

An Effective Utilization of the Language Laboratory

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1. Introduction

Advances in science and technology have made the world smaller. English is now an international language for global communication. In language acquisition, the skills of listening, speaking, reading, and writing are all different things, and all these skills have to be acquired in equal measure. English education in Japan, however, has conspicuously failed in the teaching of listening and speaking skills. Everyone concerned with English education in Japan is acutely conscious of the need for drastically improving oral communicative competence.

Each year commercial companies in Japan produce a tremendous amount of educational hardware, and each year sees marked progress in the development of ever more efficient and advanced electronic teaching equipment. Vast amounts of money are invested in the setting up of modern language laboratories in secondary schools and universities. The expectations have been great, but the actual results have been very disappointing. Many teachers charged with the supervision of language laboratory lessons have been unable to keep up with the mechanical or hardware side of teaching. They are unfamiliar with the equipment, and do not make use of the full potential of the language laboratory. On the software side, teachers have to develop some effective uses of the language laboratory which requires material and techniques. In a situation where teachers are using unsuitable software material in a language laboratory with which they are unfamiliar and ill-at-ease, it is little wonder that students find language laboratory lessons boring and tedious, and feel that they are being asked merely to repeat parrot-fashion the voices coming out of their headphones.

This is a tragic situation. Correctly and positively used, the modern language laboratory is a superb educational tool for facilitating oral communicative skills—precisely those skills that are most wanting in the English language education of current Japan.

2. The awareness of physiological mechanics of language acquisition

Students tend to ignore or to be indifferent to the mechanisms of hearing and speaking. Never having experienced any difficulties in acquiring their native language, they are unconscious of the mechanisms involved, and they are unaware of the difficulties involved in learning a foreign language. Therefore, students who study a foreign language should have a knowledge of the mechanisms of both hearing and speaking. Speaking competence is deeply associated with hearing competence. An understanding of the physiological processes involved in listening and speaking may help students to understand the nature of language acquisition. The way the brain memorizes information and of the process of muscle manipulation make us realize that the acts of hearing and speaking are by no means simple. Almost all parts of the human brain are utilized, and the nervous system co-ordinates brain functions with the muscles of the body. In each and every student of a foreign language, numberless and highly-complex new neural pathways and circuits must be developed, and accurate co-ordination of brain functions with muscular activities must take place. The proverb "Rome was not built

