

**REPORT ON SEMINAR ON TEACHING ENGLISH FOR SCIENCE\***  
**AND TECHNOLOGY, KING MONGKUT'S INSTITUTE OF**  
**TECHNOLOGY, THONBURI CAMPUS BANGKOK, THAILAND,**  
**30 MARCH-17 APRIL, 1981.**

*By Alan Waters*

**A. INTRODUCTION**

The Seminar on Teaching English for Science and Technology described in this report was held at the Thonburi Campus of King Mongkut's Institute of Technology, Bangkok, Thailand, from 30 March to 17 April 1981. There were 46 participants, drawn from universities, Institute of Technical and Vocational Education Colleges and other institutions throughout Thailand concerned with the teaching of English for Science and Technology (EST). Two of the teaching staff were from the Institute of English Language Education, University of Lancaster, England, and the others, were local British and Thai tutors. The Seminar was jointly sponsored by King Mongkut's Institute of Technology and the British Council.

**B. AIMS**

A preliminary investigation<sup>1</sup> resulted in the choice of the following overall aims for the Seminar :

1. to develop the participants' knowledge and understanding of underlying principles in EST ;
2. to guide the participants towards adaptation and/or production of teaching/learning and testing materials for EST.

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\* This report is an attempt to fulfill a request from *Pasaa*, the Chulalongkorn University Journal on language teaching and linguistics in Thailand, for a paper describing the Seminar, and to provide information for my colleagues in Lancaster and elsewhere. Another version has been prepared for the requirements of the British Council's Education Seminar department.

\* I wish to acknowledge my gratitude to those who gave so much help in the running of this Seminar : the staff of King Mongkut's Institute of Technology ; the British Council In London and Bangkok ; the tutors ; colleagues in Lancaster and elsewhere : the participants themselves.

### C. ORGANISATION

The dual aim of the Seminar—development of the participants' professional knowledge and practical expertise—was reflected in its organisation.

The Seminar was based on a series of tasks and projects deriving from the input of various topics (see Appendix). In general, formal training input led to small-group workshop sessions, which, in turn, provided a product which was assessed in a feedback session (see diagram below).

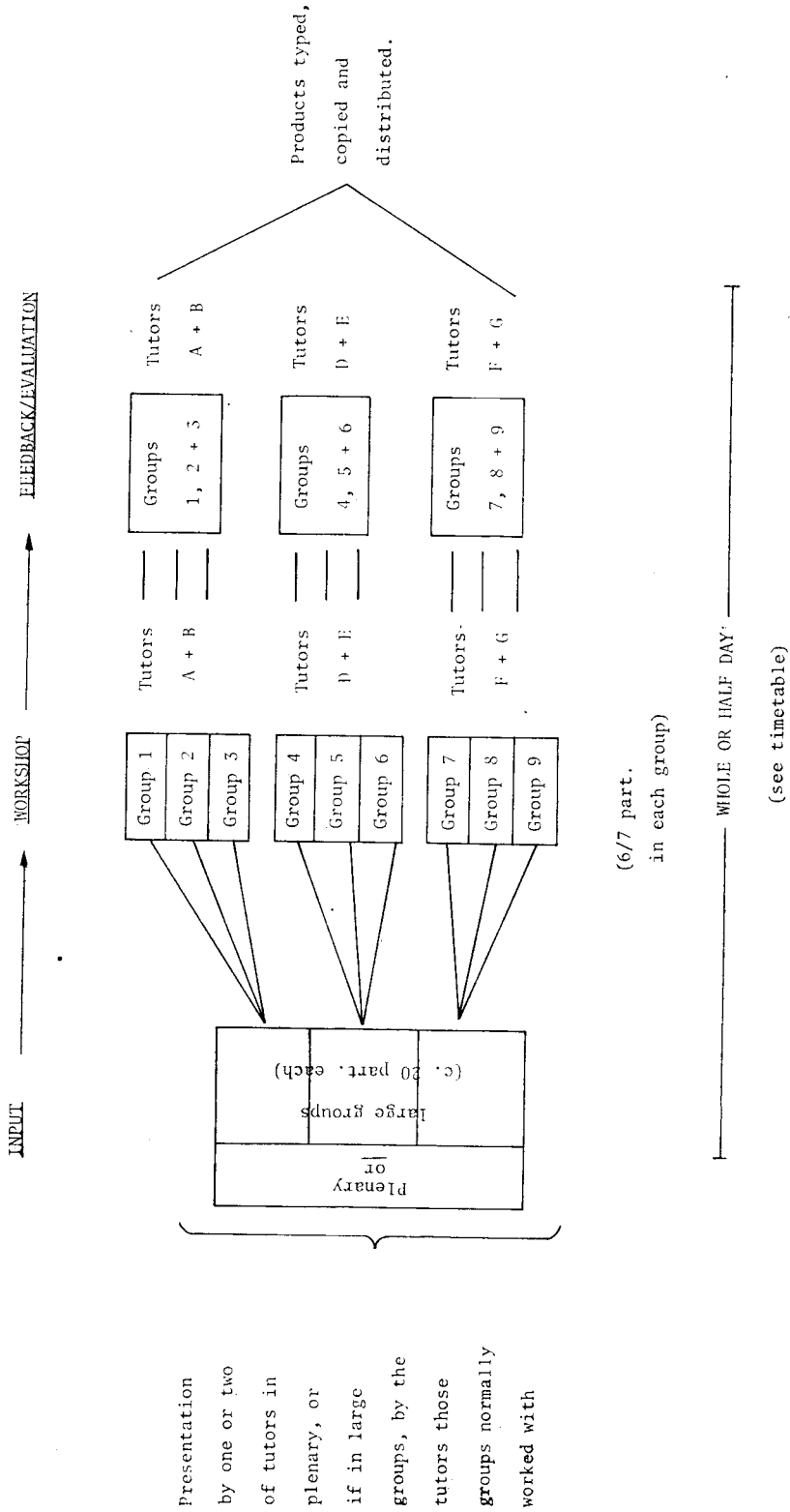
The input took the form of a lecture or practical activity, presented to participants either in plenary or in 3 *large groups* (c. 15 participants each). This was generally followed by a practical workshop activity undertaken in 9 *small groups* (5/6 participants each). This work was guided/monitored on the basis of 1 or 2 tutors per 3 small groups. Each small group's work was also co-ordinated by a participant acting as a Group Leader. Last, for the feedback/evaluation stage, participants formed 3 large groups (cf. input stage, above), each comprising 3 of the small groups in which they worked during the previous phase, along with the tutors assigned to them. Participants then presented the results of their small group activity (by means of e.g. OHP transparencies) to each other and their tutors for discussion and evaluation. The output produced by each group was typed, copied and circulated to all the participants the following day.

