Toward an Appropriate Technology Model of Communicative Course Design: Issues and Definitions

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Abstract—Prior to developing an appropriate technology model of communicative course design, key terms and important issues in the appropriate technology literature are identified and defined. The paper (a) provides a rationale for considering ESP in terms of appropriate technology, (b) surveys the philosophical and intellectual underpinnings of the appropriate technology movement, (c) defines key terms and clarifies them with language teaching examples, and (d) briefly considers some objections to the notion of appropriate technology.

As Holliday and Cooke (1982) remark, English for Specific Purposes (ESP) programs sponsored by government aid agencies (such as the British Council or USAID) often fail. A common reason for such failure is the lack of transfer of skills to the receiving institution during the project’s lifetime. These authors therefore identify program maintenance, or the ability of a project to survive the departure of foreign aid workers, as the key issue in aid-related ESP. They claim that this can only be achieved by adopting an “ecological approach” to program design. This approach may be broadly defined as negotiative and process-oriented. That is, instruction is sensitive to learners’ changing needs and wants; this requires a methodology that stresses the importance of learning as a continuing process. Most important, however, in contrast with the prescriptive, product-oriented work of Munby (1978) and his followers, it is designed to work within the host country’s system rather than against it. They try to ensure that the programs take root by developing an “alternative technology” to handle the problem of maintenance (Holliday & Cooke, 1982, p. 125).

In Markee (1985) I also recognize the need to work within the host country’s system and identify program maintenance as a key issue in aid-related ESP. More specifically, I argue that foreign experts working in newly independent countries marked by a high degree of multilingualism must consider the effects of various sociopolitical factors on course design. At Khartoum Polytechnic, Sudan, these factors ranged from the country’s multilingualism to the unofficial use of Arabic as a supplementary medium of instruction (the tertiary level is officially predominantly English medium). I therefore characterized ESP in countries such as the Sudan as an “educational language-planning solution to educational language-planning problems.”

It is important to lay the groundwork for synthesizing and developing some of these ideas into an “appropriate technology” model of communicative course design. This model must be usable in the least developed countries of the world. Given that the concept of appropriate technology is as relevant to developed as it

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is to developing nations (Jequier, 1976), such a model would also be useful in the First World.

Before developing such a model, key terms must be defined and important issues identified. I shall first provide a rationale for considering ESP in terms of appropriate technology. Second, survey the philosophical and intellectual underpinnings of the movement; third, define key terms and clarify them with language teaching examples, and fourth, briefly consider some objections to the notion of appropriate technology.

Rationale

The rationale for situating ESP projects in an appropriate technology context is simple: as language professionals, we are experts in our own field, not in development theory. Our judgments concerning why language aid programs fail are bound to be incomplete; as Fishman (1972) writes: "students of language planning have shown little awareness of the extent to which the literature on other-than-language-planning reports unexpected consequences, or at the very least conflict between different arenas of planning" (pp. 92 – 93).

This does not mean that we should all become professional development experts. However, ESP workers would certainly benefit from an informed understanding of how their work compares with, and relates to, other development activities. For our purposes, the appropriate technology movement is particularly interesting for two reasons. First, people are concerned with similar issues in the two fields. For example, in both development and ESP work, the desirability of treating development or teaching as primarily a process or a product generates heated debate. Second, I believe an appropriate technology viewpoint can help cast light on ESP-internal issues and resolve them. An example of such an issue is how to choose, in a principled fashion, between communicative approaches to language teaching that stress the importance of either materials or methodology. The concerns of this movement are therefore intimately connected with ours.

The Philosophical and Intellectual Underpinnings of Appropriate Technology

The appropriate technology movement is particularly interesting because of the astonishing variety of ideological viewpoints it accommodates. Such seemingly incompatible doctrines as Marxism, Hinduism, and Christianity contribute to the movement's vigor. Thus we find Bukharin's, Mao Tse-tung's, and Mohandas Gandhi's names quoted in the appropriate technology literature. The movement's Western prophet is E. F. Schumacher (1973).

