based, while 18% selected a 50%/50% mix of lecture/flipped activities. The vast majority (68.7%) indicated that flipped learning activities should not be mandatory.

Discussion: Students indicated an openness toward flipped classroom learning activities, under certain conditions. Flipped activities should be well-planned and non-mandatory, useful for certain disciplines and not others. These preferences reflect millennial values for personal choice, time-efficiency, and variety with regard to learning experiences.

Conclusion: Our faculty enjoy interacting with students during in-class activities, and work very hard to develop creative, engaging lessons. However, we did not know enough about student preferences with regard to flipped learning format. We conclude that <40% should be flipped, and these sessions should not be mandatory.

Take-home Message: This experience has been very enlightening. We better understand variables associated with optimizing active learning and lecture-based instruction –from the student perspective. While individually, our students revealed differences in personal preferences for learning approaches, they shared with us important insights on ways to improve instruction and structure the curriculum.

#10GG12 (1023)
Comparison of Allied Health Science Students’ Outcome towards Learning Methods between Flipped Classroom and Traditional Lecture in Basic Anatomy of the Nervous System

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Background: Teaching the nervous system has challenged anatomy lecturers worldwide due to its difficulty and time limitation. Several researchers have shown the advantages and disadvantages using flipped classroom in medical education. To investigate its effectiveness, this study was conducted comparing allied health science students’ outcome towards flipped classroom with conventional lecture.

Summary of Work: 437 students of Basic Anatomy for undergraduate curriculum at Chiang Mai University in 2015 and 2016 were assigned in flipped classroom and lecture-based learning, respectively. To evaluate the knowledge achievement, a set of true-false questions was used before and after learning activities. Questionnaires were distributed to assess their satisfaction.

Summary of Results: The flipped-classroom utilized less in-class time and showed significant better score (p < 0.05) when compared to lecture-based learning. Overall student feedback was positive concerning the self-directed and interactive aspects of this learning method (4.33; rating scale 1-5). Nevertheless, it required considerable time to prepare learning materials for self-directed activities.

Discussion: The results of flipped classroom method were superior to that of traditional lecture. Nevertheless, when creating the lesson materials, lecturers should concern its limitation. Adequate preparatory time is necessary and electronic materials must be prompted.

Conclusion: The flipped classroom is the effective learning method which promotes students’ skill of active learner and lifelong learning ability. Further studies are required to confirm these effects on their learning behavior.

Take-home Message: Flipped classroom method is highly recommended in Thai medical education.
#10GG13 (2777)
Enhancing flipped teaching using the mobile application Nearpod creates a dynamic teaching environment increasing student confidence and engagement

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**Background:** Clinical scientists bridge the gap between the diagnostic laboratory and clinical team, bringing expert knowledge of laboratory investigations to provide interpretation of results and advice on an appropriate testing strategy. Clinical scientists are trained through a competitive three year NHS apprenticeship-style programme, incorporating on-the-job training with a part-time MSc.

**Summary of Work:** We sought to identify new ways for students to contextualise theoretical knowledge into case-based scenarios simulating their profession role using an interactive flipped teaching model incorporating the iPad application Nearpod. Nearpod allows tutors to create interactive content for students who participate anonymously during a group teaching session.

**Summary of Results:** During face-to-face teaching, students were presented with two cases and asked to work through them individually on Nearpod, prior to group discussion. 85% of students reported increased confidence with course content following interactive teaching sessions. 67% of students found a key advantage was the ability to contribute anonymously.

**Discussion:** Students were also given case-based pre-session material also using Nearpod. Tutors received a report of individual answers for Nearpod content allowing weaker students to be identified, and teaching groups allocated based on a range of abilities. Students commented that each person had to contribute equally.

**Conclusion:** Tutors commented that Nearpod allowed development of a dynamic teaching environment, allowing tutors to gauge student understanding and therefore decide how to progress the teaching session. 85% of students felt they would benefit from more flipped teaching within the curriculum.

**Take-home Message:** Nearpod has allowed development of both a dynamic teaching environment and allowed identification of struggling students to provide additional support. This study has demonstrated that use of Nearpod can aid both students and their tutors in delivery of a flipped teaching model.

#10GG14 (1054)
Simulation base education with flipped classroom improves resident clinical performance in intensive care – the experience of Taipei Mackay Memorial Hospital

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**Background:** Utilizing simulation base education (SBE) with flipped classroom (FC) to improve physician’s clinical skills is the trend of current medical education, this method reasonably encourage students and teacher interaction and simplify the teaching course. It is supposed to facilitate core ability of intensive care in R3 internal residents.

**Summary of Work:** Our workshop included 30-minute bridge-in, objective, pre-assessment and 40-minute flipped classroom. About participatory learning, there were total 85-minute four simulated scenarios including intra-aortic balloon pump and pace-maker simulation, therapeutic hypothermia, abdominal echo in ICU treatment and the chief resident’s leadership. The last, we had 30-minute reflection and summary.

**Summary of Results:** There were 9 residents, 4 trainers, 4 nurses and 2 standardized-patients participated in this workshop. The training workshop not only earned their satisfaction toward FC (4.9/5) and SBE (4.9/5), but also promotes ability in MICU (Likert scales, from 3.0/5 to 3.6/5) and alleviated difficulty in MICU (from 3.8/5 to 3.6/5).

**Discussion:** There exist a gap between awareness and clinical performance in resident’s ability. “Match” is defined as consistency in written-test and simulation, whereas “mismatch” is defined as inconsistency in both. Thus, “match-mismatch highlight” is our principle strategy to appraise resident’s professionalism. Trainees felt the workshop is helpful in the future (4.6/5).

**Conclusion:** In this workshop, combining flipped classroom and SBE not only improve the validity of integrated critical care but also focus on individual deficiencies. On the basis of match-mismatch highlight, faculties will more easily create preliminary remediation before they become a chief resident.

**Take-home Message:** This flipped classroom with high-fidelity simulation can be used to train the R3 ICU physicians to become more familiar with advanced intensive care ability and chief resident’s leadership.