

An Experimental Term-based Flipped Learning Course on Medical English for Second-year Students

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In this article, we evaluate an experimental flipped learning course for second-year medical students, designed to build their skills in English for medical purposes (EMP). There were two reasons why the experimental course was taught: The materials themselves were designed for third-year students, and we wanted to establish whether second-year students were able to deal with the content of materials originally designed for a higher grade; it was also oriented towards teaching on a term basis over eight weeks in contrast to the course for third-year students, in which classroom activity took place over three days (Enokida et al., 2018A). The main idea underlying the experiment is that, given the range and complexity of medicine as a field and a profession, allowing students the opportunity to take courses on EMP earlier than the third year is beneficial.

The aim of the research project underpinning the experimental course is to provide students with a core medical English content, one that gives them sufficient specialized language to become reasonably autonomous EMP learners in their future studies and work. To this end, our research team has been working on a set of body-systems-based materials combined with a medical English word list that operates as a kind of spine for learning. This list emerges from a mixture of materials development, corpus analysis, and review by medical specialists (Fraser et al., 2015), and provides a foundation on which to build.

THE EXPERIMENTAL COURSE

The experimental course, called the Medical English Core Course (MECC), took place over seven weeks from 4th October to 15th November 2018, and was primarily oriented towards second-year students. It was taught entirely by one of the present authors, and had an online component, consisting of seven units of material, and a taught component, based on six of those units.

It was advertised as a voluntary course, in which successful students who passed it would not need to take the third-year intensive medical English course (IMEC) because the same material was being covered; they would be given a report on their performance, which they could use to apply for an exemption.

Expectation of numbers for the course was relatively low, with success being considered ten students, giving a sufficient number for a pilot study to evaluate how second-year students would cope with the teaching and materials. The initial response to the advertising greatly exceeded expectations, with 42 second-year students applying to do the course. Of those, a few students wished to do the online materials

only. In terms of attendance by second-year students, nine students who initially applied never attended the course, but an additional three students came to the first class, and were added to the register. Of the 37 second-year students who came to classes, attendance rates were very high for a voluntary course (Table 1): 19 students attended all six classes, 16 students attended five classes, and five students attended four classes. Only two students dropped out, attending just two classes.

The course was carefully planned, with the schedule shown both on the advertising and initial course information given in the first class. This rigorous planning was done so that students could coordinate their online study with the classes. Except for the first week, students were expected to study a unit online to prepare for the relevant unit in class.

TABLE 1. Attendance Rates of Second-year Students

04-Oct	11-Oct	18-Oct	25-Oct	01-Nov	08-Nov
37	35	35	27	28	34

TABLE 2. Syllabus for the Experimental Course

10/4	anatomy planes, terms of location, and views
10/11	central nervous system: brain
10/18	circulatory system: heart
10/25	pulmonary system: respiratory tract
11/1	skeletal system: knee joint
11/8	digestive system: alimentary canal
11/15	evaluation tasks

The Online Component

The content of the online component for the course was exactly the same as the third-year intensive medical English course (Enokida et al., 2018B) described below. MECC students were asked to study the materials online prior to each unit, and informed that the contents were very important for a vocabulary test at the end of the course.

During the course, it became clear that with term-based teaching, students' heavy study-loads made it difficult for them to complete all the tasks online. Consequently, they were advised to study the most important parts of the materials (usually essays that contained key content) and make sure they knew the vocabulary in the online materials before the end of the course. One unit, on the endocrine system, had no corresponding classroom component and so needed to be studied more carefully than the others before the test.

The Taught Component

Students were taught weekly for 90 minutes. In the taught component, a major part of classroom time was spent on doctor-patient interaction. After warming up with some questions on the relevant medical field, such as cardiovascular medicine, students listened to a simulated doctor-patient interaction and made notes on signs and symptoms. They studied the dialogue, practised it in pairs, then performed role plays (see Appendix 1). Throughout this process key vocabulary and aspects of doctor-patient interaction were highlighted by the teacher. The remaining part of the class was usually focused on anatomy, matching words

to diagrams and practising pronunciation.

Evaluation Tasks

There were two evaluation tasks. The first was primarily a vocabulary test, taking 45 minutes. In content, this test was exactly the same as the test used in the intensive course described below. The only difference was a slight re-ordering of the 50 multiple-choice items to more closely reflect the order of units in the online materials. The vocabulary tested was drawn from those materials. There was a further section, also included in the intensive course test, in which students were asked to write about the process of breathing, using vocabulary that had been given in a word box. This topic was drawn from an essay in the online materials.