It is the emphasis on development as "the qualitative ascent of human societies" (Goulet, 1971, p. 33) that distinguishes appropriate technology from most other theories of development. While other theories pay lip service to the idea of

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1 The information on appropriate technology in this and the following two sections is based on Jequier (1976), unless other sources are specified. The language teaching examples are the author's own.
mankind controlling its own destiny, they tend to reduce individuals' aspirations to such quantitative abstractions as the growth in a nation's gross national product, or the fulfillment of a five-year plan. The appropriate technology movement addresses such issues, as any theory of development must. However, what makes this movement so interesting, especially for non-economists, is that it self-consciously derives its intellectual legitimacy from ethics, not from science. It is primarily concerned with individuals, not with population samples; it is thus best viewed as a cultural revolution made by and for ordinary people not by experts.

The "respectability" conferred by the interest of aid agencies in the movement might lead one to suppose that appropriate technology is primarily an aspect of development aid. This is incorrect. Appropriate technology has undeniably influenced the priorities of aid agencies; but development understood in the Gouletian sense does not coexist comfortably with the traditionally quantitative concerns of aid. In practice, aid has overwhelmingly led to dependence (Mende, 1973). While aid workers can supply appropriate hardware (i.e., equipment) relatively easily, it is difficult for them to promote the use of appropriate software (i.e., management techniques). Appropriate technology should therefore not be seen as a magic aid formula, whose application will automatically result in success. In many ways, aid and appropriate technology make different assumptions about what development is: we should not underestimate the difficulties of making an appropriate technology approach work in the context of aid projects. It is possible that aid is, per se, an inappropriate technology, which blocks development. However, since aid has been so thoroughly institutionalized, and despite its bad track record, it is unlikely to be abandoned. The adoption of an appropriate technology approach by aid agencies is therefore beneficial; as we shall see, it challenges aid workers to avoid assuming that Western technologies are necessarily the best suited to doing any job anywhere. As Jequier (1976) notes,

> the development of technology is conditioned not only by the imperatives of engineering but also by the cultural and ideological values of the society which produces the technology. Changes in technological trends must be preceded by changes in culture, which in turn will bring about modifications in the demand for new technology. (p. 27)

Thus, despite the fact that aid, for example to certain Sub-Saharan countries, has so far proved itself incapable of generating long-lasting development, we must concern ourselves with precisely these cultural changes if development is to occur and maintain itself.

Definitions and Examples

The most important proponent and popularizer of such ideas in both the developed and developing worlds was E. F. Schumacher. Reacting against the idea that technology was culturally neutral, he contends that it is actually counterproductive to parachute Western technologies into developing countries without first considering whether these technologies are suited to local condi-
tions. He proposes that development projects should be ecologically nonviolent (i.e., nonpolluting), small-scale, and use technologies that are simple and reliable.

The concern with nonpolluting technologies might seem irrelevant to educationalists or language experts. However, Ivan Illich's powerful denunciation of compulsory schooling (1970) as an exercise in educational pollution shows that this is not so. More is not necessarily better. The need to develop nonpolluting educational technologies concerned with the quality, rather than the quantity, of education is thus of the utmost importance to educators and language experts alike.

It is perhaps worthwhile at this point to define what a "technology" is, because this term has thus far been used in what might seem a "loose" fashion. Following Stewart (1977):

*technology is often identified with the hardware of production—knowledge about machines and processes. Here a much broader definition is adopted, extending to all the "skills, knowledge and procedures for making, using and doing useful things". Technology thus includes methods used in non-marketed activities as well as marketed ones. It includes the nature and specification of what is produced—the product design—as well as how it is produced. It encompasses management and marketing techniques as well as techniques directly involved in production. Technology extends to services—education, banking and the law, for example—as well as to manufacturing and agriculture.* (p. 1).