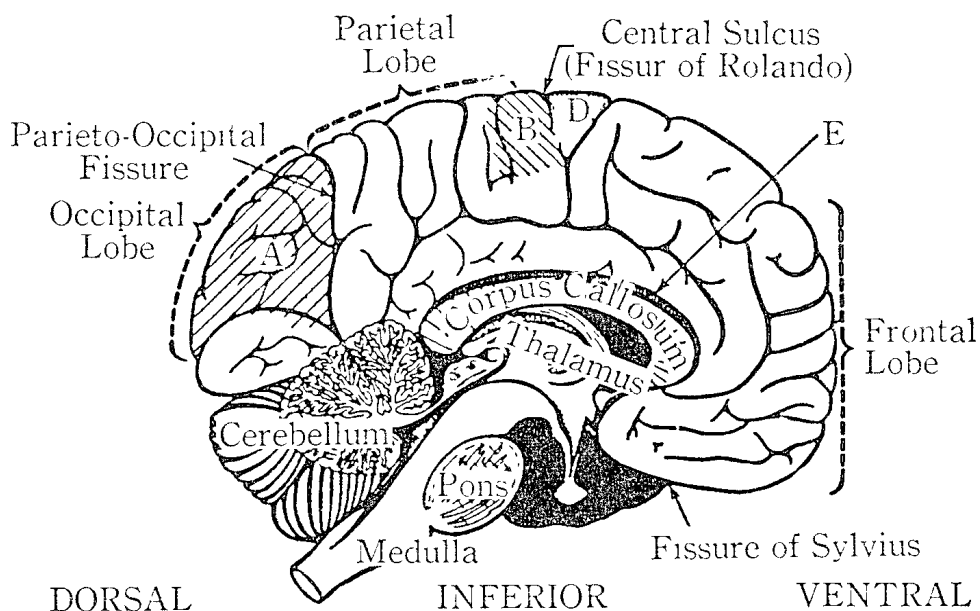


Fig. 1. Left cerebral hemisphere. Mesial view, showing thalamus, corpus callosum, and part of the projection area for olfaction and gustation (E). The primary area for smell and taste, not shown, is the nucus, situated in the hippocampal convolution on the inferior surface of the temporal lobe. (From Fryer, Henry, and Sparks, *General Psychology*, College Outline Series.)

in a day.” is highly appropriate to the process of language acquisition. Each and every student must build his or her own ‘Rome’ carefully and step by step.

The Nervous System

The stimulus for speaking may come from any environmental factor affecting the sense organs, or from any thought processes of the speaker. Hearing is frequently the sensory activity that stimulates speech: a person hears the question of another person and is stimulated to answer. These stimuli are received by the sensory branches of the nervous system and are conducted to the brain. The sensory branches which receive these various stimuli belong to the peripheral nervous system, which consists of the nerves extending from the brain and the spinal cord to the outlying parts of the body.

In the central nervous system, the brain receives and interprets the

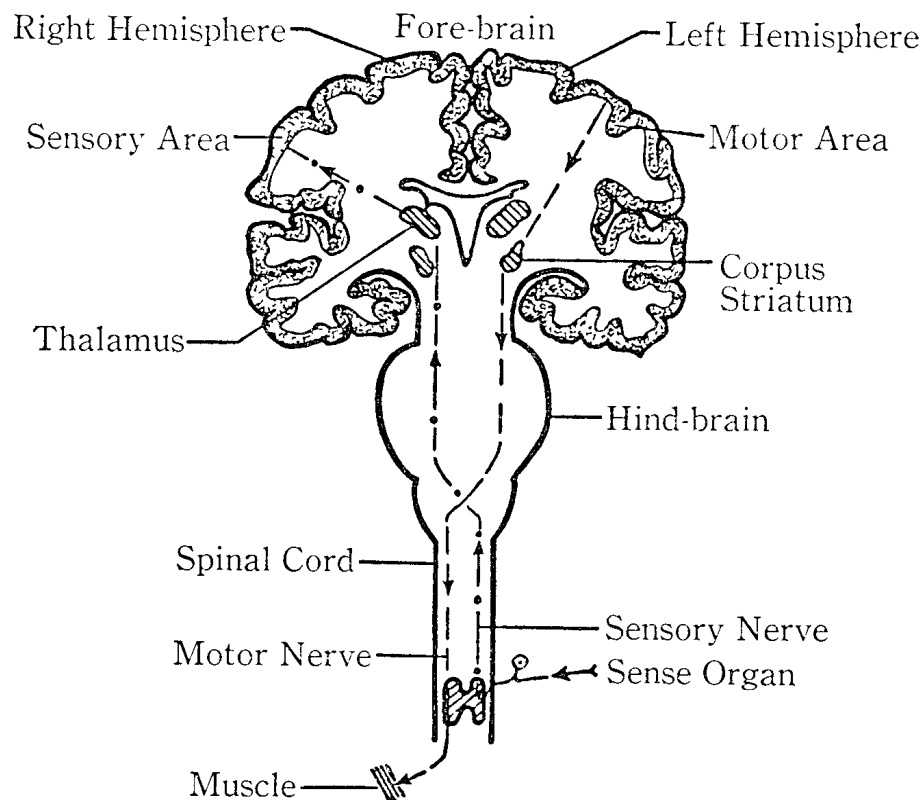


Fig. 2. Sectional view of the spinal cord and brain. The line of dots and dashes (-·-·-) shows the pathway of a sensory impulse from a sense organ to the sensory area of one side of the brain. The broken-dash line (- - -) shows the pathway of a motor impulse from the motor area of one side of the brain to a group of muscles. These pathways exist on both sides of the brain and spinal cord, but are shown on one side here to simplify the diagram. (*Speech*, p. 144)

stimuli for speech. All stimuli are conducted over sensory nerve fibers to the thalamus, a junction point for sensory nerves located in the interior of the brain. Nerve impulses are then conducted to the various brain areas.