The second evaluation task involved writing a doctor-patient conversation based on information about the patient (Figure 1). Students were permitted the use of a dictionary, and had 45 minutes to complete the task.

Write a history-taking conversation between a doctor and a patient, using the information below. It is the first time for the doctor to meet the patient (Hana Tanaka).

Hana Tanaka is a married housewife, 45 years old, with three children. She has been suffering from indigestion, and also has a burning pain in her abdomen (in the stomach area). She has had both problems for 10 days. Eating reduces the pain, but then it gets much worse a few hours after the meal. The pain sometimes wakes her up in the middle of the night. Although she sometimes gets indigestion, she hasn't experienced the burning pain in her abdomen before.

Ms. Tanaka eats three meals a day regularly, with cereal (muesli) and toast for breakfast, a salad for lunch (with vegetable oil and plenty of raw apple cider vinegar), and a larger meal in the evening (usually soup, rice, some meat and vegetables, and ice-cream). She drinks two glasses of red wine almost every evening. She has been under a lot of stress in the last year because she has started a part-time university law course, and she is also very busy looking after her children. Because of the stress, she often gets headaches, and takes ibuprofen quite regularly.

FIGURE 1. Evaluated Writing Task for the Experimental Course

THE THIRD-YEAR INTENSIVE MEDICAL ENGLISH COURSE 2018

The intensive medical English course has been documented in previous articles (Enokida et al., 2018A; 2018B) and is only briefly summarized here. It involved four teachers and approximately 120 students, formed into four student groups.

The Online Component

The content of the online component was exactly the same as the experimental course. Students were informed that they must complete their study of the online materials before the start of the intensive course, and they must achieve a score of 80 percent on the online exercises. This was because, with an intensive course involving all classes being taught face-to-face in a two-day period, there was almost no time for class preparation once the taught component started. The students had the advantage that they could prepare over the summer vacation. All students completed the online component to the required level.

The Taught Component

The taught component took place on 11th and 12th September 2018, with evaluation tasks being given on 14th September. Each teacher was allocated a classroom and taught two units of material four times, once to each group of students. The teaching period was 70 minutes in contrast to the usual 90 minutes.

Evaluation Tasks

On 14th September, students took the 50-item vocabulary test that included a section on the process of breathing. They also undertook a writing task, in which they had to summarize an essay in the online materials on diabetes mellitus.

Similarities and Differences between the Experimental Course and the Intensive Course

The similarities and differences between the two courses are tabulated below. There are similarities regarding class size and classroom contact hours. In terms of difference, the experimental course was voluntary, compared to the third-year course, which was mandatory. In relation to topic, the experimental course was focused on anatomy, physiology, and medical diseases, and excluded two classes involving discussion on medical ethics, and there was no instruction on summary writing. Instead, there was a greater focus on spoken interaction, and although there was a writing task, this was essentially used to evaluate students' understanding of doctor-patient discourse in English. The dialogues studied in class involved a

TABLE 3. Comparison Between the Experimental Course and Intensive Course

Item	Experimental Course	Intensive Course
student year	second year	third year
skills	reading, listening, speaking	reading, listening, speaking, writing
type	voluntary	mandatory
number of students	35	113
number of teachers	1	4
students per teacher	35	28
vocabulary test	50 items with written paragraph	50 items with written paragraph
written task	dialogue writing	summary writing
classroom teaching	540 minutes	560 minutes

TABLE 4. Class Topics for the Experimental Course and Intensive Course

Experimental Course	Intensive Medical English Course
1. anatomical planes, terms of location, and views	
2. central nervous system: brain	1. central nervous system: brain
3. circulatory system: heart	2. circulatory system: heart
4. pulmonary system: respiratory tract	3. pulmonary system: respiratory tract
5. skeletal system: knee joint	4. skeletal system: knee joint
6. digestive system: alimentary canal	5. digestive system: alimentary canal
	6. endocrine system: pancreas
	7. discussion on medical ethics 1
	8. discussion on medical ethics 2

broader range than those in the intensive course. The easiest conversations to construct are those relating to history taking, in which a doctor asks questions to find out about a patient's signs and symptoms. All the dialogues in the third-year course were based on this situation. In the experimental course, the dialogues were broadened: explaining results and giving advice (one dialogue), history taking (three dialogues), and examining a patient (two dialogues).