This definition is so broad that it is difficult to separate empirically the effects of organizational problems on development from those of a purely technical nature. However, because the presence or absence of educational hardware (overhead projectors, cassette recorders, video equipment, etc.) is not central to language acquisition or learning, this argument need not concern us further. (For a similar treatment of education as a technology, see Lethem, 1984.)

The ecological approach differs from the ideas developed here in two respects; while Holliday and Cooke (1982) approach the problem of program maintenance from a primarily teacher-training perspective, I emphasize the importance of materials development. More fundamentally, the ecological approach limits itself to treating training techniques as technologies; the appropriate technology approach explicitly views all aspects of the educational system itself as technologies in their own right. Thus, language planning and ESP are technologies, each with its own set of characteristics. If we wished to assess whether a particular technology was appropriate in a specific context, we would have to equate its characteristics with identified needs. In this regard, we should distinguish between the needs of the formal and informal systems of an institution, as discussed in Markee (1985); these may roughly be glossed as the difference between real and perceived needs. Obviously, assessing the appropriateness of a given technology is not a simple matter. We can tell fairly easily whether a given technology is inappropriate, because it will stifle indigenous innovation. But the appropriateness of technology is more difficult to define because it varies according to cultural context. The technologies variously known as "appropriate," "low-cost," or "intermediate" all take cultural context as their point of departure.

Thus, ox-drawn plows introduced into several African countries that do not
have a tradition of livestock breeding are an intermediate technology, more sophisticated than traditional hand hoes, but less so than small tractors. In language-teaching terms, we might view photographs cut out of magazines for use as visual aids as technologically intermediate between stickmen drawn on the blackboard, and commercially produced educational filmstrips or videotapes. Similarly, an audio-lingual approach would be a pedagogically intermediate technology between rote learning and post-1960s meaning-based approaches to teaching. It is intermediate because the approach requires students to participate orally in class. In contrast, a rote-learning approach does not. Despite the considerable technical expertise required to teach well with this approach (audio-lingualism), it is intermediate in the sense that the interaction it promotes is language-like behavior, rather than a true communicative use of language (Widdowson, 1978).

An example of low-cost technologies are the $10 rural latrines developed in India, which are clearly cheaper than flush-toilets. From a language-teaching point of view, duplicated handouts are a low-cost technology in relation to book-form materials, whether commercially supplied or printed in-house. A “chalk-and-blackboard” approach is also a low-cost technology in relation to computer-assisted instruction or other “high-tech” approaches to teaching.

“Intermediateness” and “low-cost” are both relative concepts that are not fixed in space and time. Thus, while audio-lingualism might be considered an intermediate technology in country X, the same approach might be considered traditional in country Y. If stationery is scarce, as it is in certain Third World countries, it may in fact be cheaper in the long run to produce printed materials which are more durable than a file of loose-leaf handouts.

While intermediateness is an engineering concept and low-cost an economic notion, appropriateness represents the sociocultural aspect of innovation. Solar pumps are an appropriate technology in Africa because they use a freely available source of energy (the sun) to provide a scarce commodity (water). Although highly sophisticated technologically, these pumps require little or no maintenance and seem to have a long working life; they can thus “acculturate” easily to the local environment. In language-teaching terms, portable battery-operated cassette recorders are an appropriate technology in cities like Khartoum where power cuts are endemic. Furthermore, they are easily maintained by local repairmen, and can easily be taken to the technicians for maintenance, rather than vice versa. In contrast, language laboratories are not “system-independent”; that is, they are useless if there is no main electricity. They are also difficult to maintain because technicians must come to the institution to carry out maintenance work; because they are sophisticated pieces of hardware, this often means that local technicians are not qualified to do the job. Consequently, a foreign technician who does have the required expertise must be flown in at great cost to set matters right. This sets the stage for another cycle of breakdown and expensive repair, and perpetuates the country’s dependence.

