

## Student-Led Objective Tutorial (SLOT) in Medical Education

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### **Abstract:**

**Purpose** - To assess an innovative tutoring program named 'Student-Led Objective Tutorial' (SLOT) among undergraduate medical students.

**Method** - The program was conceptualized by the Pharmacology Unit of Faculty of Medicine and Health Sciences, Asian Institute of Medicine Science & Technology (AIMST), Malaysia and implemented in the middle of 2005. A cohort of 246 medical undergraduate students (spread across 5 consecutive batches) participated. Following a brief explanation on the purpose and nature of SLOT, each batch was divided into small groups and was given a reading assignment on 4 previously delivered lecture topics. Each group was asked to prepare 3-5 multiple choice questions (MCQs) of their own in PowerPoint format to be presented, in turns, to the whole class on the day of SLOT. The proceedings were facilitated by 2 lecturers. Student feedback on the efficacy and benefits were assessed through an anonymous self administered questionnaire.

**Results** - About 76% (188) of the students favored SLOT. The acceptance rate of SLOT was higher among males. There was no significant difference between batches in their opinions on whether to pursue SLOT in future. The most prevalent positive comment was that SLOT enhanced learning skills, and the negative comment being, it consumed more time.

**Conclusions** - SLOT is a novel tutorial method which can offset faculty shortage with advantages like enhanced interest among teachers and learners, uniform reach of content, opportunities for group learning, and involvement of visual aids as teaching-learning (T-L) method. SLOT unraveled the students' potential of peer tutoring both inside as well as outside the classroom. Consumer tutors (students) can be tapped as a resource for SLOT for all subjects and courses in healthcare teaching.

**Keywords:** novel teaching-learning (T-L) method, tutorial, self learning, small group learning, medical students, staff shortage

A tutorial is a class or short series of classes in which one or more instructor provides intensive instruction on some subject to a small group.<sup>1</sup> Tutorial classes for medical students are imparted to develop and test their own ideas, clarify material presented in lectures, apply general concepts to the solution of specific problems, define new problems and seek solutions to them, hone problem-solving skills and encourage students in self learning.<sup>2</sup>

According to Savery and Duffy, learning occurs through multiple interactions within the learning environment, especially when the students are encouraged and expected to think both critically and creatively.<sup>3</sup> Learning is not one directional (teacher to student), but multi-directional, including other students, tutors, and professors. The student receives guidance and support from the significant others.<sup>4</sup> Responsibility for learning