As a general principle, the small groups (5/6 participants) were made up of participants representing *different* types of institution. However, re-grouping (e.g. on the basis of the same or similar institutions) was arranged for Topics such as Block 1, Part 3 (A Framework for EST Course Design).

In the feedback/evaluation stage, the presentation procedures adopted ensured that there was an opportunity for all the members of the large group to understand and discuss each of the 3 small group's products. The exact method for achieving this was not prescribed, but there was discussion among tutors to ensure that the techniques which emerged as the most successful ones were used as widely as possible.

Slightly different arrangements existed for the organisation of Block 3 and 5, and for the Topic "Writing/Adapting Units of Materials" (Block 2, Topic 6) :

- Block 3 consisted of two main stages: the teaching practice and observation, and a feedback and evaluation session;
- Block 5 took the form of a series of plenary discussions;
- the Topic "Writing/Adapting Units of Materials" was based entirely on small group work under close supervision by the tutors.



TOPIC ORGANISATION

Presentation by one or two of tutors in plenary, or if in large groups, by the tutors those groups normally worked with

## D. CONTENT

The subject-matter of the Seminar was divided into five main *Blocks*, each comprising a number of *Topics*, reflecting the different aspects of each main theme that was covered. A brief description of the content of these sections follows.

### Block 1 : Principles of EST Course Design

The work of this part of the course was intended to raise issues concerned with questions such as : what is the nature of language learning ? what kind of language is used in communicating about scientific and technical topics in English ? what factors need to be taken into account about the learner and the learning context in EST course design ? It was felt that answers to these questions were necessary starting point, since viewpoints on these matters (or even their absence) tend to inform a teacher's actions in choice of materials, types of classroom activities promoted, overall criteria for programme design, and so on.

The first of the Topics chosen to illustrate work in this Block was *The Good Language Learner*. To begin the Seminar by considering some of the characteristics of learners was, of course, deliberate : although EST, in common with other forms of English for Specific Purposes (ESP), claims to have the needs of learners as its central concern, much work in the field appears to ignore the full implications of adopting such a position. In particular, research into the habits of successful language learners appears to have made very little impact. This part of the course, therefore described the characteristics of learners resulting from the available research, and showed what the implications might be in terms of EST materials design and methodology. Among the matters given most emphasis were the typical good language learners' predilection for strategies involving educated guessing, problem-solving, attention to meaning, willingness to communicate, pattern-seeking, and so on. Participants were then given the opportunity to evaluate the extent to which a set of published materials promoted these strategies, and to suggest ways in which any failures to do so might be remedied.

The second Topic was *Language as Communication in Science and Technology*. Through a series of practical activities, participants were asked to evaluate the traditional view that the English used for communicating on scientific and technical topics is a specialised register, distinct from the general resources of the language as used for more everyday purposes. They were also asked to consider what kinds of knowledge and abilities a learner needs in order to interpret and produce communication of this type. The exercises promoted a view which sees the language of EST, in contrast to what is normally assumed to be the case, as closely connected with a wide-ranging knowledge of "general" English, and indicated that many other kinds of knowledge-of a basic, broad scientific and technical kind, of a socio-cultural

nature, and so on—are also very important resources for the learner. In addition, attention was drawn to the abilities needed by learners in using these different kinds of knowledge: essentially, the need to provide practice in higher-level thinking of the “going-beyond-the-information-given” type, as well as the more traditional “memorization” work concentrated on almost exclusively in most EST textbooks. Participants then evaluated and made recommendations for change in published materials in the light of these findings. In this section of the course, an attempt was also made to reinforce the point that teaching texts of a very narrow, specialist kind, despite their apparent high face validity, are in many ways unsatisfactory, for both the teacher and the learners, as a basis for EST course design.

The last Topic in this Block was *A Framework for EST Course Design*. In this part, the participants were presented with an outline model for the design of EST courses, focussing in particular on the kinds of information which needs to be taken into account about the “target situation”, and the learners, and the relationship between this and the EST curriculum as a whole. The necessity of building on the full range of the learner’s initial competence and expectations, and the development in him of the type of competence required for successful communication in his study or work situation, were given particular emphasis—again, in contrast to the traditional strategies of focussing on a much more limited range of the student’s abilities and interests, and aiming to equip him only with a narrow range of “specialist” structures and vocabulary.

## **Block 2 : Designing Teaching Learning Materials**

The first of the Topics in this Section was *A Framework for Designing Units of Materials*. The aim here was to give participants an outline model for the design of sets of exercises resulting in an increment in the learning process.<sup>(2)</sup> The model set out to satisfy three main criteria :

1. language should be *presented* in ways as close as possible to its naturally occurring communicative value ;
2. language should be *used* in ways as close as possible to normal communication ;
3. opportunities should be given for clear, systematic accumulation of knowledge about how the *system* of English is used in communication.

In other words, the model aimed to encourage conditions in which learners might communicate about science and technology, rather than merely learn English to communicate about science and technology,

It was felt that the provision of a model which realised these conditions would help to guide participants’ thinking as they progressed through more detailed work on exercise types for various skills, and so on, at later points in this Block. Practice was given at this stage, then, in using certain data on scientific and technical topics to produce outlines of units along the lines of the model.

Certain Topics which followed in the rest of this Block can conveniently be grouped together and given a more general treatment; they are

- Part 2: Selecting and Preparing Texts for Materials
- Part 3: Teaching Reading and Study Skills
- Part 4: Teaching Writing
- Part 5: Teaching Listening and Speaking Skills
- Part 7: Teaching Grammar
- Part 8: Design of Learner-Centred Activities.

The aim of these Sections of the Course was a common one; to provide detailed practical work in the various aspects of materials design which their titles reflect. *Part 2* dealt with the techniques for choosing and adapting texts so that they can be incorporated successfully in a unit of teaching materials. *Part 3* examined the types of exercises which can be used for the teaching of reading and skills such as note-taking, summarizing and so on. Writing exercises were covered in *Part 4*, particularly as regards the necessity for giving learners opportunities to use their abilities to impose a logical structure on data before communicating this information in the form of a written text. *Part 5* considered issues such as "accuracy" and "fluency" and the types of exercises which most effectively promote spoken communication in the classroom. Work on grammar (*Part 7*) explored the relationship between the choice of structural forms and the particular purpose, or function, of a piece of communication. The use of pair-work, communication games, and other forms of learner-centred activities was presented in *Part 8*.