The notions of appropriateness and system independence may equally be applied to educational software. For example, the pedagogical instructions that accompany language drills may prescribe the use of particular techniques; on the other hand, the choice may be left to individual teachers. In many Third World
countries, it is the second technology that would be appropriate and system-independent. It would allow untrained or inexperienced individuals to use teacher-fronted techniques, and would not threaten their status as the source of knowledge and authority in the classroom. At the same time, better-trained and more experienced teachers could choose to use group-work techniques to cover the same ground as their less experienced colleagues. Their status would not be threatened to nearly the same extent, because they would be drawing on classroom-management skills that they had already internalized. Status-related problems might still occur because the learners had not been encouraged to accept responsibility for their own learning. Such problems are to be expected because any change in technology must be preceded by a change in culture. Thus, while the first option would inevitably lead to frustration, the second leaves open the possibility of teachers using progressively more sophisticated techniques as their experience grows.

A synthesis of the previous discussion will serve to formulate a definition of appropriate technology that refers specifically to language education. Following Illich (1970) and Freire (1970, 1985), education must free people, not enslave them. However radical these authors’ criticisms of contemporary education may seem, they are drawing on, and claiming as their own, a long-established liberal tradition of education that is concerned above all with people, not equipment. A definition of appropriate technology must therefore focus on software rather than on hardware. Thus, although I agree with Olshtain (1979) that cost effectiveness must permeate all levels of policy formulation and implementation, we must not underestimate the difficulties involved in calculating the cost effectiveness of either the hardware or software of education. Such a calculation is perhaps more practicable when we are dealing with hardware. The concept of low-cost technology is certainly applicable in this instance. But these are secondary considerations; low-cost technologies therefore constitute a minor input to the proposed definition of appropriate technology.

Because program maintenance is the key issue in ESP aid work (indeed in all aid work), I will define technological appropriateness in terms of cultural change leading to indigenous innovation. The technologies that are used to implement ESP operations must be the result of a cooperative effort between the foreign experts and their local colleagues. Furthermore, if the situation demands it, these technologies will be intermediate in character. This is of course a matter to be settled by negotiation. It is just as counterproductive for foreign experts to underestimate the professional sophistication and expertise of their colleagues as it is to impose the latest applications of research findings on uncomprehending “subjects” anywhere. However, if the situation makes the development of intermediate technologies desirable, these should also be system independent. As Swales (1985) notes, we cannot assume that the carefully nurtured nucleus of trained teachers will remain intact over time. In the Third World as in the First, people move on to other jobs. Allowance must therefore be made for a program having to return to the use of less sophisticated technologies because local teachers have used their training to secure jobs elsewhere, often out of the classroom. While using system-independent technologies will not guarantee program maintenance, it would at least make the retraining of new staff less difficult.
The effort required to regain lost ground would be lessened because the original technologies were system-independent.

**Some Objections to Appropriate Technology**

A variety of objections have been raised by economists opposed to the appropriate technology movement. Most center on technical matters such as the impact of different kinds of technological hardware on economic growth and efficiency. These need not concern us here, not least because we are primarily interested in the impact of educational software on the attainment of educational goals whose economic benefits are not easily calculable.

However, there is one issue that must be addressed; as Jequier (1976) says, appropriate technology “is considered by some critics of the world’s industrial system as an attempt to institutionalize the technological status quo by offering to the developing nations technologies which are inefficient, obsolete, and unable to evolve further” (p. 34). In particular, some communicative methodologists might reject the use of audio-lingual drills as both obsolete and inefficient, and certainly unable to evolve further. They are therefore out of place in all language programs, not just in those that profess a philosophical commitment to teaching language as communication rather than structure.

Swales (1980) says in this regard that he sometimes regretted that his unit at the University of Khartoum did not appeal more often to the students’ traditional reliance on rote-learning. The result was that the library was noticeably empty the night before English exams, while it was always packed before content-subject exams. He surmises that this was attributable to the learners feeling that there was nothing concrete that they would “cram” for in English, which in any case had low status in the university. This last question is a complex issue, but one factor that Swales chooses for special mention is that the students were dismissive of techniques that they considered frivolous or unacademic.