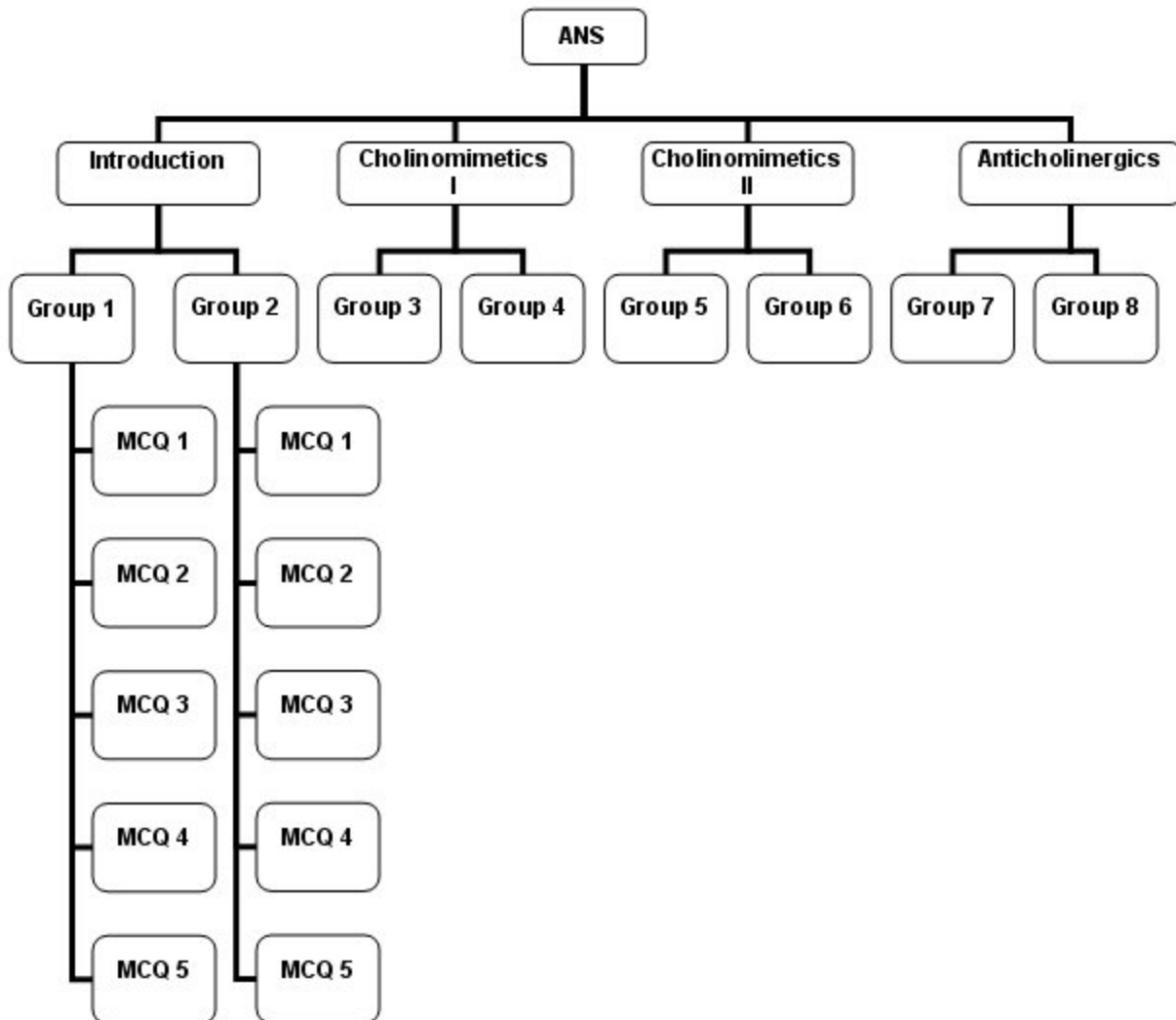
should be placed on the student, with the instructor's role shifting from lecturer to facilitator. From students' point of view, the main characteristics for a good tutorial are tutors: a) allowing enough time for discussion, b) accepting students as partners, c) refraining from interference and d) having expertise.<sup>5</sup> It has also been found that the components of a rich learning environment are stimulation by classmates, a knowledgeable and creative faculty and a large amount of personal contact between students and instructors.<sup>6</sup>

Learner Centered Education (LCE) places the responsibility for learning on the student with the instructor's role shifting from lecturer to facilitator. It is recommended that students become engaged in activities that produce deeper understanding of course content through skill development.<sup>7</sup> They learn better and more, when they are involved actively in learning than when

they are passive recipients of instruction.<sup>7, 8</sup> In general, students learn what they practice.<sup>8</sup> It has been suggested that students acting as peer tutors can be appealing and create constructive educational opportunity to further their academic development. The same study showed that about 96% of all graduates had acted as student tutors at some time during the program and such experience expanded their academic expertise.<sup>9</sup> Studies have also shown that student-generated learning issues serve as critical determinants for self-learning.<sup>10,11</sup> Students

should be allowed to “learn by doing” to enable them to master their subjects, develop independence and become problem-solvers, critical thinkers and life-long learners.<sup>6</sup> For effective learning, teaching needs to involve a multi-sensory approach filled with variety.<sup>12</sup> Visual aids, when used as a presentation tool, provide variety and stimulate interest in the learning environment and is pedagogically effective.<sup>13</sup>

**Figure 1: Model Flow Chart Depicting Division Of Groups And Allocation Of Topics Among A Given Batch Of Students for SLOT**



Medical education is experiencing, on one hand, a massive paradigm shift in pedagogy, and on the other hand, dearth of teaching staff. Shortage of teaching staff is not only experienced in near developed countries like Malaysia but also in developed countries like the United States and United Kingdom. Dilution of the medical teaching staff worsens with the concomitant increase in the number of medical schools.<sup>14</sup> In the current scenario, with existing staff strength, conducting conventional tutorial for small groups is becoming more and more impractical. Other deficiencies of the conventional tutorial are lack of active and full participation by students, passive learning strategies and lack of opportunity for team work. The key issues that were considered for the present study were the value of working in small groups, providing an opportunity for active learning, addressing limited faculty time and utilization of visual aids as a presentation tool.