EVALUATING THE EXPERIMENTAL COURSE

The experimental course was undertaken to evaluate how well second-year students could deal with a course that was originally designed for third-year students. In this article, course evaluation is done in the following way:

1. Evaluating the vocabulary test results of the experimental course
2. Comparing the vocabulary test results between the two courses
3. Evaluating quantitative student feedback from the experimental course
4. Evaluating qualitative feedback from the experimental course

In order to address 1 and 2 above, the vocabulary test results from both courses have been analyzed and compared. Regarding 3 and 4, students were asked to complete a set of feedback questions (Appendix 2).

Multiple-Choice Vocabulary Test Results

The 50-item multiple-choice vocabulary test was given using cards for mark reading. These were processed after the course. Thirty-five students completed this section. The average mark was 75.8 percent (standard deviation 16.1). Only four students were under the pass mark of 60 percent, and were given the opportunity of a re-test. In comparison with the third-year intensive course results, 113 students took the multiple-choice section of the test, with an average mark of 80.1 (standard deviation 14.7), and with 10 students under the pass mark. An unpaired two-sample *t*-test using R showed no significant difference between the two data sets ($t(53)=1.399$ $p>.05$), indicating that second-year students could cope just as well as third-year students in relation to medical terminology.

Student Feedback on the Course

For the experimental course, students were asked to give quantitative feedback on the mark cards (items 51 to 56), and they were asked to write any qualitative feedback (comments) on the back of their mark cards. Of the 35 students, 30 completed the quantitative feedback. Only 13 students wrote qualitative feedback (Appendix 3). This lower number was probably due to tiredness and time pressure from doing the vocabulary test and the dialogue-writing task. Three students wrote extensive qualitative feedback (comments 7, 8, and 11 in Appendix 3).

Quantitative Feedback

In IMEC 2017 and IMEC 2018 feedback had been gathered through an online questionnaire. Gathering quantitative feedback by mark card had not been used since IMEC 2016. The reason for using this way for

MECC was that it was simple and fast. With the experimental course there was a very reduced amount of time for the testing and feedback. In IMEC 2018, an actual time had been allocated for giving feedback outside of the evaluation tasks, with the whole process (evaluation tasks and feedback) taking 2 hours and 10 minutes, including a 15-minute break between the vocabulary test and summary writing task. With the experimental course, there were just 90 minutes allocated for everything. The dialogue writing task was considered to be simpler than summary writing and so was only allocated 45 minutes in comparison to 90 minutes for the IMEC summary-writing task. With the increased time pressure, the simpler approach of the mark-card feedback was the better option, involving a slightly different set of questions from IMEC 2017 and IMEC 2018. Table 5 shows the averaged student responses to the feedback questions. As a comparison, the 2016 data are shown in Table 5. While the content of IMEC 2016 was almost the same as IMEC 2018, IMEC 2016 did not involve flipped learning, and required at least double the amount of classroom teaching.

TABLE 5. Student Feedback Responses (averages) for MECC 2018 and IMEC 2016

Category	2018	2016
Motivation (4-point scale, highest:4, lowest:1)	3.5	3.2
Usefulness (4-point scale, highest:4, lowest:1)	3.5	3.3
Clarity (4-point scale, highest:4, lowest:1)	3.5	3.2
Improvement (2-point scale, Yes:2, No:1)	1.9	1.9
Word list (4-point scale, highest:4, lowest:1)	3.4	3.3
Course as a good way to study (2-point scale, Yes:2, No:1)	1.9	1.9

In relation to the MECC 2018 course, the level of motivation was very high, and this may have had an effect on the perceived usefulness and clarity of the course. If students are highly motivated to study, they may be more determined to understand the material, and in gaining such an understanding, they may feel it is clear. Most students felt they had improved, and that the course was a good way to study.

Qualitative Feedback

Qualitative feedback has been listed in Appendix 3. The longer comments (7, 8, and 11) reflect teacher dilemmas on approaching medical English, and can be analyzed in more detail.

In comment 7, the student raises two important issues: parallel syllabuses and complexity. The idea behind a parallel syllabus is that students develop their English skills by focusing on areas they already know from their medical studies. The student suggests this approach by observing that in the second year, students do not learn doctor-patient interaction in their medical studies in Japanese, and do not know so much about symptoms. The student recommends that a focus on anatomy and physiology would be better. However, it is interesting to note that in comment 8, a different student felt that a discussion of symptoms made “difficult symptoms” easier to understand. The second point arising in comment 7 is that there is too much in the materials, and that a shortened summarized version of the materials would be better. This raises the issue of complexity, and relates to the classroom materials that were used on the course. Students were given material designed in the form of draft textbook units of eight B5 pages, including many of the essays and activities that appear in the online tasks. The classroom materials involve vocabulary tasks, essays, dialogues and comprehension questions, covering anatomy and physiology, medical problems, doctor-patient interactions,

and treatments. Consequently, each unit is substantial in content, and this may have made the classes appear more daunting than they actually were, causing some frustration.