The other main element of this Block was Part 6, *Writing/Preparing Units of Materials*. The aims here were, first, to synthesize the various aspects of materials design studied in the other Parts, by providing the participants with an opportunity to prepare a full teaching unit incorporating as many as possible of the ideas and techniques covered up to this point, second, to provide a resource for exploitation in Block 3 (*Teaching Practice and Observation*), and, third, to heighten the participants' general sensitivity to the possibilities available for the treatment of published materials or in the creation of novel ones. In other words—to expand a little on those points, particularly the last one—to use the adaptation or writing of materials as both an end in itself, and as a means, a way of encouraging coherent thinking about a set of connected teaching decisions. In passing, it is perhaps interesting to note that the participants were presented with three possible ways of accomplishing this work: to prepare a set of existing materials for teaching, to adapt a set of materials, or to write completely new materials. Although the first choice would have involved considerably less effort, and, in any case, could be justified on other, better-motivated grounds, all the participants chose to and succeeded in producing

units in the second and third modes.<sup>(3)</sup> The reason they gave for these preferences was, in so many words, “we want to try out the new ideas we’ve been learning in in the Seminar”. It may well be that other motivations, of a possibly less valuable nature, also contributed to this outcome, but it would be uncharitable not to assume that the “public” rationalisation was a widely-shared and sincere one.

### **Block 3 : Teaching Practice and Observation**

This section of the course comprised a session in which the materials prepared Block 2, Part 6 were taught, and a follow-up discussion evaluating and feeding back on the success of the materials and the teaching strategies used. It is worth stressing that, in contrast to the micro-teaching methodology frequently employed in courses of this kind, the lesson taught was a full-length one (1½ hours), and the learners used for this purpose were undergraduates of King Mongkut’s Institute of Technology (i.e. “real” language learners). Although, of course, many elements in this project were “unnatural” – the untypically small class-size, the presence of observers, the time which had been available for lesson preparation—and so on, the chief defects of the micro-teaching methods—fragmentation of teaching due to severe time limits, the make-believe of peer-teaching in this context—were avoided. The discussion sessions which followed took the form of a stage-by-stage examination of the steps in the material and the teaching methodology used. No lesson observation analysis system was used, since, in the writer’s experience, no adequate one exists for these purposes, and, instead, observers were encouraged to take notes on what they thought were positive and negative features of the lesson, and why, and to think of alternatives to what was done, as appropriate. As a follow-up to these sessions, participants redesigned certain sections of their materials.

### **Block 4 : Designing Testing Evaluation Materials**

Due to shortage of time (for reasons explained later in this report) only the first two Topics were covered, *viz* : *Summative testing*, and *Formative Evaluation*. The former concentrated on various types of progress (or achievement) tests, and their associated formats, question types and so on. Participants were given opportunities to evaluate published test items, and to construct simple ones of their own. The latter looked at the issue of how evaluative techniques might be built into a curriculum, as an integral part of materials and methodology.

### **Block 5 : Follow-up Planning and Seminar/Evaluation**

This section of the Seminar took the form of two plenary discussions, in which participants gave their reactions to the work of the course as a whole, and put forward suggestions for how they intended to follow it up on return to their institutions. Detailed evaluation questionnaires were also completed at this point. The mix of open discussion and individual written records was intended to ensure that as wide a variety of opinions and ideas as possible were forthcoming, (see F. below).

## E. METHODOLOGY

Certain features of the methodology—the overall pattern of organisation of the work—have already been described in C. above. By these methods it was intended that the Seminar would offer as many opportunities as possible for participants to :

1. understand, critically evaluate, and communicate to others their views on the reasoning underlying the various sets of teaching decisions studied, either as presented by tutors or as produced by the participants themselves ;
2. have as much practical experience as possible in following through a coherent set of design decisions to their logical outcome : the writing of a set of teaching materials, the teaching of them to a class of Thai EST students, and the evaluation of their efficacy.

These goals reflected another—ultimately of much greater importance—which was the hope that a significant number of participants would gain the necessary understanding and confidence to continue the development of their own projects, and to influence the work of their colleagues in a similar way, on return to their home institutions ; However, the extent to which these aims were realised by the methodology and content of the Seminar must remain open to speculation until sufficient time has elapsed for a proper, long-term evaluation to be conducted. Nevertheless there is evidence in the results of the evaluations which were done during the Seminar (see below) that many participants felt the methodology of the Seminar was successful in fulfilling the aims mentioned in B. above.

It remains, in this part of the paper, to briefly describe some of the other methodological principles used :

- all lectures were accompanied by outlines in the form of questions, incomplete diagrams, short summaries of more complex points, and so on, with spaces for the participants to fill in with their notes ;
- as much as possible, lectures and workshop instructions provided clear, practical examples of the application of ideas or techniques ;
- frameworks, or “models” were provided, for thinking within, and for gradually being “filled in” in greater detail as the Seminar progressed, particularly with regard to course and materials design ;
- each small group had a participant acting as Group Leader, selected, as far as possible, as being known to be a person who already had a record for showing initiative and organisational ability ;
- workshops were structured so that peer, as well as tutor, criticisms and suggestions, arising from the presentation of the results in the performance of a series of practical tasks, were encouraged ;
- tutors constantly tried to emphasize, and encouraged participants to see for themselves the work of the whole of the Seminar as forming a coherent pattern ;



- participants were increasingly encouraged, particularly in the materials writing phase of the workshop, to work *with* tutors;
- in general, tutors asked participants to solve problems for themselves *in the first instance*, only providing further cues or “answers” when necessary (the latter, however, was regarded as essential as the former, in this general strategy);
- at the end of each of the first two weeks, plenary discussion sessions were held in which participants were asked to say whether they agreed or disagreed, and why, with series of statements reflecting the main issues dealt with in the work by those stages.

