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LANGUAGE LABORATORIES IN SCHOOLS

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The technical characteristics of various types of language laboratory are outlined The difficulties of effective monitoring by teachers and accurate auditory discrimination by pupils are highlighted and the theoretical rationale underlying most commercial laboratory material is critically examined Some major research studies into the effectiveness of language laboratories are discussed It is suggested that laboratories give only a slight initial advantage in speech production and that their educational usefulness is not always commensurate with their cost and technological sophistication

Over the past decade, language laboratories have been fashionable acquisitions in schools Such installations may increase the prestige of an institution and are consonant with a rather sophisticated 'technological' approach to education, but all too often the educational rationale for installing a language laboratory is given insufficient attention Despite the great cost of the equipment, we tend to assume, without looking at the evidence in depth, that it will have a beneficial effect upon language study Perhaps, subconsciously, the high cost of the equipment may even reassure us about its efficacy – it would be a confidence trick too outrageous to contemplate that we should pay out so much money for the installation and maintenance of a laboratory and then find that the results are no better than those of traditional language teaching If it is so expensive, then surely it *must* be efficient in improving language learning? Yet if we consider the situation in the United States, we see that many language laboratories have fallen into disuse or have been replaced by other types of equipment which are sometimes both cheaper and simpler than a full language laboratory Recently, it has been noted that 'the learning carrel in the materials resource centre plus an electronically equipped classroom has replaced the laboratory of the 1960s (2, pp 1286 7)' While we in Ireland are still striving to equip our schools with laboratories, there are indications that such aspirations may be already outmoded

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TYPES OF LANGUAGE LABORATORY

The simplest type of installation is known as 'audio passive' This is no more than a gramophone or tape recorder with loudspeaker output It is cheap and portable, but obviously its uses in teaching and learning are limited

The 'audio active' laboratory requires headphones and a microphone linked to output from a gramophone or tape recorder The student is able to hear his voice in the headphones as he speaks and his perception of his speech may be more critical than usual because the sound is air conducted and not, as he usually hears it, bone-conducted If there is a suitable console of switches, the teacher can listen to individual students, but the student, since he has no tape-recorder of his own, cannot repeat a passage at will, and has no control over the material upon which he works The audio active principle has been applied to the ordinary classroom, and this will be described in more detail during the discussion (below) of educational problems arising from use of the language laboratory

The most versatile and expensive type of laboratory is known as 'audio active-comparative' Here each student has his own tape recorder and can make recordings on the student track which can be erased and repeated until the learner is reasonably satisfied with his effort There is a master track with which he can compare his utterance (hence the name 'audio active-*comparative*') and which can only be erased by the teacher Depending on the type of central console, it may be possible to divide the class up into groups with a different input for each group The teacher can listen to each student and correct him in the privacy of his individual student booth without disturbing the work of the rest of the class

There is a fourth technical possibility – that of mixed installation This is composed of both audio active and audio-active comparative booths in the same laboratory The student practises listening and repeating in a booth of the first type, and when he has reached a reasonable level of competence, he transfers to a booth of the second type to make his recording This type of laboratory is cheaper than a full audio active comparative installation, and is educationally sound in that students are discouraged from making recordings before they are properly ready to do so

In general, the advantages offered by the language laboratory could be summarized as follows Firstly, even the least sophisticated type of

laboratory offers an opportunity for concentrated and intensive exposure to the foreign language, and students can actually practice speaking to a far greater extent than they would in conventional classroom instruction, during which they are compelled to listen to the faulty hesitant utterances of their colleagues In the laboratory, they are continually exposed to a model of correct native spoken language Secondly, in the audio active and audio active comparative types of installation, the student is able to hear his voice as others hear it (i e , air conducted) and this should lead to a greater objectivity in his judgement of his own performance Proper auditory perception of mistakes is a prerequisite for the correction of those mistakes Thirdly, the audio active comparative installation offers some unique advantages The student is given greater independence in his work and by listening to the master tape and comparing his own version with the model, he is enabled to correct himself Furthermore, individualization of instruction is achieved in various ways Once the student has been given control of his own machine, he can work at his own pace, proceeding in accordance with his own capabilities Then, facilities for group work enable the teacher to divide the class up into sections, providing more advanced work for the more gifted individuals Finally, the teacher can monitor each student privately and without interrupting the work of the rest of the class