In Comment 11, the student is dissatisfied with a lack of availability of answers in the classroom material, particularly in relation to the last page, a self-study section on treatments. As noted above, in each class, students were given a full unit of material, but most of this was already included in the online materials. The self-study section was new, oriented towards treatments, which had not been covered in the other sections of material. Because it was not set as homework and not used in class, answers were not provided. However, the comment points towards the importance of making answers available for students who wish to explore the material in their own time. The student's criticism that some words were not covered in the word list may also be related to the self-study section of the materials, which is new, and so the frustration with the word list may be linked to the fact that words in the self-study section may not yet be incorporated in the word list, which is currently being reviewed and further developed by the research team.

The student making comment 11 is very positive about the course, and stresses the usefulness of a focus on affixes, such as *-itis* and *peri-*, noting that medical English terms are sometimes easier to understand through roots, prefixes, and suffixes. From a teaching perspective, the term-based course had several advantages over IMEC 2018 in relation to this aspect of medical English. The teaching approach to affixes for MECC can best be described as piecemeal and analytic: Students were exposed to medical English primarily through illustrative essays and dialogues which contained complete terms. After the students had experienced the terms in this way, the teacher then showed how some of the key words break down into their constituent parts, and gave other examples. However, this took time, and the 90-minute MECC classes were the right length to do this compared to the high-energy 70-minute IMEC classes that were much more fluency oriented, with little time for reflection. A further advantage of the MECC classes was that with only one teacher covering six different units, it became easier to identify and emphasize word parts. In contrast, for very practical reasons, with four teachers repeating units of material to different groups, there was a more production-line aspect to IMEC. Given the pressures of an intensive course, this had advantages in terms of efficiency, with teachers becoming very practised in teaching their respective units, but the disadvantage was that it was difficult for teachers to see the connections across units.

DISCUSSION

Voluntary Courses and Mandatory Courses

An interesting fact from the experimental course was the large number of students who joined and completed it. This exceeded all expectation and indicated that a significant proportion of second-year students want to study medical English earlier than the third year. Also, in terms of results, the course was a successful one, with most students being able to pass the evaluation tasks. However, it is also important to note that a voluntary course is likely to contain more motivated students than a mandatory one. Consequently, some caution is needed in comparing IMEC 2018 with MECC 2018. While a large proportion of second-year students are likely to be able to deal with the materials, there may be a group for whom the materials are too difficult, reflected in some of the student comments.

Parallel Syllabuses and Communicative Tasks

A complex issue relates to how closely medical English teaching should parallel medical studies in Japanese. In reality, even with third-year students, the materials themselves have involved elements that not only parallel students' studies but go beyond them. For example, second-year students learn a great deal of anatomy and physiology, and third-year students study medicine through lectures. Consequently, most third-year students have encountered the content of the online component in their medical studies. However, third-year students do not cover doctor-patient interaction, which they learn in higher grades. There are several reasons for having this component in the materials: Doctor-patient interactions are easy to use for productive skills through the use of illustrative dialogues and role plays; they provide students with a range of key non-specialized words for signs and symptoms; they are fairly easy to understand because they are in everyday English. Consequently, although students have not experienced doctor-patient interaction in their medical studies, this provides an opportunity for listening and speaking activities. With a change to the teaching of second-year students, there is a further move away from a parallel syllabus, with students studying medical problems that they may not yet have encountered in their medical studies. However, as the results of the vocabulary test show, around 30 second-year students demonstrated that they could cope with the material. One student noted in comment 3 of the qualitative data (Appendix 3): *I think the sentence in this course is very easy, but the words are difficult. So I must study the words hard, that is very useful for a medical student.* The materials themselves are written for students of English, and the essays in them are designed to produce simple, clear explanations of medical problems, as shown by the example from the musculoskeletal unit:

Osteoarthritis is a name for a variety of conditions that involve degradation of joints, particularly articular cartilage and subchondral bone. It is the most common form of arthritis. The main symptom is pain in the form of a sharp ache or burning sensation. Where the knee is affected, there may be tenderness, stiffness, and sometimes locking of the knee. Another symptom may be a grating sound from the joint, as the bones rub together. This is known as "crepitus."