## F. EVALUATION

The main means of evaluation used in the Seminar were as follows :

1. after each Topic, participants completed a short questionnaire (see Appendix), the results of which were acted upon, as appropriate, by the teaching staff;
  2. at the end of each week, a longer questionnaire, covering administrative as well as academic issues, was completed by each participant;
  3. Block 5, as described in D. above;
  4. weekly meetings of the Director of Studies and the Group Leaders;
  5. weekly meeting of the teaching staff, in which “evaluation” was the first item on the Agenda;
  6. informal, regular discussions between tutors and participants, and among tutors.
- The results of these evaluations are impossible to record in full in this report. However, the following summary, derived from one of the evaluation documents used in Block 5, would appear to be representative of the general attitude.

## SEMINAR EVALUATION

A. The Seminar had two main aims, *viz* :

- i) developing knowledge and understanding of underlying principles in teaching EST;
- ii) providing guidance in adapting and/or producing teaching and testing materials for EST.

1. Were these appropriate aims? If so, why? If not, what different ones should have been chosen? Why?

generally appropriate aims.  
 not enough on testing.  
 need clearer idea of kind of EST.  
 more consideration for materials for students weaker in English.  
 more *science* texts examples, etc.  
 role of L<sub>1</sub> in EST.

2. Did the Seminar content reflect these aims? Did it reflect any other aims? If so, how?

Yes, very well done.  
 other aims reflected?  
 - role of teacher and learner in class.  
 - scientific/technical knowledge of the EST teachers.

- B. The Seminar was divided into a series of Blocks, and usually each Block was divided into several Topics (see Appendix to this Report).

1. Were the connections between each of the Blocks clear? If not, which were the ones that did not connect together clearly? Why?

*testing* (Block 4).  
 maybe earlier to connect with the teaching from the start.  
 needs to come after the teaching.  
 create testing during the workshop time of preparing materials.

2. Were the connections between each of the Topics clear? If not, which ones? Why?

Yes.

3. Should any Blocks and/or Topics have been missed out? Why?

Testing, because it needs another seminar on its own.  
 No, in fact there should be more on evaluation and testing.

4. Should any other Blocks and/or Topics have been included? Why?

affective factors in learning (vs. cognitive).  
 need to take a different approach in topic on reading.  
 more time for testing.

- C. Taking the Seminar as a whole, was there enough guidance given to you about what you should do? If so, what methods of guidance did you like best? If not, what should be done to improve this?

Yes.  
 Tutors should be more straightforward.  
 need for proper discussion after lectures with lecturers?  
 presentation time too short.  
 need to try something out first then opportunity to try it out again.  
 (i.e. learn from their own experience—not too much feeding?)

- D. Taking the Seminar as a whole, did you have enough freedom to try things out for yourself? If so, in what ways? If not, how can this be improved?

Yes.

No, not as free because of the groupwork, things were decided by the majority only.

- E. Was the way the tutors taught you similar to the ways they have been saying you should teach your students? If so, how? If not, how was it different?

This question is hard to answer because it's a different kind of teaching. This is seminar type, actual teaching is different.

We were forced to think and to apply what was said in the lecture to our classroom situation.

Invalid question. We can't compare because tutors didn't teach us, they just guided and helped us work/understand.

Yes, it's an interesting and challenging method.

Demonstration lessons by tutors?

- F. Were your own opinions about the work in the Seminar paid attention to? If so, how? If not, in what ways?

Yes, through group work and lessons taught.

- G. 1. Did the Seminar have the right kinds of participants? What are the reasons for your opinion?

Yes, all teaching EST.

No-different levels of English of participants, some don't teach EST, but ESP.

Yes, most of them are key personnel in various institutions.

Accordingly, lots of experience were shared and ideas contributed.

2. Was the membership of the small groups appropriate? Why or why not?

Yes.

Easier to concentrate on issues of materials for a certain level of students if small groups of same type of institutions.

A lot can be learned from participants from other kinds of institutions (in small and large groups).

I. 1. Was the length of the seminar day right? Please give your reasons.

Yes, about right as it is.

Day too long: up until 3/3.30 would be better.

3 sessions a day would be enough (at present, not enough time to go to book exhibition etc).

The lecture sessions were too short, no time for discussion—too many topics for one week.

2. Was the number of weeks of the Seminar right? Why, or why not?

Need to allow for travel time.

Stay on campus?

Religious festivals and holidays.

Four weeks long (keeping enough time if day shorter), especially to try things out more than once? Testing things.

Suggest two week periods because I have other work to do at my own institution, but include Saturdays—to make about 12 days.

My own evaluation follows (and, incidentally, reflects my agreement with many of the points made by the participants).

1. The length of the Seminar day was too long—something like 8.30–2.30 for 4 days each week, and 8.30–12.00 on the other day, would have been more appropriate.
2. Much more time might have been allowed for giving participants an opportunity to improve their background knowledge of basic science and technology, which was found to be generally inadequate.
3. Greater emphasis should have been given to the way language behaves as discourse, i.e. the structure of language in use above the level of a short utterance. Most participants seemed to be quite unused to the ways in which texts on science and technology are organised in relation to what they are describing, or for what purpose they have been created, and so on, at the deep, discourse-structuring level.
4. Testing should have been given a much more central role. Perhaps participants should have been asked to devise short tests to be given to the classes they taught a day or two afterwards. This might have provided much more meaningful and practical experience in test construction, and, incidentally, served to shed further light on the efficacy of their teaching materials. Also, as noted in D. above, work on this area had to be curtailed slightly, due to the need to allow time for revision of the teaching materials produced by the participants.
5. The role of the mother-tongue – its uses, limitations, values, and so on, – needs much more extensive treatment than was possible.