EDUCATIONAL PROBLEMS IN THE LANGUAGE LABORATORY

One of the great advantages of the laboratory is the opportunity offered to the learner for critical self listening, but many researchers and teachers assert that students' level of auditory discrimination is too low to enable them to profit from this facility It is being increasingly realized that imitation of foreign language utterance is a complex activity and not just a kind of reflex action Guberina (quoted in 21) believes that we are to all intents and purposes 'deaf' to sounds in the foreign language which do not occur in the mother tongue Furthermore, he asserts that the language learner's encounter with a new sound system engenders a type of psychic shock which causes a subconscious resistance to this new system, all language learners, therefore, labour under a physio psychological handicap Guberina is not alone in stressing the difficulty of imitation Spolsky shows how perception of the sounds must be selective for proper imitation to take place He writes ' it is clear that even the simplest form of imitation involves perception, selection and reproduction, necessarily supposing some sort of "induction of latent structure" Before I can imitate an utterance, I must perceive it in terms of an understanding of its structure

and select certain features for reproduction (29, p 161)' This diagnosis of the difficulties experienced in language learning might be assumed to apply only to the early stages of sound acquisition or to very young learners, but such an assumption would be unwarranted Dissatisfaction with auditory discrimination runs like a leitmotiv through the writings on language laboratory work and exists among teachers of adult learners as well as among school teachers For example, Châlon, Bouillon, Holec, Kuhr and Soppis (4) explain how they had to abandon the idea that undergraduates could monitor themselves The reason was that 'the student does not repeat what he hears but what he thinks he hears In fact it has been found that even at a relatively advanced level, students find some difficulty in repeating a sentence correctly, however simple, particularly when the construction under consideration involves stress and intonation patterns (4, p 10 and p 32)'

The implications of this problem for the classroom must be carefully considered If students cannot successfully monitor themselves, then the teacher's role becomes more important than we have usually considered it to be in the language laboratory Factors influencing monitoring also need consideration and discussion Size of class is one such factor It is immediately obvious that in a class lasting 30 minutes and containing 33 students, there will be less than one minute for each individual Various bodies have specified various numbers of students as efficient maxima for laboratory work The Modern Language Association in 1956 suggested 20 as the upper limit of class size for beginning Spanish The Army Specialized Training Program specified ten as the maximum for intensive training

Another factor associated with efficiency in monitoring is the length of practice session Skene (26) and the Department of Education and Science (11) both recommend 15 minutes as the optimum period for intensive language laboratory work It has been found that the concentration of younger pupils cannot be sustained for much longer without a change of activity Skene proposes an interesting deployment of the mixed installation which takes account of the limitation of children's attention span Half the class works at multiple-choice comprehension exercises in the audio active part of the laboratory, while the other half is monitored intensively in the audio active-comparative booths At mid point in the lesson, the children change activities, so that each half of the class experiences each type of work during the period Skene's successful use of

this stratagem shows that it is possible to surmount problems of technology and timetabling if one is really determined to create the conditions for efficient monitoring A prerequisite for such determination is that teachers should be absolutely convinced of the importance of good monitoring

The problem of low level auditory discrimination appears to be the main pedagogical difficulty experienced by teachers in laboratory work It is, however, by no means the only one Many educationalists are beginning to question the usefulness of the full audio active comparative installation for reasons which are partly implied in the above discussion It is felt that the practice sessions are too long and not well enough integrated with class work to permit proper preparation and follow-up Most schools are subject to the exigencies of a rigid timetable, and this makes it impossible for every class to use the laboratory at the stage when it would be educationally appropriate A class may begin a new lesson on Friday and be forced to use the laboratory on Monday – long before they are ready to profit from it – because this happens to be their assigned day All this tends to render less attractive the prestigious audio active comparative fixture On the one hand, its effectiveness is diminished by the student's inability to listen critically On the other, it presents problems of organization and logistics which often prove insuperable Consequently, attention is directed back to the classroom

It is no longer, however, a traditional 'talk and chalk' classroom which confronts us, but a modern electronic version In England, Ridler (22), a pioneer in the development of the so-called 'audio active classroom', has engineered an importation of the audio active laboratory into the classroom All desks are fitted with boom microphones, audio-active headsets and volume control The equipment can be used for short periods during every modern language class This makes it much easier to achieve proper preparation for laboratory work and immediate follow up after every session