The students were hankering after the kind of teacher-dominated environments they experienced in their content-subject classes. My own first attempts at using student-centered techniques at Khartoum Polytechnic were failures. This should not have been surprising. Despite the advice of foreign technical consultants to use problem-solving techniques rather than rely on lecturing, the latter was still the technique preferred by Sudanese technical teachers; most did not even mention problem solving as a useful technique. When pressed, one person described requiring students to demonstrate their knowledge of a concept at the blackboard as problem solving. One person’s process is clearly another’s product. It is therefore dangerous for an ESP operation to isolate itself from the accepted way of teaching in subjects whose needs it is servicing.

I came to this conclusion because when I switched to a more authoritarian, teacher-fronted style involving a mixture of lecturing, drilling, and some group work, the students began to respond positively to my teaching. With time, as they came to feel that English was a “serious” subject, I was gradually able to relax control. By the end of the academic year, these same students were doing quality group work without resistance.
Students could use either English or Arabic during group work, but only English when addressing me. Most used Arabic to discuss their ideas with their peers; however, they also used significant amounts of English, especially to quote material in support of their opinions. These activities were balanced with teacher-fronted techniques mediated exclusively through English. This differential use of the two languages to mediate an ESP reading course approximated the typical patterns of English and Arabic use in and outside technical classrooms (Markee, 1985).

In effect, although I had not at the time formulated my approach in terms of appropriate technology, I was using audio-lingual techniques, and Arabic, as intermediate technologies. The freedom to use Arabic resulted in far more English being spontaneously produced by the students than when I tried to conduct classes exclusively in English. Allowing the use of Arabic was therefore not detrimental to the use of English as a library language in Sudan. The use of audio-lingual techniques was also justified because they promoted attitudinal changes which had to precede the regular use of more participatory techniques, and not because I believe in behaviorist theories of language learning.

Just as the use of Arabic was not detrimental to the use of English, the use of lock-step techniques did not have a negative effect on language learning; indeed, it may even have had a positive effect. Much as it may be difficult to admit, students probably learn languages in a formal setting despite the use of our techniques (even our most cherished ones), and not because of them. Therefore, psycholinguistically “inefficient” and “obsolete” techniques can be used effectively to promote learning.

**Conclusions and Implications**

I have provided a rationale for situating ESP in an appropriate technology context because I believe that successful development is an organic process which is not amenable to purely technocratic solutions. In so doing, I have committed myself to a vision of development that necessitates the elaboration of techniques whose appropriateness is based on a dynamic of sociocultural change. The dichotomy between product- or process-oriented approaches to learning and development is clearly central to both disciplines. Furthermore, the position I am advocating is founded not only on Fishman’s bridge-building between disciplines, but also echoes Swales’ (1985) particular vision of ESP as “an applied nexus with lines of communication to a considerable range of disciplines in the Social Sciences and Humanities, and with a contribution to make, in interdisciplinary terms, to those disciplines” (p. 220).

The ideas in this paper contribute to a two-way process of communication between applied linguistics and development studies. Applied linguists can benefit from realizing that the problems of aid-related ESP are manifestations of the problems that affect aid work in general. The appropriate technology movement can benefit in turn from a discussion of the implications of treating education and language planning as technologies, whose appropriateness must be empirically established.