6. Perhaps the Seminar could have had a generally greater emphasis on *doing*, rather than theorising, with fewer lectures, more demonstrations, more extended workshop sessions such as those concerned with materials writing and teaching. English language teaching is, in my view, much more akin to a technology than a science. A science is concerned with description, analysis and the formulation of explanations, laws and so on governing natural phenomena. A technology seeks to gain practical advantage through the design of systems which function in the real world. Since the "real world" is still largely unexplored, the insights of sciences will only provide a very limited amount of the information the technologist needs. By practical doing, however, as many great engineering innovations demonstrate, we are nevertheless able to advance the sophistication of our technological systems. I believe that much more heed needs to be given to the doing side of English language teaching than this Seminar, or, indeed, most EFL training courses, provide. Like the invention of Watt's steam engine, this is likely to generate new discoveries in the sciences themselves. Theoretical perspectives are important for what they can contain of practical value, and for the way they facilitate communication between workers in the field, and other interested parties. However, it is important to realise the limitations of attempts to apply theory to practice, and to give due weight and proportion to the solving of practical problems in English language teaching, drawing on as wide a range of insights as possible, and allowing, above all, for that due measure of practical experience which is ultimately the only guaranteed means available to us of incorporating subliminal knowledge into systems which create advantageous conditions for language learning. Perhaps the *atelier* mode of training used to such good effect in the Renaissance studios and the Bauhaus, for example, is the direction we need to explore much further.<sup>(4)</sup>

## G. CONCLUSION

I believe that the approach taken in this Seminar makes the job of the EST teacher simpler, and more educational. The knowledge of "general" English which he or she possesses, far from being an inadequate resource, to which must be added a new, or several new languages, remains a valuable tool. The selection and preparation of teaching texts is made easier, because there is a wider range to choose from, and far fewer of them need cause the teacher real difficulties of comprehension. For both the teacher and the learners there are enhanced opportunities for using knowledge and engaging in activities of a broadly educational nature, rather than merely of a narrower, linguistic analysis-centred kind.

Finally, on a personal note, I wish to record my picture of the teaching of EST in Thailand, as I now see it. There are many existing projects of great merit, for example, those undertaken in King Mongkut's Institute of Technology, Chulalongkorn, Prince of Songkhla and Mahidon Universities, Bangkok Technical College and so on. There is a cadre of teachers whose professional ability is as high indeed, in many cases, much higher—as is to be found anywhere in the world. The students, from my limited knowledge of them, appear to be generally conscientious, co-operative and of a high intellectual calibre. The chief remaining constraint, I believe, is nothing more than the need for a greatly increased level of *confidence* in the way these abilities are and can be further exploited. Teachers need to be less concerned about their expertise in handling the English language—this should *not* be regarded as so great a problem as it is, at least among the majority of the Seminar participants—and more adventurous in using what they do know, and their students abilities, in the creation of interesting, novel and useful classroom activities that promote realistic communication in English

Alan Waters

6 May 1981

#### FOOTNOTES

1. The analysis of needs on which the Seminar was based was derived from the following sources:
  - visits to the King Mongkut's Institute of Technology campuses and Bangkok Technical College;
  - study of teaching materials, syllabuses and other documents, as prepared by a number of institutions concerned with teaching EST throughout Thailand;
  - discussions with British Council officers in Thailand;
  - information obtained from staff of King Mongkut's Institute of Technology during periods of study in Lancaster University,
 etc.
2. cf. "A Technique for Exploiting Authentic Material", by Tom Hutchinson (unpublished mimeo, Zagreb, Yugoslavia, 1979).
3. See Appendix for samples of this work.
4. I am indebted to Donald Firth for many of the insights included in this section.

## APPENDIX 1 : OUTLINE PROGRAMME

### BLOCK 1 : PRINCIPLE OF EST COURSE DESIGN

Topics	Dates
Part 1 : The Good Language Learner	Week 1, Day 1
Part 2 : Language as Communication in Science and Technology	Week 1, Day 2
Part 3 : A Framework for EST Course Design	Week 1, Day 3

### BLOCK 2 : DESIGNING TEACHING/LEARNING MATERIALS

Topics	Dates
Part 1 : A Framework for Designing Units of Materials	Week 1, Day 4
Part 2 : Selecting and Preparing Texts for Materials	Week 1, Day 5
Part 3 : Teaching Reading and Study Skills	Week 2, Day 1
Part 4 : Teaching Writing	Week 2, Day 2
Part 5 : Teaching Listening and Speaking Skills	Week 2, Day 3
Part 6 : Writing-Preparing Units of Materials	Week 2, Days 3-5
	Week 3, Day 1
Part 7 : Teaching Grammar	Week 2, Day 4
Part 8 : Design of Learner Centred Activities	Week 2, Day 5
	Week 3, Day 1

### BLOCK 3 : TEACHING PRACTICE AND OBSERVATION

Topics	Dates
Parts 1-3 : Practice Lesson and Feedback/Evaluation	Week 3, Days 2-4

### BLOCK 4 : DESIGNING TESTING EVALUATION MATERIALS

Topics	Dates
Part 1 : Summative Testing	Week 3, Day 2
Part 2 : Formative Evaluation	Week 3, Day 3
Part 3 : Course Evaluation	Week 3, Day 4

### BLOCK 5 : FOLLOW-UP PLANNING AND SEMINAR EVALUATION

Week 3, Day 5

## APPENDIX II

### SAMPLE : PARTICIPANTS - PRODUCED TEACHING MATERIALS

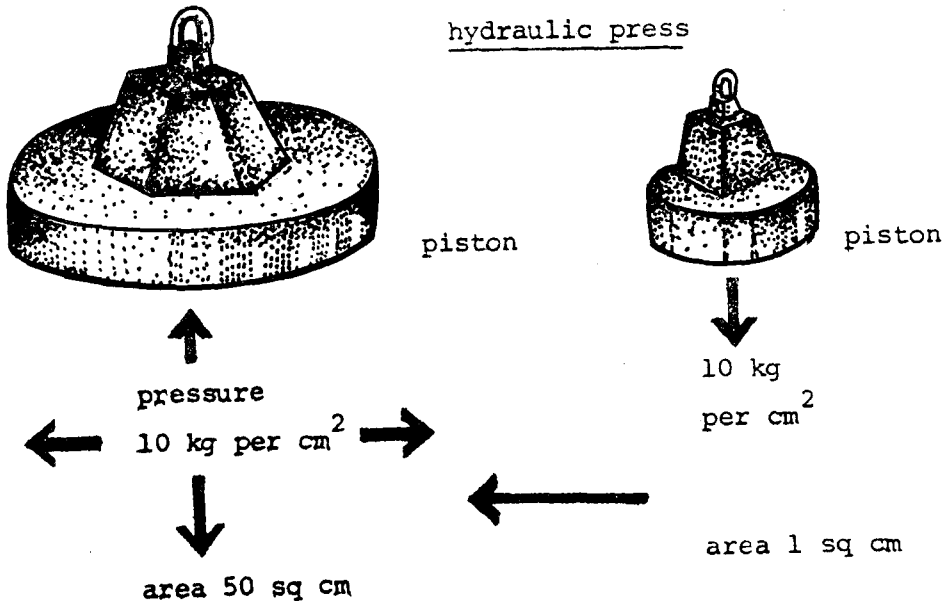
#### SIMPLE HYDRAULIC SYSTEMS

Input

Read the following passage :

Rods and belts by themselves can only transmit pushes and pulls in one direction : the great advantage of using liquids is that they transmit power equally in all directions at once. If you fill a rubber ball with water, prick it with holes of approximately equal diameter and squeeze it, water will spurt out in all directions with the same force.