Enough has been said to make it clear that, although the possibilities offered by educational technology initially seem rather glamorous, on closer examination they do not entirely correspond to the needs of either pedagogue or pupils In the next section, an attempt is made to probe more deeply the educational use of the laboratory, in terms of the materials used in it, and the principles on which they are constructed

A RATIONALE FOR LANGUAGE LABORATORY WORK

Language laboratory materials tend to follow the principles of audio-lingual theory which may be regarded as having the following characteristics: the structural patterns of a language are studied and manipulated, new material is presented inductively, and skills are learned in their natural order of acquisition – listening comprehension, speaking, reading and writing (cf 5). This approach is derived from several sources and forms a beneficial counterbalance to the old grammar-translation method with its excessive emphasis on deductive explanation prior to practice. Three main components of audio-lingual theory will be examined here. First of all, we have an obvious analogy between acquisition of the mother tongue and acquisition of the foreign language. Despite the fact that the second language learner is usually vastly different in cognitive development and maturation from a baby acquiring its mother tongue, certain features of initial language acquisition are abstracted and applied to a different situation. The natural order of skill acquisition is one of these features. The intensive and systematic use of imitation is another; mimicry-memorization of a corpus of material is an indispensable part of language learning, according to audio-lingual theory. The child's apparent ability to infer structures from linguistic material in its environment leads theorists to stress a situational rather than a grammatical presentation, and the foreign-language learner is expected, like the child, to infer structures from this presentation.

A second important influence on audio-lingual theory derives from a linguistic theory known as structuralism. This is a theory which views language as a totality of structures. He who masters all the structures will be master of the language. The structures are sometimes known as 'patterns' and pattern practice is a technique used extensively in language laboratory work. Over-learning is regarded as essential to the efficiency of language study. Bloomfield asserts categorically: 'Language learning is overlearning; anything else is of no use (3, p. 12).'

Audio-lingual theory is associated with reinforcement theory in psychology which stresses the role of repetition and reinforcement in learning. Because this approach places little emphasis on intervening cognitive variables, there is some ambiguity about the place of cognitive explanation in audio-lingualism, but it must be made quite clear that, whereas there may be doubt in audio-lingual theory as to whether cognitive explanations are admissible, there is absolutely no ambiguity about this

matter among the American structuralists themselves. They believe in a conscious, cognitive grasp of the principles underlying the patterns.

Language learning which rests on reinforcement theory postulates that language is acquired mainly by a process of stimulus-response bonding. Skinner (27) believed that the parent sets up a repertoire of responses in the child by reinforcing many instances of response. The child's vocalizations, at first relatively unpatterned, are selectively reinforced and gradually assume forms which produce appropriate consequences in a given verbal community. After verbal behaviour has been acquired, reinforcing consequences maintain the response in strength. If reinforcement is withheld altogether, a response (or 'operant') grows weak and many effectively disappear. The device of reinforcement is, therefore, a way of controlling the probability of occurrence of a certain class of verbal responses. Skinner's theory can be neatly applied to second-language learning. The audio-active-comparative language laboratory acts as an imported verbal community and the learner is reinforced by hearing that the correct response on the master tape corresponds to his own correct utterance. If the two do not match (i.e., the student response is incorrect), then the master tape will not have a reinforcing effect; rather it will tend to extinguish the incorrect response.

Audio-lingual theory has been extremely influential in determining the type of exercise done in the laboratory. Three and four phase drills, pattern practice and repetition all derive from it, and it is precisely because they are so prevalent that it is desired to offer some critique of the theory underlying them. In many respects it is an admirable theory and seems to constitute an almost ideal 'marriage-partner' for the laboratory, but in showing the limitations of audio-lingual theory, one is simultaneously showing the limitations of language laboratory work and helping to ensure that it will be seen in perspective. The three components of audio-lingual theory will be treated in the order in which they have already been discussed.

ANALOGY WITH ACQUISITION OF THE MOTHER TONGUE

The child's motivation to learn a foreign language is unlikely ever to be as strong as it was for the first language. His need to communicate and make his needs known has already been met, and he may even resent the introduction of a foreign language as a symbolic attempt to make him regress to infancy. In the school situation we can never replicate the conditions under which he learned his mother tongue, and the amount of

exposure which we can give him to the new language will normally be so inadequate that we are forced to employ special cognitive stratagems to accelerate learning. As for the deliberate delay in introducing reading and writing, there is evidence that such delay always presents difficulties, no matter how long it may be (15). To a child who has already mastered skills of reading and writing in his native language, the moratorium can seem frustrating and artificial. He may well *imagine* how the words might look when written and have to unlearn a whole system of home-made phonetics and mnemonics when finally he is introduced to the official form of the written language.