As the student notes, the main challenge is the vocabulary (underlined). Osteoarthritis and crepitus are defined within the passage, which has been written as clearly as possible. Although it is probably easier for students who have learned about osteoarthritis from medical specialists, it can also be studied in the medical English materials prior to such learning. Provided that students have studied anatomy and physiology, they can understand the medical problems from the medical essays themselves.

Materials, Word List, and Self-study

In the first class, students were handed a word list for use in the course. The quantitative student feedback shows that this was positively received. However, as noted above, the qualitative data show that one student was unhappy with the word list because it did not have all the key vocabulary contained in the classroom materials.

Given that the course was an experimental one, there was a minor weakness in some mismatch between class materials and word list. Because the aim of the research project connected to this experimental study

is to produce a pedagogic word list embedded in a set of materials, the materials themselves had been extended to include self-study sections on treatments. For example, the cardiovascular unit now includes the following terms in its self-study section: *intravenously, platelets, sternotomy, lesion, angioplasty, subcutaneous, anticoagulant, atherosclerosis, antiplatelet, wire-mesh, guidewire, coronary artery, catheter, cardiopulmonary, streptococcus, microorganism, plaque, thrombosis, stent, bypass, anesthesia*. Many of these terms were not included in the word list, which was used for IMEC 2018, and lacked the words in the new treatment sections. In addition, the other sections of material in the units had sometimes been updated. For example, parts of the musculoskeletal unit had been changed to bring the anatomy section into closer alignment with the medical section, with a focus on the knee joint rather than on the skeleton as a whole. Items such as *anterior cruciate ligament, quadriceps*, and *meniscus* were not on the list. This may have caused the commenting student some frustration, and the problem will be remedied by the end of the academic year by extending the word list to include the omitted items.

One very important point arising out of comment 11 is that many students have an autonomous approach to study. Throughout the course, complete units of material were given to the students, but in class less than half the material was studied. This was because most of the material was online and accessible to students; they could do exercises and check their answers online. The reason for handing out full units of material was that it offered exercises in a different format. Some students pointed out that they did not have time to go online and do all the exercises; the paper materials handed out in class offered them a chance to do them quickly on paper in their own time, but did not give them the chance to check answers. As the units themselves are designed for the eventual creation of a textbook, one possibility would be to put answers in the back of the book, following the strategy of Cambridge University Press's *English in Medicine*.

Strategies for the Future

The experimental course was essentially a pilot study for teaching short term-based courses to second-year medical students. Several key points emerge from the data in this article.

Medical students are almost always busy with a heavy study-load. To give the best opportunity to study medical English, making students aware of online materials and giving them access to paper materials as early as possible would allow them to act autonomously in preparation for a classroom course. While this strategy was not possible with the experimental study, there are some simple ways in which this can be remedied for future courses. All students in their first three years of undergraduate study could be registered for the online materials, and students at the end of their first year could be given an orientation about accessing and completing them. This would give them the opportunity to use the vacations to study if they so chose, and allow the teacher to set a requirement for a target mark for online materials that students should obtain prior to the classroom component. IMEC 2018 had this requirement for online study, and all the third-year students achieved the target mark of 80 percent. This may have contributed to the slightly higher average test result of 80 percent for IMEC compared to 76 percent for MECC.

As we have noted above, the materials have elements of a parallel syllabus in them. One of the reasons for the success of the experimental course may be that it was given in October and November, so that students had already done their dissection work and had a very good understanding of anatomy and physiology. In comparison, some of the materials were trialled with first-year students in an open voluntary

course in 2017, and this involved them learning basic anatomy conceptually through the medium of English, making such learning a big challenge even for students who were clearly very skilled English speakers. A course such as MECC should be given after medical students have learned anatomy in their medical studies.

A further issue relates to the English skills and abilities of the second-year students as a complete group. As we have noted, the experimental course is a voluntary one compared to the mandatory IMEC. It may be that there are students who are not ready to take such a course, illustrated in comment 3 of the qualitative data (*Too difficult for me*). The comment raises a general issue that instructors face in teaching groups of students: There is always diversity within a group, and a teacher has to try to keep the most proficient students motivated and challenged while ensuring that the least proficient students do not fall behind. If the gap between the most proficient and least proficient students is too big, this balancing act becomes very difficult. A possible solution to the problem would be to teach the course both to second-year and third-year students, allowing them to make their own choices as to when to take the course.