The hydraulic ram, or press, is an example of how a small weight can produce a large force. If a mass of 10 kg is placed on a small piston in a tube of one sq cm area that is filled with fluid, the pressure throughout the fluid will be 10 kg per sq cm (or more correctly 98 newtons per sq cm). If this narrow tube is connected to a wider one of 50 sq cm area, the pressure of 10 kg per sq cm acting on an area of 50 sq cm will produce a force of 500 kg (4900 newtons). In this way a load just less than 500 kg can be raised, but only a tiny distance. If the 10 kg weight falls 10 cm, the 500 kg will only rise one-fifth centimetre. (Fig. 1)



(Fig. 1)



### Fully Hydraulic Car Lift

When the air valve is opened, compressed air enters the oil reservoir. This puts the oil under pressure. Next, the oil valve is opened, and oil goes into the cylinder, raising the plunger. This lifts the car. To lower the car, air is first exhausted from the reservoir by opening the air valve. The oil valve is then opened gradually, allowing the oil to flow back into the reservoir.

(Fig. 2)

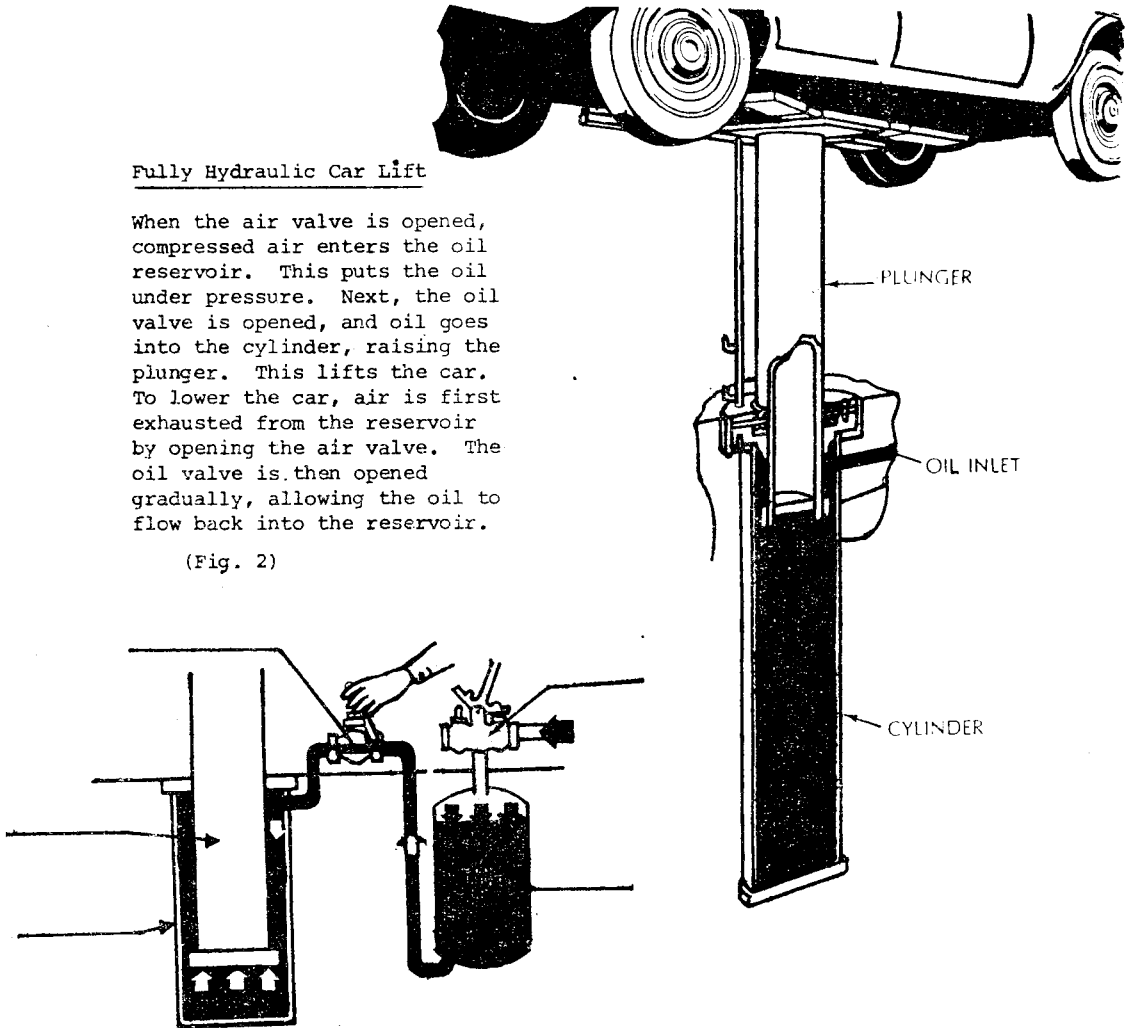
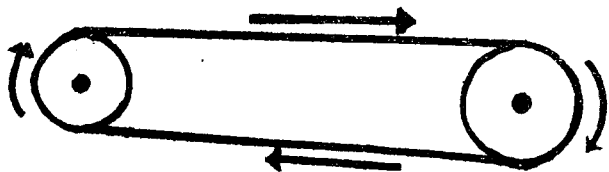