Each type of stimulus is received by a specialized area of the brain. Adjacent to these areas are association areas, where recognition and interpretation of the stimuli take place. For example, the sound of a person's voice is experienced as a sensation in the auditory area, but the recognition of the person's voice and the understanding of the meaning of the words occur in the auditory association area. After the recognition of the significance of any stimulus, the thought processes start in the frontal area, where the decision to speak takes place.

A decision to speak involves activities of the motor branches of the nervous system. All motor nerve impulses pass through the corpus striatum, located in the interior of each hemisphere of the brain. Nerve impulses travel from the motor area, over the motor branches of the cranial and spinal nerves, to appropriate muscles.

The Hearing Mechanism

Hearing refers to the reception of sound by the ear, its analysis, and its transmission to the brain. Associated with the hair cells are the end organs of the auditory nerve which conducts the auditory nerve impulse to the

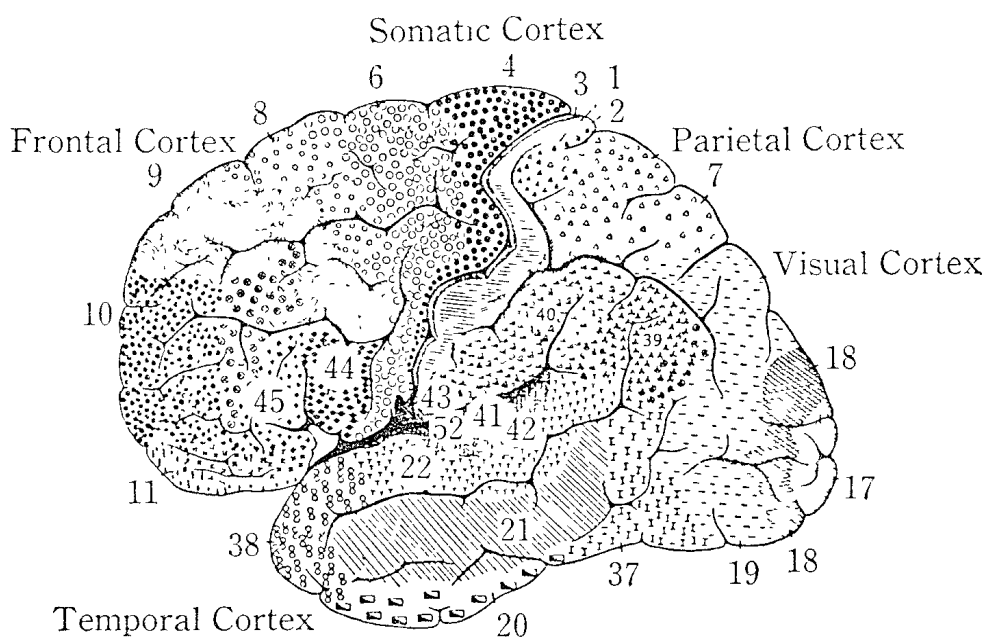


Fig. 3. Cytoarchitectural map of human cerebral cortex by Brodmann (1914). Topographical representation of areas of cortical function in Broca's Areas (44+45) and in Wernicke's Area (22)

brain, resulting in the sensation of hearing. In the human brain, several areas have evolved that have special importance for the learning and processing of language. The two classical areas known for more than a century are, Broca's Area and Wernicke's Area in the left hemisphere in the brain. Paul Broca, in 1861, pointed out the special importance of the left hemisphere of the brain for language, and he placed special importance on the frontal region—Broca's (44 & 45). Carl Wernicke, in 1874, pointed out the special importance of the posterior regions, especially Brodman's Area 22, for the auditory comprehension of speech.

Broca's Area: Integration of encoded linguistic information in Frontal Cortex, "Patterned" and delivered to other cortical regions.