The experimental course itself covers only half the material planned by the research team. The full aim of the research is to create a word list and materials that provide a core of vocabulary across medical fields relating to body systems. This eventually means extending online materials and classes to cover 14 units of material. By doing this, a core syllabus will be created, whose content can be allocated to different courses and shared between teachers, so that by the end of their third year, students should have learned a core medical English vocabulary that they can use communicatively. The evaluation tasks created for IMEC and MECC have proved reasonable and could be developed further, allowing for two tests, each based on seven units of material.

CONCLUSION

In this article, we have described a term-based flipped learning course on EMP for second-year medical students. Based on the results of the evaluation tasks and feedback, the course itself can be considered a success, indicating that at minimum, a significant proportion of second-year students can cope with such learning. If this is the case, then there is the opportunity to create a small manageable integrated curriculum for the second-year and third-year students, aiding them to build a core of language skills in medical English.

The experimental course has differed from the intensive third-year course in that it has been oriented towards oral/aural skills for students. To balance the skills, further research will be oriented towards investigating written discourse, particularly case reports and case studies. However, it is important to note that there may be strong links between all four skills. Taking an accurate patient history, for instance, is integral to a good case report, and aspects of case reports may be valuable for the development of spoken skills. For example, asking students to create doctor-patient dialogues from written cases, as in the evaluation task for the experimental course, is a potentially valuable activity. Likewise, documenting the details of a case based on listening to a doctor-patient dialogue could be a good way of developing writing skills.

A further important area of future investigation is to explore how students may develop their discussion skills. As we have noted, it was not possible to retain the intensive course's classes on medical ethics in the experimental course. Developing materials and courses in areas more oriented to doctor-doctor discussion either in ethics or in discussing cases will be an important future direction.

Finally, it should be noted that on the surface, English for medical purposes appears daunting in its

level of complexity and its difficulty. The risk for medical students is that, faced with such a challenge, they opt to ignore it, and purely focus on medical studies in Japanese. However, if in the early stages of their studies, students can learn a manageable core of high-value medical terms and the skills to use them both in written and spoken discourse, this may motivate them to continue developing their English skills throughout their careers. At this critical stage of English study, English specialists have an important role to play in aiding students to build on their general English skills by transitioning to medical English, and it is towards this goal that our current research is oriented.

NOTE

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APPENDIX 1. Extract from the Materials Involving Dialogue and Role Play

Doctor Patient Dialogue: Taking a History

1. Read and listen to the dialogue. Make a list of the patient's symptoms.

Signs and symptoms:

2. What problem do you think the patient might have?
3. What does RICE stand for?
4. What other questions do you think the doctor could have asked?

Conversation

A patient enters the doctor's consulting room.

A: Good morning, Mr. Johnson. What seems to be the problem?

B: My right knee is causing me a lot of pain.

A: Could you tell me more about the pain?

B: Well, my knee has been stiff for a couple of months, but recently it's got a lot worse.

A: In what way?

B: Well, it's starting to lock when I take exercise, and now the pain is getting worse.

A: By pain, do you mean just stiffness?

B: No, there's a sharp ache, and it feels tender if I put a lot of weight on the knee.

A: I see. What kind exercise do you take?

B: I play football at the weekend, and I also do a lot of training during the week.

A: What kind of training do you do?

B: I run a few kilometers, and then I do some sprinting.

A: Have you done anything which you think may have affected the knee?

B: Well, a few months ago, I landed badly after jumping high and I jarred it, but I was able to continue playing.

A: OK. Is there anything else apart from the stiffness and the ache?

B: Yes, my knee is now making a crackling sound when I bend it a lot.

A: And have you been treating your knee in any way?

B: Well, I gave it the RICE treatment, you know "rest, ice, compression, elevation." I've also been taking a painkiller.

A: What kind of painkiller?

B: Ibuprofen.

A: Has the ibuprofen had any effect?

B: It's helped a little, but my knee still locks up with exercise.

A: Hmm. Have you had problems with your right leg before?

B: Nothing very serious doctor. I've sprained my ankle a few times, but I gave it the RICE treatment and the ankle soon recovered.

A: OK. I'll need to examine your knee. Would that be all right?

B: That's fine.

Pair Work: Role Play - Student A

Work with a partner and do the following role plays.