Towards these objectives, a novel method was initiated by the Pharmacology Unit of School of Medicine, Asian Institute of Medicine Science & Technology (AIMST), Malaysia. A new type of tutorial entitled “Student Led Objective Tutorial” (SLOT) was formulated with a view to overcome certain deficiencies of the conventional tutorial and embrace some merits of its own.

### Method

A partnership between five successive batches of medical students who were undergoing the first two years of a five year MBBS course and the Pharmacology Unit of Faculty of Medicine & Health Sciences, AIMST, Malaysia, was formed in the middle of 2005. This partnership jointly studied the feasibility of the innovative tutoring program.

**Table 1. Demographic Characteristics of SLOT Study Participants**

Variables	Number (%) Favoring SLOT	Number (%) Not favoring SLOT	Total Number	P value
<b>Gender</b>				
Female	100 (72)	39 (28)	139	<b>0.0413*</b>
Male	88 (82)	19 (18)	107	-
<b>Year of Study<sup>^</sup></b>				
I	91 (77)	27 (23)	118	<b>0.4615#</b>
II	97 (76)	31 (24)	128	
<b>Batch<sup>@</sup></b>				
4	19 (76)	6 (24)	25	
5	40 (77)	12 (23)	52	
6	38 (75)	13 (25)	51	<b>0.2656#</b>
7	38 (68)	18 (32)	56	
8	53 (85)	9 (15)	62	

n=246

\* Significant;

# Not significant

@ Admission batch numbers of the participating students

<sup>^</sup>The first 3 batches (Year III and IV of MBBS course) have already entered clinical side, hence did not participate in the study. There are 2 intakes per year (2 batches of around 60 students per intake).

Pharmacology, a system wise, horizontally integrated course, is taught during the second term of Year I and both the terms of Year II for medical undergraduates. At the time of the study, there were five different batches in all (in a given year there are two intakes, and each intake is considered a batch). Students from each batch were divided into small groups, ranging from five to 10 depending on the size of the class. Each group self-elected a group leader to whom the sub topics of the preceding four lecture topics were allotted. Each group was instructed to read the given sub topic and prepare three to five multiple choice questions (MCQs) in PowerPoint format for presentation in the tutorial session. Each session lasted between 60 and 90 minutes, depending upon the number of groups, which in turn was determined by the batch size. The students were instructed to approach the lecturers for clarification during preparation, like framing of questions for SLOT. A model of how the process was carried out is illustrated in the flow chart in Figure 1. A model of MCQ slides was given to the class as a guide for the students for preparing their SLOT session (Figure 2).

On the day of the tutorial, students of all the groups of a particular batch assembled in the lecture room which was equipped with a computer and projection system. The groups took to their respective positions. The leader of Group 1 displayed the first MCQ to the class to which Group 2 was expected to respond while other groups observed, and if the answer was incorrect, the question was passed on to subsequent groups. Irrespective of the nature of the response, the next slide displayed the correct answer. The third slide showed the objective for setting the question. This process was repeated until all the groups completed their presentations. All groups had equal chances of posing and answering questions.

Two lecturers (only two lecturers were available to teach Pharmacology) monitored, intervened and assisted the proceedings. The interventions by the lecturers included comments upon the difficulty level, explanations and suggestions on the MCQs presented wherever appropriate.

At the end of the first tutorial, an anonymous questionnaire (Appendix 1) was administered to the participants to elicit their perceptions on SLOT. Apart from their basic demographic data, the questionnaire covered areas pertaining to the relevancy, interest stimulation, assistance in understanding of the content, guidance provided, learning opportunity, and acceptance of SLOT compared to conventional tutorial. The responses were obtained on a Likert scale (strongly agree = 4 to strongly disagree=1) to indicate their degree of

agreement with the statements in the questionnaire. Three open ended questions about the best and worst aspects of SLOT, and any other free comments were also part of the questionnaire. The data were entered in Microsoft Excel and comparison of frequencies using Chi square test was done.

## Results

In all, 246 medical students participated in the SLOT study. Demographic data are provided in Table 1. The median age of the respondents were 21 and 22 Years for Year I and Year II respectively. The gender distribution was 57% (139) vs. 43% (107), female to male, and the difference is not statistically significant.