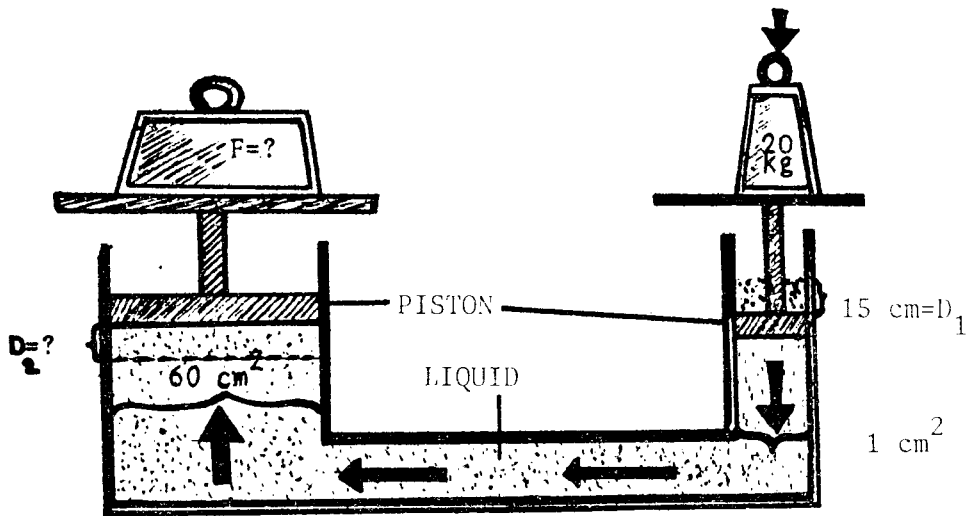
Fig. 2

### Gathering information

- a. What kinds of transmission do these diagrams show?



b. Now use the information in the passage to draw a diagram showing the transmission of power by liquids.



Look at this diagram and give answers to how much force is produced

$F = \underline{\hspace{10em}}$

and what distance the weight can be raised?

$D_2 = \underline{\hspace{10em}}$

3. Most simple pumps operate on the principle that if pressure increases volume decreases and if pressure decreases volumes increases. What is the principle of the hydraulic press?

4. Supply the missing labels in the diagram of “the hydraulic car lift” on page 2.

5. Order the following information to show the steps in raising a car :

- this puts the oil under pressure
- the plunger is raised
- the air valve is opened
- this lifts the car

the oil valve is opened gradually  
the oil goes into the cylinder

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6. Now, write a similar description for lowering the car.

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7. Can you name any other common devices or machines using hydraulics? Can you think of another advantage of such systems, and a disadvantage?

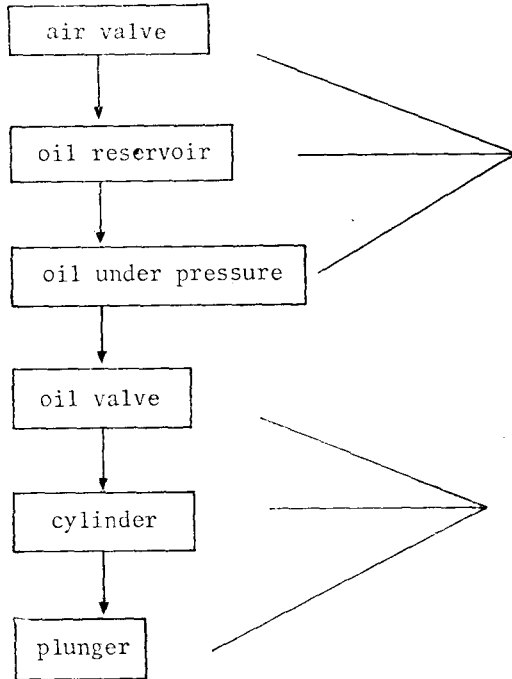
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**Language Focus**

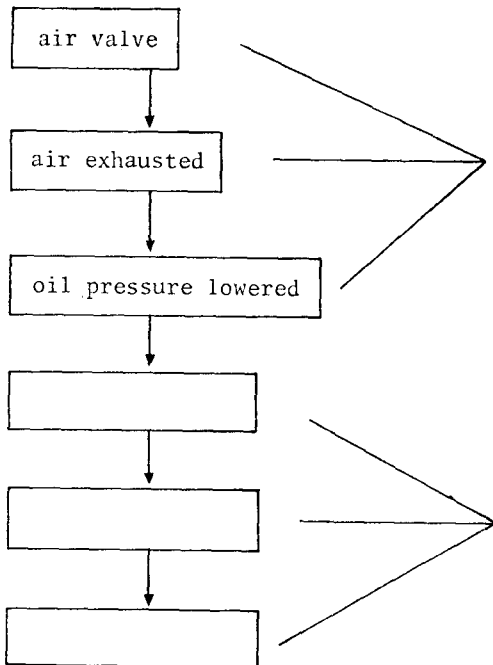
**Step 1** Look at this diagram and written description of how a car is lifted by a hydraulic car lift.



When the air valve is opened, compressed air enters the oil reservoir.  
This puts the oil under pressure.

When the oil valve is opened, oil goes into the cylinder.  
This raises the plunger.