Wernicke's Area: Feature detection of language elements. Neural analysers. Neural encoding available to sensory and integrative and motor-expression regions. (Visual and Somatic)

The Speaking Mechanism

The brain receives and interprets the stimuli for the act of speaking in the central nervous system. All stimuli are transmitted over sensory nerve fibers to the thalamus, a junction point for sensory nerves located in the interior of the brain.

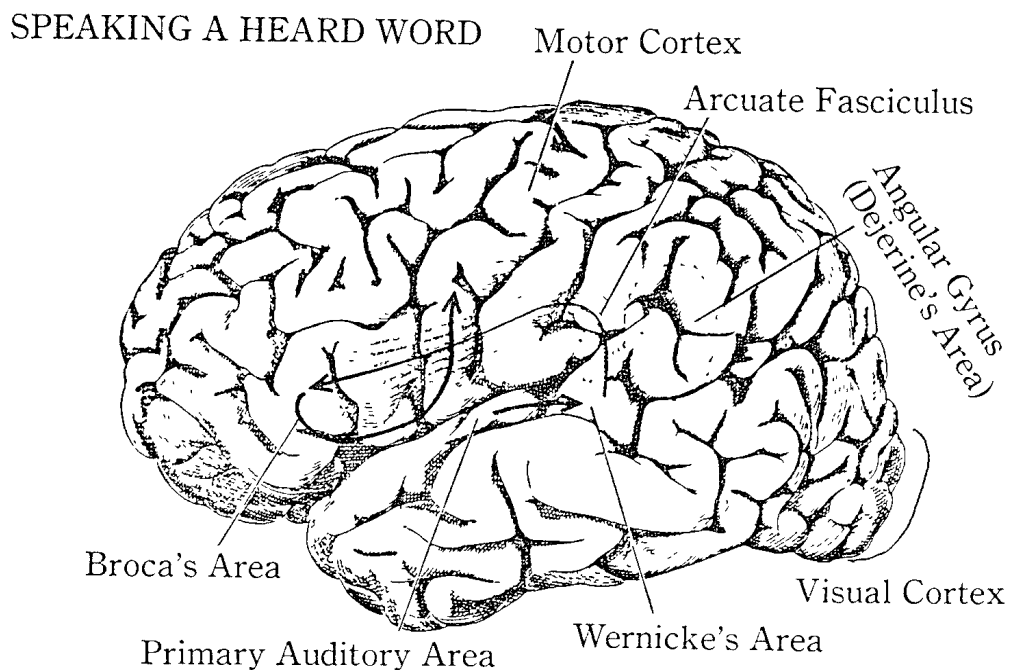


Fig. 4. Cooperation of Several Linguistic Areas of the human Neocortex (Presented at LLA Convention in 1981)

Nerve impulses travel from the motor area—Broca's Area—over the motor branches of the cranial and spinal nerves, to appropriate muscles. Broca's Area identified in the left frontal lobe of the brain is the speech association area.

In order to produce the speech sounds, each part of the speech mechanism, such as the respiration system, the jaw, the tongue, or the lips have to work cooperatively. The main functions of the speech mechanism include (1) respiration, (2) phonation, (3) resonance, and (4) articulation.

Hemispheric Specialization of the Brain

It has recently become apparent that in man the anatomical complexity of the area at the back of the temporal lobe devoted to language, is greater in the left hemisphere than in the right. Therefore one can conclude that the left hemisphere is specialized for the production and analysis of vocalizations and language, whether transmitted by sound, vision or, in fact, touch. The location of Wernicke's auditory language area and Dejerine's visual language area and also Broca's area are found only in the left hemisphere. One can generalize by saying that all human mental activities which depend on encoding experience in some abstract form (such as language, numbers and algebraic or logical symbols) are mainly performed by the left hemisphere.