More than 75% of the students were affirmative in the post-SLOT survey about various aspects of SLOT (Table 2). Nearly two-thirds of the students favored SLOT as their future tutorial method. The acceptance was higher among males, 82%, ( $P=0.0413$ , one-tailed) though 72% of females accepted SLOT. There was no significant difference between batches on their agreement to continue SLOT in future. There was also no difference between genders within batches.

However, surprisingly, in the open-ended questions (Table 3), 140 comments noted that SLOT enhanced their learning skill and was cited as the best aspect of SLOT. Commenting on the worst aspects of SLOT, participants felt that it was time consuming and some of the MCQs were ambiguous. Some also lamented the lack of cooperation among team members (Table 3).

## Discussion

Nearly three-quarters of the cohort of medical undergraduates who participated in the study were optimistic about SLOT. Although performance in tutorial classes was comparable among the genders, significantly higher acceptance of SLOT was noted among male students. In a study involving PBL tutorial, such gender difference was seen but was attributed to improvement in the performance of female groups, rather than to a decline in performance of the male student-led tutorial groups<sup>17</sup>. In the present study, the better performance was in the reverse order. This may be a reflection of factors such as different learning styles and liking of team work.<sup>18</sup> Students agreed that SLOT was relevant to the topic, giving it the highest rating. Also achieving the highest rating was the interest of the tutors in facilitating and the usefulness of lecturer's supervision (reelected by the mean score 3.2). Similar high mean scores were obtained for stimulation of interest in the topic; enjoy working with a team, and

**Figure 2: A Model Of MCQ Slides Shown to the Students as a Guide for Preparing Their SLOT Session.**

<p>Antimuscarinic (atropine like) drugs may be used in the following situations EXCEPT</p> <ul style="list-style-type: none"><li>A. <i>Narrow angle glaucoma</i></li><li>B. <i>Drug-induced Parkinsonism</i></li><li>C. <i>Organophosphate poisoning</i></li><li>D. <i>Motion sickness</i></li><li>E. <i>Prae-anesthetic medication</i></li></ul>	<p><b>Slide 1</b> Leader of Group 1 projected the MCQ to the class. Question was open for a minute to Group 2 to answer. In case of wrong answer, the question passed on to subsequent groups with a 30 seconds time limit.</p>
<p>Answer</p> <p style="text-align: center;"><b>A</b></p>	<p><b>Slide 2</b> Irrespective of the response, the correct answer was displayed.</p>
<p>Objective</p> <p><i>To emphasize that atropine like drugs are contraindicated in conditions of raised intra ocular condition (Glaucoma).</i></p> <p><i>And all other conditions listed are indications.</i></p>	<p><b>Slide 3</b> The objective for setting the MCQ was highlighted. The answer was discussed and an explanation provided by the presenter. The other groups and/or lecturer had the option to comment (e.g. on ambiguity).</p>

**Table 2. Evaluation of SLOT over a scale of 1 to 4 by medical undergraduates of Asian Institute of Medicine, Science & Technology (AIMST)**

Serial Number	Statement	Number Agreed (%) <sup>*</sup>	Score <sup>@</sup> mean $\pm$ SD
1	The new type of tutorial was relevant to the topic	239 (97)	3.2 $\pm$ 0.6
2	The new type of tutorial stimulated interest in the topic	207 (84)	3.1 $\pm$ 0.7
3	The new type of tutorial assisted me in understanding of the content of the lectures	190 (77)	2.9 $\pm$ 0.7
4	The new type of tutorial provided guidance on how to learn effectively for this topic	162 (66)	2.7 $\pm$ 0.7
5	I learned more than I would have by participating in a traditional (old type) tutorial	165 (67)	2.8 $\pm$ 0.8
6	I received adequate feed back on my tutorial work	185 (75)	2.9 $\pm$ 0.7
7	The tutors were interested in helping me learn	225 (91)	3.2 $\pm$ 0.6
8	I enjoyed working with a team	220 (90)	3.1 $\pm$ 0.6
9	The group work increased my ability to learn independently	193 (78)	2.9 $\pm$ 0.7
10	My group succeeded working as a team	207 (84)	3.1 $\pm$ 0.8
11	The supervision by the lecturer was useful	230 (93)	3.2 $\pm$ 0.7
12	I look forward to have more of this kind of new type tutorial	188 (76)	3.0 $\pm$ 0.9

n=246

\* Figures include 'Agree' and 'Strongly Agree'.