1. *You are the patient.*

Tom Telford (50, married, builder). **Starting line:** “I have a problem with my knee.” You have a painful and swollen knee. The skin around the knee is quite red. You’ve had it for a week. You’ve been working very hard for the last month and are under a lot of stress, so you’ve been drinking a lot of beer and eating a lot of burgers, steaks, and French fries.

2. *You are the doctor. Make notes.*

SURNAME: Aston FIRST NAME: Jane AGE: 65 SEX: F MARITAL STATUS: M OCCUPATION: retired bank clerk
PRESENT COMPLAINT:

3. *You are the patient.*

Anna Chaplin (22, single, university student). **Starting line:** “I have a problem with my right knee.” It’s quite sore. You are a member of the university athletics club, and you have been training very hard for the pentathlon (100m hurdles, long jump, shot put, high jump, and 800m). You’ve had the pain for a week. You also have a slight tingling feeling in your right leg. You’ve been eating a lot of meat and you often drink beer with your club members.

4. *You are the doctor. Make notes.*

SURNAME: Matthews FIRST NAME: John AGE: 42 SEX: M MARITAL STATUS: S OCCUPATION: taxi driver
PRESENT COMPLAINT:

Each patient has one of the following medical conditions. Match the patients with the conditions.

Diagnosis	Patient number
osteoarthritis	_____
rheumatoid arthritis	_____
gout	_____
lumbar disc herniation	_____

APPENDIX 2. Course Feedback Questions and Answers

Please answer all the feedback questions

51.) How motivated are you to develop your medical English skills?

Very motivated(4) *Motivated(3)* *Not so motivated(2)* *Not motivated(1)*

52.) How useful was the course?

Very useful(4) *Useful(3)* *Not so useful(2)* *Not useful(1)*

53.) How clear were the classes and teaching materials?

Very clear(4) *Quite clear(3)* *Not so clear(2)* *Not clear(1)*

44.) Do you feel your English improved during the course? If so, in what way(s)?

Yes(2) *No(1)*

55.) How useful was the medical word list?

Very useful(4) *Quite useful(3)* *Not so useful(2)* *Not useful(1)*

56.) Was the course a good way to improve your English skills?

Yes(2) *No(1)*

57.) Please write your comments about the course in English on the answer card.

questions	number of students answering 1	number of students answering 2	number of students answering 3	number of students answering 4	average
51	0	0	16	14	3.47
52	0	1	14	15	3.47
53	0	2	12	16	3.47
54	3	27	-	-	1.90
55	0	4	9	17	3.43
56	2	28	-	-	1.93

APPENDIX 3. Student Comments on the Course

Students' comments have been written verbatim, with no attempt to correct grammatical mistakes.

1. I think a lot of sentence in this course is very easy, but the words are difficult. So I must study the words hard, that is very useful for a medical student. Thank you.
2. It is very good because we can actively speak English about medicine. In the future, I'm going to speak English actively.
3. Too difficult for me.
4. This class is a little difficult for me. So I'll study hard when I take this class at third-year student.
5. Good!
6. Very good!
7. This course was pretty good as I expected. However, there's some room for the materials to be improved, though my feedback can be nonsense if you're created the material for future medical course for 1st and 2nd year students. The material has so much info that we cannot handle them all. Especially when it comes to the class that only held once a week. If you're considering keeping this type of course, I would recommend you create a shortened or summarized version of it. Furthermore, the material focuses on not only physiology and anatomy but also on clinical stuff. Since we haven't learned the names of symptoms of disease nor doctor-patient conversation even in Japanese, I guess it can be better to focus on anatomy and physiology. I know the benefit of focusing on science and clinics simultaneously, but some of us were struggling... I'd appreciate it if this helps you to improve the course.
8. This course was very useful for me. When I studied anatomy first in Japanese it was so complex to me, so I couldn't remember anatomical words in English. But I knew English words sometimes are more easier to understand, because many anatomical words in Japanese are just translated from English. In fact I could learn many useful words (such as -itis, peri- and so on) in English. This made my understanding deeper. It was also good to discuss symptom. That made difficult symptom easier to understand.
9. Thank you for opening the medical English course. Your classes helped us develop our English skills.
10. It was a little quickly, so it was hard for me to study and review the medical English words. However, it was very useful class. I'm lucky to study medical English in the second grade. Thank you so much.
11. Hello, thanks for several weeks Davies! I'll answer the feedback questions, here. First, this course was not so useful, I think. That's because I wanted all answers to both of online materials and especially materials in class. I tried materials in class but it was difficult for me (ex. Last pages) For studying I wanted these answers. Secondly, the medical word list was not so useful. That's because I checked often the list, but some words I found in materials online or in class were not there. So, after all, I used smartphone to examine meanings of words.
12. Thank you.
13. This course was very useful to me.