The right hemisphere seems to be mainly specialized for 'spatial processing'—finding the way out of a maze, determining whether complex patterns flashed successively in the left hemisphere are the same or different, recognizing faces or pictures, and so on. It can perform these operations

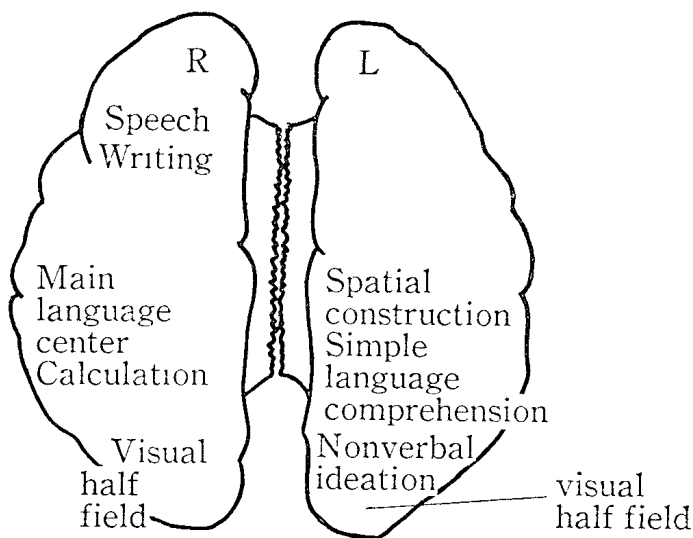


Fig. 5. An Introduction to Neurophysiology p. 339.

more efficiently than the left hemisphere. The right hemisphere is probably also superior to the left in musical appreciation and imaginative thinking.

3. The Language Laboratory Class *¹(A-A-C type)

Hitherto the physiological or neurological aspect of language acquisition has been introduced. The writer would like to move on to the subject of the Language Laboratory (L.L.)—how teachers can apply this knowledge to LL education. As the potentialities of LL education have been and are great, it will be important at this point to consider the definition of the Language Laboratory.

Language laboratories are study rooms equipped with electronic sound-reproduction devices, enabling students to hear model pronunciations of foreign languages and to record and hear their own voices as they engage in pattern drills. Most laboratories provide a master control board that permits a teacher to listen to and correct any student individually. Many are equipped to use filmscripts or motion pictures simultaneously with the tape recorders. These laboratories are effective modes of operant learning, and, after a minimum vocabulary and syntax have been established, the learning can be converted into a stimulating form of problem solving. —*Encyclopedia Britanica*

Another definition is: A system using audio visual machines to teach a number of students—*Current Vocabulary for Language Learning and Language Laboratory*

Why is the LL used in foreign language teaching? It is vitally important to understand the limitations of the LL and to know its merits and the demerits.

The Merits

1. The LL can provide a uniform controlled environment for hearing, speaking, and recording.
2. The students can practice individually.
3. The students can compare their speech with the model tape.
4. It is easy to present a different culture by using TV, slides, and so on.
5. Teachers can monitor the students day-to-day work and can keep a record of it.

The Demerits

1. The students feel it is impersonal since they are dealing with impersonal

*¹. Audio-Active-Comparative type

machines.

2. The machines are complicated and can be difficult to manipulate for some teachers and students at the beginning.
3. Edited master tapes can not be easily changed.

After considering all these LL merits and demerits, the teacher can decide how and when to use the LL in his program of language instruction. In itself, the LL is not a teaching method. It is simply a room filled with electronic equipment. And yet the main purpose of the LL is to facilitate oral communicative skills.

In his Oral Method, Palmer identified five Speech-Learning Habits in language learning: 1) Auditory Observation. 2) Oral Reproduction. 3) Catenizing. 4) Semanticizing. 5) Composition by Analogy. All of these steps have been applied by many experienced teachers, and the Oral Method as a whole has seemed to work quite effectively. However, there are many problems inherent in a direct application of this Method to a LL situation. For one thing, simply requiring the student to sit in the same position in a LL booth and listen, repeat, substitute, write and record for 90 or 100 minutes will result in tiredness and boredom. The problem of intensive language use is that wearing headphones for a long time and concentrating on the listening function of language acquisition results in rapid tiredness. After about thirty minutes most students find themselves unable to concentrate on the taped material. When the teacher considers the physiological and neurological processes involved in listening to tapes in the LL, it is clear that most students are using only the left hemisphere of the brain—that part which includes the linguistic functions. Teachers, therefore, have to consider students' physiological exhaustion against their productive activities in the LL. Here, the writer would like to compare man's passive and active states. The following are not the exact activities involved in acquiring language in the LL; however, through this data, the teachers presume the students' degree of exhaustion.