STRUCTURALISM

Many educationalists believe that the whole is more than the sum of the parts and doubt whether the learning of patterns will lead to a true competence in a language. Spolsky (29) fears it will lead not to a true command of language, but to a mere manifestation of 'language-like behaviour'. Likewise Gefen is bothered lest 'graduates of the "new school" will suffer from the same faults as do the traditionalists: knowing the patterns (where the traditionalists know the paradigms) but not knowing the language (10, p. 192).'

The structuralist contention that practice is indispensable for mastery of a language has been questioned in many quarters. The phenomenon of 'latent learning', for example, seems incompatible with the theory. A considerable amount of repetition often seems powerless to 'fix' a structure. This was observed by McNeill (16) who found that, despite thorough practice of irregular verb forms, children immediately modified them on contact with regular verb forms. McNeill concludes that the patterns weigh more heavily with children than frequency of repetition.

REINFORCEMENT THEORY PSYCHOLOGY

Reinforcement theory has been subjected to close scrutiny by many scholars. Miller, Galanter and Pribram (17) scornfully calculate that if language learning were really the result of S-R learning, then childhood would need to be a hundred years long with no pauses for eating or sleeping and perfect retention of every string of 20 words after one presentation. Chomsky (6) does not utterly reject S-R learning, but believes it to be inadequate to explain language learning in its entirety. Chomsky would support the use of rote learning in the early stages but asserts that insightful

grasp of rules is a more powerful model of learning which can account for the innovative properties of language He makes the categoric statement that

> The notion that linguistic behaviour consists of 'responses' to 'stimuli' is as much a myth as the idea that it is a matter of habit and generalization (6, p 46)

If Chomsky is right, then the types of exercise most frequently performed in the language laboratory are not at all calculated to promote true linguistic behaviour A survey by Vernon (30) shows that the most frequently performed exercises are structure drills and repetition by exploded tape, while these may have a certain utility, teachers must be aware of their limitations and avoid attaching too much importance to the fact that students perform drills properly They may be totally incapable of using language in a generative way and of responding to novel situations Casual or ill informed use of the language laboratory encourages parrot-style repetition which by passes the intellect This kind of laboratory 'work' is likely not only to be ineffectual but to have a positively deleterious effect upon learning Research can be quoted in support of the view that repetition without understanding will play no part in the formation of associations (23, 24, 25) Asher (1) came to a similar conclusion The less repetition before learning occurs, the greater will be the retention Asher also found that item presentation before the critical learning occurs has a cumulative negative effect on retention The implications for laboratory learning are very obvious They are that items should never be practised without having been properly understood, and that practice without such understanding will militate against retention of the material by the learner

RESEARCH STUDIES IN THE USE OF THE LANGUAGE LABORATORY

In this section, we will examine research on the efficiency of the laboratory with a view to establishing a consensus about the all important question does the laboratory improve attainment in foreign language study?

Four important studies will be considered, namely those by Smith (28), Keating (13), Lorge (14) and Green (12) There is some scarcity of empirical evidence on the effectiveness of language laboratories, possibly because it is so difficult to control all the variables, but the work of Green in York is especially satisfactory in that it pays very careful attention to methodology

Smith (28) can claim credit for a very large-scale survey, but the disadvantage is that it proved impossible to control it tightly. It was primarily a comparison of cognitive and audio-lingual approaches in foreign language instruction, but a subsidiary objective was to measure the relative effectiveness of three different types of language laboratory installation: audio-passive, audio-active, and audio-active-comparative. Smith's conclusion was that:

> The language laboratory systems employed had no measurable effect on achievement in tests of listening, reading, vocabulary or grammar after one year of French or German instruction (28, p. 164).

He found that students taught by the traditional method, using only a tape recorder in class, performed significantly better than the group being taught by audio-lingual methods and using a laboratory. His work can, however, be criticized on methodological grounds. The teachers did not always adhere to the particular teaching strategy which they had been asked to use, and because the experiment was on such a large scale, it was only possible to arrange observation of each class about once every two weeks. Pupils' achievement was rated after one year, using Modern Language Association Co-operative Foreign Language tests (18). These tests had the advantage of being standardized, but they were intended to be used after two years of study rather than one. For this reason, they probably did not constitute an accurate and sensitive measure of pupil attainment. The language laboratory was not used to individualize instruction in any way. Teachers were asked simply to play the tape to the whole class and no attempt was made to investigate how effective the installation would have been if each pupil had been allowed to practice at his own pace.