The figures of 'Disagree' and 'Strongly Disagree' are not shown.

@ Mean score of the sample population for each item over a scale of 1 to 4 (Strongly Disagree to Strongly Agree)

groups' success working as a team. Generally, a high level of enthusiasm was observed among the participants. This correlates with the suggestion that students acting as peer tutors can be appealing with a constructive educational opportunity for furthering their academic development.<sup>9</sup>

Participants gave the lowest rating to guidance provided for effective learning of a particular topic and acquisition of knowledge via SLOT (mean score of 2.7 and 2.8, respectively). However, surprisingly, when asked for the best aspects of SLOT, 59% of the total comments revolved around increased learning skills. More than two-thirds of the students agreed about receiving adequate feedback on their tutorial assignment via SLOT.

Students expressed facing difficulties in the first tutorial session. This is in accordance to other findings<sup>17</sup>

which is inherent upon introduction of any novel teaching method. Some complained of difficulties in obtaining full cooperation of their team members during their out of class discussion. According to Sobral, "experience expanded peer tutors' academic expertise"<sup>9</sup> and the same is hoped for our students with successive exposure to SLOT sessions. More than two-thirds of the students indicated they agreed that they received adequate feedback on tutorial work via SLOT. It is worth mentioning that difficulties during the first tutorial session were not only faced by learners but also by facilitators. When we gathered experience, we were able to organize the sessions in a more systematic manner. This was reflected in the improved SLOT acceptance rate, from 68% (Batch 7) to 85% (Batch 8). Note that SLOT was first tried with Batch 7, other batches followed suit, and Batch 8 was the last to join the study.

**Table 3. Comments on SLOT by Medical Undergraduates of Asian Institute of Medicine, Science & Technology (AIMST)**

Serial Number	Themes of open ended statements	Frequency of comments
<b>Best aspects of SLOT</b>		
1	Increased learning skills	140
2	Enhanced participation	62
3	Exam oriented & useful	50
4	Interesting	27
<b>Worst aspects of SLOT</b>		
1	Time-consuming	30
2	Ambiguous MCQs	24
3	Less cooperative group members	24
4	Limited coverage of topics	9
<b>Free comments</b>		
1	More MCQs needed	17
2	Let our MCQs be picked for exams	8
3	Very special tutorials “for us, by us”	8

n=246

Total number of students who offered open comments =237 (96%).

In general, the mean scores on the perceptions of SLOT were above the midpoint of the scale. Students were significantly more positive and judged SLOT to be superior in most respects. Students used positive statements in responding to open ended questions soliciting their opinions and suggestions about SLOT. They cited the importance of full participation by the students. In contrast, with conventional tutorial very often students and teachers complain that, when left to their own devices, some of the students do not contribute.<sup>19</sup> It has been reported that students appreciate “active learning is the key to effective learning.”<sup>7,6-8</sup> Cooperative-learning exercises, role playing, simulations, models, debates, and games are active-learning strategies that can be used effectively in large classrooms.<sup>20</sup> In this context, we propose SLOT can also be considered as an additional

option, for teaching large classes, with advantages like active learning strategy, overcoming staff shortages and self-directed learning in small groups.

In SLOT, the instructors served as coaches who facilitated the process of inquiry and offered constructive comments and feedback. The students learned during preparation for SLOT (intra group), as well as during the presentation of the same (inter group). Further, the content reached the learners uniformly.

When asked for the worst aspects of SLOT, most students cited the time consuming nature and that they would have enjoyed it more if the sessions were not so close to their examinations. The groups were allotted specified areas of a given topic. However, within the specified area

**Table 4. Comparison of SLOT and Conventional Tutorial Method**

Serial Number	Parameter	SLOT	Conventional tutorial
1	Staff strength needed	One lecturer to supervise the whole class	More than one depending on group number
2	Exam orientation	MCQ	<i>Viva voce</i>
3	Content reach	Uniform	Varies with lecturer/group
4	Group learning	Yes (in and out of class)	Usually no
5	T-L method	Slide presentation	Mostly verbal
6	Individual attention	Not possible	Possible
7	Learning strategy	Active	Passive
8	Topic coverage	More focused & objective (learner oriented)	Less focused & subjective (teacher oriented)
9	Prior preparation by students	Must read and prepare	May or may not read
10	Opportunity to learn additional skills (Setting MCQs, PowerPoint)	More	Less
11	Group evaluation	Objective	Subjective
12	Time consumption	Usually more	Variable
13	Teaching led by	Student	Teacher
14	Learning issues determined by	Student	Teacher

the choice of the objectives and construction of relevant MCQs were left to the group members. The group was responsible for identifying the more important aspects of the topic. This resulted in a few ambiguous MCQs which were notified during the proceedings or brought to our attention through their comments about SLOT.