Although *²it is said the relative metabolism of mental work is little, it uses up about 4 to 5% of basal metabolism. The amount of consumption is regarded as a result of physical movement—such as that of the fingers and hands. Therefore, the writer presumes the student's consumption of energy in language laboratory learning is between item No. 3 (Culture) and No. 4 (Desk Work) or even more. Most students must use up even more of

*2. 『スポーツとエネルギー・栄養』p. 84.

The Relative Metabolic Rate of Daily Routine Labor and Its Consumption
Table 1.

NAME OF WORK	RELATIVE METABOLIC RATE	CONSUMPTION OF ENERGY (cal/kg/min.)
1. Sleep	90% of basal metabolism	
2. Recess/Conversation in native tongue	0.2	0.0233
3. Culture/Education (reading, writing, watching)	0.2	0.0233
4. Desk work (accounts, counting, entry work)	0.6	0.0304

Source: 沼尻幸吉著『活動のエネルギー代謝』労働科学研究所出版 昭和 49.

their energy by catechizing, repeating after the tape or dictating it.

One way to relieve students' tiredness, and give the left hemisphere a brief rest, is to take a five or six minute break and listen to ^{*3}Western classical orchestral music, which is said to use the right hemisphere of the brain. It goes without saying that it is useful to have a recess, just talking to other students for relaxation.

Since students can practice individually in the LL, they must be given clear guidance about the important point of the lesson, must be shown the key structures of that lesson, and must be given background information on any cultural items that are relevant. The teacher must also identify any points that might prove difficult to some students. Unless all these things are done, learning in the LL will be just a waste of time for some students.

One important advance in the application of Palmer's Oral Method to the LL situation has been the work of Prof. Saito at Meiji Gakuin University. ^{*4}He has proposed a lesson procedure for more effective use of the LL. His ideas were inspired by previous systematic approaches to piano and type-writing instruction. In his procedure, instruction is divided into three periods: Pre-Lab, Lab and Post-Lab. Pre-Lab and Post-Lab activities are carried out in an ordinary classroom with his teaching method. After preparatory work such as checking of homework in the classroom, the students then enter the LL for actual LL practice. The professor got 90% of the students' full support and could improve their ability to imitate the taped models. Therefore, it is up to the teacher when he uses the LL in his instruction.

^{*3}. 角田忠信著『日本人の脳』p. 227.

^{*4}. LLA Convention in Japan, 1981.

Needless to say these procedures are able to be done in the LL without using regular classrooms, and not moving from one room to the other. It is a general principle to give clear guidance to all students as an introduction and give individual work, at the end of the class followed by the consolidation of the day's work in the classroom situation. The LL is just a room, and if there is no booth (individual fence), the teacher can use it just as a regular classroom. He can sit in front of the students and use eye contact, which is useful to smooth down the impersonal atmosphere of the LL. After being given the explanation in the Pre-Lab, which is here, while not wearing headphones, students go into the individual LL practice.

Oral Communicative Skill

Language teachers often say to expose the target language to the students is effective and then they can observe it by hearing. Prof. Wilga M. Rivers wrote in her book that people learn to speak by speaking, and that students of a new language will not learn to speak fluently only by hearing speech in class, although this is most important for familiarizing them with accepted forms and the flow of authentic speech, as well as for giving them practice in the receptive side of communication. She also insists that students should be given the chance, throughout their period of language study, to develop even greater skill in encoding their thoughts in even more complicated structural patterns of the new form of speech, and in consolidating the muscular control involved in the acceptable production of sound sequences.