Keating (13) established that the type of laboratory used in the district which he studied was predominantly audio-active; instruction generally consisted of one weekly session per class. Each student was identified by IQ on whatever intelligence test the school employed, and five IQ groups were established – top, high, medium, low and bottom. The top group had scores in the top 12½% of the range of marks, the high group scored in the second 12½%, the medium group scored in the middle 50%, the low group in the next 12½% and the bottom group in the last 12½%. All students were tested for speech projection using the Metropolitan School Study French Speech Production Test (9). Reading comprehension was tested by the administration of Part I of the Co-operative French Test (Series Q) (8), while listening comprehension was tested through the administration of

the Co operative French Listening Comprehension Test (Form B) (7) Keating's findings in relation to the intelligence of students are interesting He discovered that differences between laboratory and non-laboratory students in the same IQ class always favoured the non-laboratory students and that the equipment did not help students of average or lower IQ to gain over students of similar ability not using the laboratory In the second, third and fourth years, high IQ students achieved better listening comprehension if they did not use the laboratory The only advantage which lab work seemed to confer was in speech production during the first year of language study This difference levelled out, however, in subsequent years

Lorge (14) found that in overall quality of speech and in daily pencil and paper tests, the audio active-comparative group was superior to the audio active group Like Keating, she claimed that the laboratory conferred an advantage in speech production during the early stages of learning, but found that this levelled out by the third year, so that the laboratory group' then had no advantage in any speech factor measured Her work on frequency of exposure to the laboratory is of particular interest She compared non laboratory groups with those using the installation once-a week, and those using it for 50% of class time This last group equalled or exceeded the non laboratory group in conventional learning, whereas the once a-week laboratory group was in some cases inferior to the non laboratory group What this amounts to is that use of the equipment on a once weekly basis may actually be worse than never using it at all Lorge speculates that 'it is possible that one weekly language laboratory session may not allow the student enough time to develop the habit of learning through hearing (14) ' This finding must be taken very seriously since there is evidence that the once a week pattern is the most widespread in all educational institutions (12)

Green's study lasted three years (1967 70) and an audio-active-comparative laboratory was used once a week at set times All pupils were given IQ tests, (NFER Test No 3 of verbal and non verbal ability) They were also tested for language aptitude using the Pimsleur Language Aptitude Battery (19) An attempt was made to assess the degree of parental encouragement which each child received This was done by sending a confidential letter to headmasters of feeder primary schools asking them to rate the support given to each pupil by his home on an A to E scale At the end of the study, a questionnaire intended to assess parental support was given by an interviewer in each home The teacher variable was controlled by rotating

the teachers between the groups at the end of each term. As there were three groups and nine terms, each group would have encountered each teacher for three terms by the end of the three-year study peroid. During the experiment twenty-three specially devised tests of achievement were administered, and the Pimsleur German Proficiency Test, First Level (20), was given in the ninth and final term as an 'external' test of proficiency. At the end of the study, it was found that the language laboratory proved to have no significant advantage over the use of a single tape-recorder in the classroom.

The results of the four studies may be briefly summarized. The language laboratory gives an initial advantage in speech production which levels out during the second or third year of language learning. There is some evidence that audio-active-comparative systems are superior to audio-active systems. The use of the laboratory once or twice a week is unlikely to benefit attainment to any great extent, and may actually be inferior to conventional teaching. The laboratory is of no particular service to low or average IQ students, and high IQ students often do better without it.

CONCLUSION

Existing research on language laboratories may be of service to teachers in several ways. It should alert them to the danger of taking the pupil's auditory discrimination for granted. It should point up the danger that pupils may merely repeat structures without being able to adapt them. It should highlight the fact that the installation of a laboratory cannot offer any miraculous short-cut to language proficiency. Above all, it should shift emphasis from the role of the machine to the role of the teacher. Language laboratories are in keeping with the spirit of a technological age and may initially intrigue pupils by their novelty, but they cannot by themselves inspire the desire to communicate in a foreign language. They may be tireless in their repetition of utterances, but they are also mindless. Used by a competent teacher, they may have a contribution to make to the language learning process; however, only the teacher can motivate pupils in a manner which will enable the laboratory to be exploited to maximum effect.

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