ABSTRACT

An Experimental Term-based Flipped Learning Course on Medical English for Second-year Students

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In this article, we describe and evaluate a flipped learning course for second-year students, involving an online component and a classroom component. It was experimental primarily because the course materials were originally designed for third-year students. A more minor aspect of the experiment was to teach the classroom component over a seven-week period in contrast to the intensive three-day way it was taught to third-year students. The success of the course was evaluated using both test results and student feedback in the form of both qualitative and quantitative data gathered from a feedback questionnaire.

Almost a third (35) of the second-year students completed the course, which took place in October and November 2018. Of the 35 students, 31 passed the final-day tests first time. A major part of the tests consisted of a 50-item multiple choice vocabulary test, and the average student score was 75.8 percent with a standard deviation of 16.1. The same test was given to third-year students in their September 2018 intensive course; here, the average score was 80.1 percent with a standard deviation of 14.7. An unpaired two-sample *t*-test using R showed no significant difference between the two data sets ($t(53)=1.399$ $p>.05$), indicating that second-year students could cope just as well as third-year students in relation to medical terminology.

Data from the quantitative feedback shows that student motivation was very high, the students considered that the course was useful, and the teaching and materials were clear. Qualitative data indicated that a few students considered the course to be too difficult. There were also some minor weaknesses relating to teaching materials.

Overall, the experimental course can be considered a success, indicating that a significant proportion of second-year students are keen to study medical English earlier than the third year, and that they have the ability to do so. A key factor in the success of the course is considered to be the timing of it: Second-year students had a good knowledge of anatomy and physiology by the time they took the course, which gave them the schematic knowledge to be successful in their medical English studies. Also, because the course had less time pressure than the current third-year intensive course, it created the space to focus on affixes and roots in relation to medical terms. In conclusion, we consider that teaching medical English in the second year is valuable but not necessarily suitable for all students, so that the opportunity to take such a course should be available in both the second and third grades.

要 約

医学部2年生を対象とした「医学英語」コースの試み — 反転授業を活用したターム授業 —

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本稿は、オンラインを使つての事前学習と対面授業を組み合わせた、医学部2年生を対象とした「反転授業」の報告とその試みの評価を目指したものである。授業で用いた学習教材（内容）は元々医学部3年生用に開発したものであったので、この取り組みはかなり実験的要素の多いものであった。また、従来このコースは3年生を対象とした三日間の集中講座であったが、この試みでは7週間にわたる対面授業を組み合わせて行った。本コースの成果について、学生の「試験成績」及び「アンケート結果」の量的及び質的分析を報告する。

在籍する医学部2年生の約1/3にあたる35名がこの試行コースを修了した。実施時期は2018年10月～11月であった。35名のうち、31名が期末試験に一回で合格した。試験の中心は、医学語彙に関する50問の多肢選択式問題であり、平均正解率は75.8%で標準偏差は16.1であった。ちなみに、医学部3年生を対象とした2018年9月の平均正解率は80.1%で標準偏差は14.7であった。これらの2グループを比較したt検定では5%水準で統計的有意差はなく、本コースは2年生でも十分に履修できる内容のものであることが示唆された。

医学部2年生によるアンケート結果からは、受講生のモチベーションはかなり高く、本コースが有益であり、指導や教材が分かり易いという受け止めをしていることが窺えた。他方、自由記述には、学習内容が少し難し過ぎたというコメントがあった（数名）。また、いくつかの細かな教材の改善点が見つかった。

全体としては、この試みは成功だったと評価してよいであろう。そして、このことは2年生段階で医学英語を学びたいと強く思っている学生が一定数いること、そして英語で十分に学習内容を理解できることを示唆していると言えよう。本試行の成功の主要因は時期が良かったことであろう。つまり、本コース受講までに（2年生後期までに）、学生は解剖学や生理学の十分な知識を得ており、それが英学英語を学ぶにあたって有益な背景知識として作用したと考えられる。さらには、3年生を対象とした三日間の集中講座とは異なり、時間的圧迫感が少なく、医学用語に関する語根や接辞などをしっかりと理解できる余裕があったことも良かった。医学部2年生を対象として、（必ずしも全員でなくとも）希望者に対して「医学英語」コースを提供することは、有益であると考えられる。