In the LL it is effortless to expose target language to the students, such as showing video tape cassettes. Again, as the writer mentioned before, the main purpose of the LL lesson is to facilitate oral communicative skills. It is utterly pointless to evaluate any such acquired skills by written examinations. To do so is to completely vitiate the whole purpose of LL education. Hitherto not enough attention has been paid to the positive role that carefully-structured evaluation techniques can play in language acquisition. Newly-acquired oral skills should be evaluated by oral tests, and these oral tests can serve to act as important motivational and re-inforcing factors. The students are motivated to perform well in the evaluation tests, and the test itself gives the students opportunities to use the material they have learned in a real-life situation. Oral evaluation can take any form, but here again, the LL can be effectively used by the teacher, the advantages being that it provides uniform and fair conditions for all students. Needless to say,

there are many technical problems in giving and evaluating the oral test; however, it is not the aim to write these problems here.

Teaching Materials

In contrast to the high quality of the educational hardware except editing machines being produced every year, the quality of the maching software is very poor. Although a vast amount of material is available commercially, and even more is being produced, most teachers have great difficulty in finding material to suit their individual requirements. There are so many courses, aimed at so many levels of ability, and catering to so many special interests, that teachers find themselves having to re-edit commercially available material to suit their own needs. Very rarely is it possible to use commercial material directly in the form in which it comes from the publisher. Needless to say, re-editing such material is not easy, and takes up much time that could be otherwise spent. Moreover, the advanced editing machine does not work efficiently.

If the re-editing of commercial material is difficult, all the more so is the preparation and production of private laboratory materials. Conscientious teachers who, dissatisfied with the commercially-available materials, seek to put together their own LL software must devote an enormous amount of time, and utilize a number of highly technical skills involved in the drafting, recording, editing, re-recording, and so forth. The demands on the teacher are slmost too great. However, there is a positive side to this matter. *⁵As Prof. P. Strevens has pointed out, this field is virtually a new frontier, and vast potentialities exist for the structuring of new laboratory materials, and for making the LL an even more effective and enjoyable way of teaching and studying.

Conclusion

The LL is not pedagogy, but is merely a room filled with electronic equipment. To make the most of the LL, it is all depends on the teacher's decisions on how and when to use it in his program of the target language instruction. The main purpose of the Audio-Active-Comparative type of the LL is to provide oral communicative skills. Newly-acquired oral skills should be evaluated by oral tests, and these oral tests can serve to act as important motivational and reinforcing factors. The students are motivated to perform well in the evaluation tests. To do so, the LL can provide uniform

*⁵. LLA Convention in Japan, 1981.

and fair conditions for all students simultaneously.

The language learning in the LL uses up a lot of energy compared with other passive forms of learning. The students should develop their own language circuit and they have to learn with their bodies. Therefore, both teachers and students should be made more aware of the nature of the basic mechanics of language acquisition. A fundamental knowledge of the psychological and the physiological or neurological mechanics of listening and speaking, and of the mechanics of language acquisition, would enable teachers to understand more the unique demands of LL education, and to prepare more effective software materials. The same fundamental understanding would also help the students to understand *what* they are doing in the LL, and *why* they are doing it—in other words, it would serve to motivate them in their studies. Without this fundamental knowledge, both the teacher and students are working blindly. Perhaps they have some vague idea that the LL is an important tool in language learning, but they have no idea as to why this should be so, or as to how that tool should be used.

Finally, teachers must have some firm goals in their teaching. They must be consciously directed towards clearly-defined objectives, even though they may seem unrealistic. With no such clearly-defined objectives, the teacher will not be able to structure his teaching, and the student will not make the fullest progress possible. The writer suggests that the goal of English language education should be survival coordinate-bilingualism. This means that students have a command of both Japanese and English at the basic level necessary in daily life. However, coordinate bilingual students may not be able to translate English to Japanese or vice versa, because coordinate bilingual students have two languages operating as different systems for the encoding and decoding of information. Yet with firm goals in mind, basic communicative skills can be facilitated by LL education.

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