Conventional tutorial classes are definitely superior in certain aspects; however, the staff requirement to conduct such tutorial classes is higher. In view of the scarcity of medical teachers, a more conscious effort and planning, has enabled us to handle the tutorials effectively. In conventional tutorial classes, students are subjected to some degree of bias since tutors with different level of knowledge, approach and experience conduct the same topics (unpublished observation and a well known fact). SLOT offers uniformity in the proceedings and information is shared by the whole class, equally and fairly. SLOT also helps students master the techniques of answering the MCQs for their examination. SLOT indirectly imparts basic social, interpersonal

communication and study skills. Students were required to use PowerPoint. Thus, there was an opportunity to learn or improve PowerPoint skills, which was an added advantage. The use of presentation slides provided variety and stimulated interest among students, as observed with other studies.<sup>12,13</sup> A more detailed comparison of SLOT with the conventional tutorial is presented in Table 4.

Weaknesses of this study include the SLOT method has not been compared directly with conventional tutorial; lack of objective evidence in support of SLOT, like impact on the students' performance in examinations, and the study has been carried out in only one institute. A more rigorous, multicentric, comparative study would more thoroughly explore the merits of SLOT. The experience gained and the students' enthusiasm for SLOT, forced us to continue the same methodology with the existing batches and introduce it to upcoming batches. We do not claim SLOT as superior or a substitute for existing teaching methods, but as an additional tool, especially in situations

with a shortage of teaching staff or for developing mass interest in a particular topic.

### Conclusions

To conclude, SLOT is a novel tutorial method which, in our opinion, has advantages including enhanced interest among teachers and learners, uniform reach of messages, overcoming deficiencies in staff strength, opportunities for group learning, and involvement of visual aids in teaching and learning. Consumer tutors (students) along with professional tutors (actual facilitators) have a place in medical education. However, students are an untapped resource for tutors. Our study reveals that consumer tutors were able to sustain delivery of tutorial classes with positive attitudes toward the program. Finally, SLOT can be incorporated for all subjects and courses in healthcare teaching. Hyperlinking short video clips and sound clips may make SLOT a truly multimedia tutorial, especially for clinical year healthcare students..

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**Appendix 1**  
**Questionnaire survey among Medical Students**

Greetings. This is a survey conducted by the teaching faculty of Pharmacology Unit of AIMST, to elicit your views regarding the modified form of tutorial conducted **by you, for you**, using MCQs. We solicit your kind co-operation in filling up the following questionnaire by sparing a few minutes of your valuable time. Your answers may enable in improving the standard of medical education. Please **DONOT WRITE YOUR NAME OR ADDRESS**.

**Please write the response or tick accordingly, as what you feel as most appropriate**

1. Your age: .....years
2. Sex: Male= 1 Female= 2
3. Year of study: I II
4. Batch number: 4 5 6 7 8

**Student evaluation**

**Please respond to all the statements**

No.	Statement	Strongly agree	Agree	Disagree	Strongly disagree
1	The new type tutorial was relevant to the topic				
2	The new type tutorial stimulated interest in the topic				
3	The new type tutorial assisted me in understanding of the content of the lectures				
4	The new type tutorial provided guidance on how to learn effectively for this topic				
5	I learned more than I would have by participating in a traditional (old type) tutorial.				
6	I received adequate feed back on my tutorial work				
7	The tutors were interested in helping me learn				
8	I enjoyed working with a team.				
9	The group work increased my ability to learn independently				
10	My group succeeded working as a team				
11	The supervision by the lecturer was useful.				
12	I look forward to more of this kind of new type tutorial.				
13	What are the best aspects of this new type tutorial				
14	What are the worst aspects of this new type tutorial				
15	Any other remarks (not exceeding 3 lines)				