Following Markee (1985), ESP in countries such as Sudan is “an educational
language-policy solution to educational language-planning problems" (p. 4). I reached this conclusion because it was clear that the needs of Khartoum Polytechnic could be understood only in the context of a national educational language policy that was not working well. My materials development efforts were thus an example of what Fishman called for in 1972: specifically, a project concentrating on institutional or micro-level language planning. As Jernudd and Das Gupta (1971) note, language planning is usually considered a macro-level activity involving the formulation of policy at the national level. On the other hand, Prator's definition of the policy-making process is much broader:

> language policy-making involves decisions concerning the teaching and use of language, and their careful formulation by those empowered to do so, for the guidance of others. The language policy-making process leads to the implementation of these high-level decisions, which in turn leads to the making of further decisions at lower levels. Decision-making is therefore a permeating aspect of the process of developing a teaching program on a national scale. (Prator, revised version of definition quoted in Olshtain, 1979, p. 3, emphasis added)

While it is inconceivable that national language teaching priorities could be developed without centralized guidance from the ministry of education, macro-level language-planning does not therefore preclude the emergence of micro-levels of planning. Indeed, macro-levels of planning logically suppose the existence of micro-levels of planning. If macro-level policies are not working well, as they plainly are not in Sudan (see Andrews, 1984), it is because they have been overtaken by events and/or are inappropriate. The decreasing use of English in Sudanese tertiary-level classrooms is a case in point. Although English is the official medium of instruction, Arabic is increasingly encroaching on this traditional "domain" (Fishman, 1971) of English. A micro-level policy seeks to modify moribund and/or inappropriate national policies by addressing autonomous micro-level needs. It is only then that second-language instruction can be made appropriate.

Following Freire (1985), education is a reflection of the dominant power structure. It is therefore naive to expect that education can be used to challenge the fundamental interests of the dominant elite. However, this is not to say that this so-called super-structure does not create a certain limited autonomy of action in terms of the means of achieving particular ends. While being mindful of the constraints discussed previously, it is unnecessary to go as far as Widdowson (1983, p. 109) does in limiting ESP to a "dependent activity, (whose pedagogy) must be dependent too."

This brings me to my last point. I claimed earlier that an appropriate technology outlook could provide us with a principled way of choosing between communicative approaches to language teaching which stress the importance of either materials or methodology. Here I agree with Widdowson (1983, p. 107) that methodology is "at the heart of the operation with course design directed at servicing its requirements." This can mean that course designers have to take into account their clients' initial educational conservatism when developing courses. For example, the product-oriented attitudes to education typical of Middle Eastern students (Dudley-Evans & Swales, 1980) are an important
source of input to the design process. Naturally, these attitudes are not limited to Middle-Eastern students, as the volume that contains the Dudley-Evans and Swales paper shows. We must not ignore these attitudes; as Jequier (1976) pithily puts it, while there may be a need for our product, there may not be a market for it. We cannot choose our educational technologies in terms of our ideological preferences alone. We should see product- and process-oriented approaches to promoting second-language classroom interaction in terms of a text-context cline (Bowers, 1980, p. 80), as shown in Figure 1.²

Teaching techniques that rely on text are concerned with mention and correctness, while those that rely on context are concerned with free practice and exploitation. Less technically, the former concentrate on language as grammatical form, while the latter concentrate on language as communicative use. Thus, the former are associated with a lack of genuine interaction, while the latter are associated with an abundance of it. The quality of the interaction (in terms of its genuineness or lack thereof) is determined by the degree and type of teacher involvement or intervention.

An appropriate technology approach to course design suggests that we must choose our teaching technologies in terms of their cultural appropriateness. An added dimension to Figure 1 provides a measure of the cultural appropriateness of a technology in terms of whether the culture under investigation encourages learner dependence or independence from the teacher (see Figure 2).

We would therefore initially choose technologies that corresponded roughly to the learners' current level of educational dependence or independence. The subsequent aim of teaching would be to move the learners in a methodological sense toward the right of the text-context cline.

² Some researchers, particularly those interested in conversational analysis, claim that text is context (see Schegloff, in press). While I agree with this position, it does not affect the argument here. I am concerned with the fact that teacher and student-centered teaching techniques can be arranged along a cline; I am not concerned with the technical specifications of these specialized versions of ordinary conversation.
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REFERENCES


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