**Step 2** Now use the same patterns to describe how a car is lowered by a hydraulic car lift.



**Step 3** Now use the patterns practised above to complete this description of how a simple pump works.

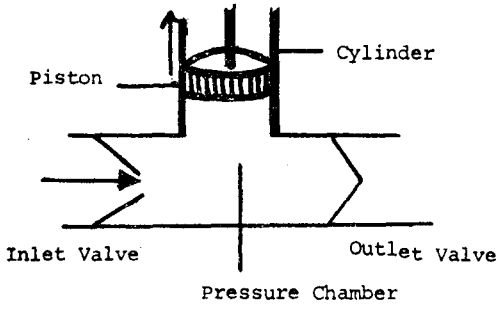


Fig. 1

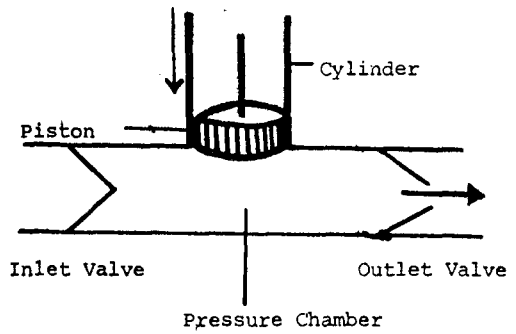
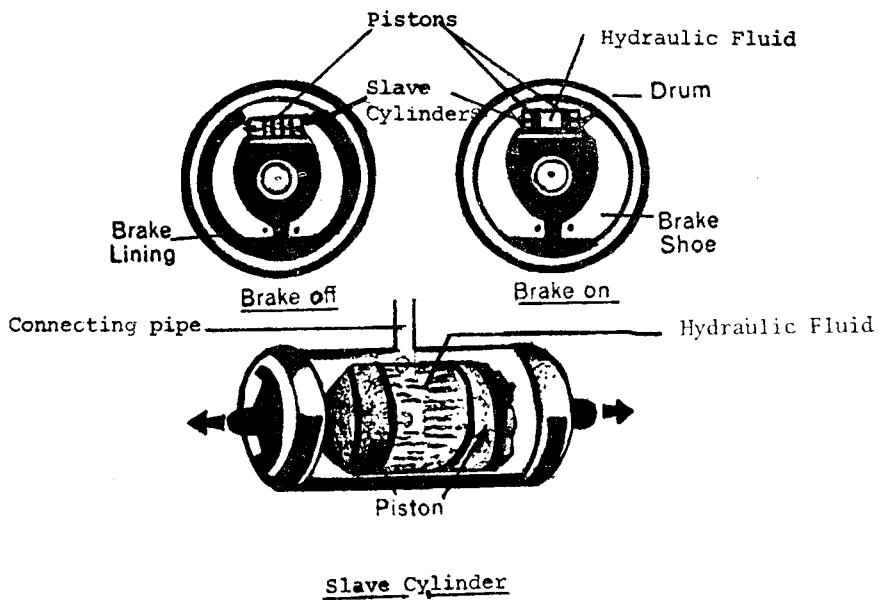
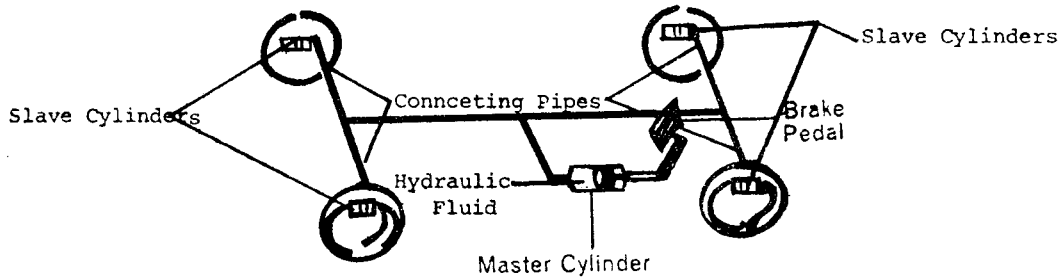


Fig.2

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- \_\_\_\_\_ . The fluid enters the chamber.
- 
- \_\_\_\_\_ . The fluid leaves the chamber.

Task
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- Work in groups of three or four



### Slave Cylinder

#### Car braking system

- Look at this diagram of another simple hydraulic system
- car brakes.

**Step 1** Discuss among yourselves how it works.

**Step 2** On your own, using the patterns you have practised in this unit, write a short description of how the car braking system works.

## SIMPLE HYDRAULIC SYSTEMS

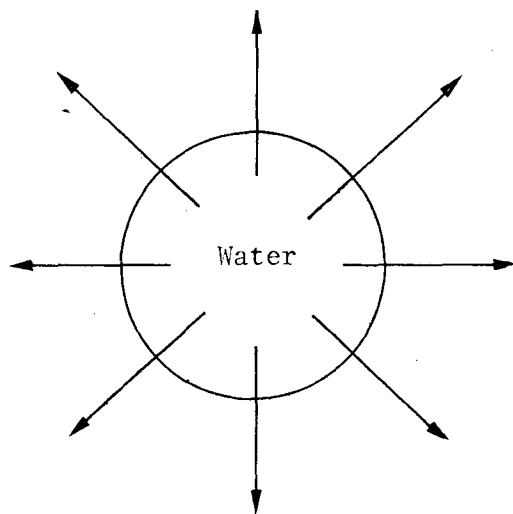
### Teacher's Notes

#### Input

- Give the students 10 minutes to read the first two passages.

#### Gathering Information

- a. Students study the diagram and should be able to answer orally that e.g.  
"Rods and belts transmit power in one direction"  
b. Students draw a similar diagram as shown, illustrating the idea that liquid transmits power in all directions.



Teacher goes around checking whether the students have conveyed correct idea.

- Students work individually calculating the answers within 5 minutes.

$$\begin{aligned} \text{Answer } F &= 1200 \text{ kg/cm}^2 \\ D_2 &= \frac{1}{4} \text{ cm.} \end{aligned}$$

- Ask 2 or 3 students what their answers are and see if they are different, if yes, ask for explanation.

- Students write the answer e.g.  
"A small weight can produce a large force"
- Turn to the Input, page 2 and have the students put in missing labels in diagram 2. The missing labels are, "air valve, oil reservoir, oil valve, cylinder, plunger (from the top right, going clockwise).

5. Students *Write* the six steps in the correct order. Have one student read out loud what he has, whereas the others check their own answers. Discuss the difference if there is any.
6. Students write the description. Teacher gets possible steps from class e.g. The air valve is opened.  
Air is exhausted.  
The oil pressure is lowered.  
The oil valve is gradually opened.  
Oil goes back into the reservoir.  
The plunger is lowered.  
This lowers the car.
7. Possible answers :- Flushing system in the toilet, coffee pot, dump truck, etc.

**Advantages :** Few moving parts, therefore less wear and tear.

**Disadvantage** 1. Fluid needs replacing and replenishing periodically; a puncture in any part of the system makes all of it stop.

Task
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- Students work in group of three or four.
- Give them 8-10 minutes to discuss among themselves while the teachers go around to help.
- On their own, using the patterns they have practised in the unit, the students write a short description of how the car braking system works.
- Teacher collects the student's work for Alan Waters to correct, promising the students that they will be returned ten minutes later.
- Possible answer :

When the brake pedal is pressed, it moves the piston in the master cylinder. This forces brake fluid out of the master cylinder and along four pipes to the slave cylinders. The pistons in the slave cylinders are forced outwards. This causes brake shoes to press against the brake drum.



## **Simple Hydraulic Systems**

### **Recommended improvements of material**

1. Make the diagram on page 1 clearer, easier to understand.
2. Ask the learner to label the missing labels in the diagram on page 2 immediately at the end of the text instead of putting it as question 4 in gathering information part.
3. Add the labels “belt” and “rod” to the first two diagrams on page 3.
4. Rewrite question 3 on page 4 so that the students will not be confused by the preceding example.
5. Rewrite the instruction of question 5 so that the students know clearly what to do.
6. Replace the word “description” in question 6 with the word “steps”.

### **Recommendations on some teaching points**

1. There should be more orientation and structuring on what students are expected to do in this unit.
2. Teacher should use more English at certain points.
3. Teacher should be more prepared in terms of technological concepts.