We know that general transfer is the type of transfer at the heart of the educational process. It consists in the continual broadening and deepening of knowledge in terms of basic and general ideas.

Students necessarily have only a limited exposure to the materials they learn, they are only in school a limited number of hours and they have others things that take up their time. How can this limited exposure be made to count in their thinking for the rest of their lives? The answer lies in giving students an understanding of the fundamental structure of whatever subjects we choose to teach. This is the minimum requirement for using knowledge, for bringing it to bear on problems and events one encounters outside a classroom, or in classrooms one enters later in one's training. Studies have stimulated a renewed interest in complex learning of a kind that one finds in schools, learning designed to produce general understanding of the structure of a subject matter. The teaching and learning of structure, rather than simply master of facts and techniques, is at the center of the classic problem of transfer.

Take for instance a student studying a plants response to a changing light source by placing the plant inside a black box with a hole cut in the side. After a week in the box the once straight plant will have changed position in order to grow toward the light; it has responded to an external stimulus, this is known as a tropism. A tropism is a biological phenomenon, indicating growth or turning movement of a biological organism, usually a plant, in response to an environmental stimulus.

Once the student understands that organisms respond to external stimulus, that is the structure of the subject, he can use this understanding to relate many other things to it meaningfully. For instance, there is a preferred level of illumination toward which lower ocean organisms orient, a preferred level of salinity, of temperature, and so on. Or take the example of studying species maintenance of insects at different altitudes on the side of a mountain, where crossbreeding is prevented because the different insects prefer different oxygen levels. While these things may seem unrelated to the study of plants they are examples of the many phenomena in biology that can be understood in light of tropisms. The learning of one particular task has allowed the learning of other activities, this is transfer. Grasping the structure of a subject is understanding it in a way that permits many others things to be related to it meaningfully. To learn structure, in short, is to learn how things are related.

Algebra is a way of arranging knowns and unknowns in equations so that the unknowns are made knowable. Once a student grasps the ideas embodied by the fundamentals of algebra, she is in a position to recognize wherein "new" equations to be solved are not new at all, but variants on a familiar theme. Whether the student knows the formal names of these operations is less important for transfer than whether she is able to use them.

The often unconscious nature of learning structures is perhaps best illustrated in learning ones native language. Having grasped the subtle structure of a sentence, the child very rapidly learns to generate many others sentences based on this model though different in content from the original sentences learned. While young children are able to *use* the structural rules of English, they are certainly not able to say what the rules are.

Good teaching that emphasizes the structure of a subject is probably even more valuable for the less able student than for the gifted one, fir it is the former rather than the latter who is most easily thrown off the track by poor teaching. One thing is clear: if all students are helped to the full utilization of their intellectual powers, we will have a much better chance of surviving as a democracy in an age of enormous technological and social complexity. Redoubled efforts are essential in the social studies, in the humanities, and in language instruction. A sense of tragedy and triumph achieved through the study of history and literature is surely as important to modern man as a sense of the structure of matter achieved through the study of physics. It should be utterly clear that the humanities, the social studies, and the sciences are all equally in need of imaginative effort if they are to make their proper contribution to the education of coming generations.

“Pedagogy” is derived from the Greek words *paid*, meaning “child” (the same stem from which “pediatrics” comes) and *agogus*, meaning “leader of”. Thus, pedagogy literally means leader of children. The pedagogical model of education is a set of beliefs, as viewed by many traditional teachers as an ideology; based on assumptions about teaching and learning that evolved between the seventh and twelfth centuries in religious schools. Young men would complete courses in theology before entering the priesthood. The teachers had only one mission and that was to instill the religious dogma to the students; they controlled everything. For a long time this was the only model available, even in secular schools; and so our entire educational enterprise, including higher education, was frozen into the pedagogical model.

The pedagogical model assigns to the teacher full responsibility for making all decisions about what will be learned, how it will be learned, when it will be learned, and if it has been learned. It is teacher-directed education, leaving to the learner only the submissive role of following a teachers instructions, it is based on a few assumptions about the learners.

The need to know. Learners only need to know that they must learn what the teacher teaches if they want to pass and get promoted; they do not need to know how what they learn will apply to their lives. "When are we going to ever *use* this stuff?" is a protesting lament heard by most teachers several times a year. It comes from students with little patience to put up with ideas or concepts too abstract or irrelevant for them to fathom. Often students do not understand the value of what they are learning and unless they are blessed with an exceptional memory, most of the stuff they are taught won't be remembered or used beyond passing the final exam.

The learners self-concept. The teacher's concept of the learner is that of a dependent personality; therefore, the learner's self-concept usually becomes that of a dependent personality. In a typical youth classroom setting the teacher is seen as an oracle who is never to be questioned, and the students are totally reliant on her to transmit all the information they will be learning. The students do not play any role in contributing to the body of knowledge.

The role of experience. The learner's experience is of little worth as a resource for learning in the pedagogical model; the experience that counts is that of the teachers. Therefore transmittal techniques such as lectures, assigned readings, worksheets, etc, are the backbone of pedagogical methodology.

Readiness to learn. Learners become ready to learn what the teacher tells them they must learn if they want to pass and get promoted.

Motivation. Learners are motivated to learn by external motivators; grades, the teachers' approval or disapproval, parental pressures.

Orientation to learning. Learners have a subject-centered orientation to learning; they see learning as acquiring subject-matter content.

As individuals mature, their *need* and *capacity* to be self-directing, to utilize their experience in learning, to identify their own readinesses to learn, and to organize their learning around life problems, increases steadily from infancy to pre-adolescence, and then increases rapidly during adolescence. Thus, pedagogical assumptions are realistic and pedagogy is practiced appropriately during the very early years of education, because of the high degree of dependency of young children. Pedagogy becomes decreasingly appropriate in the following years of a child's education. The problem is American culture assumes and permits a growth rate that is much slower than what is possible. Our culture does not nurture the development of the abilities required for self-direction, while the need to be increasingly self-directed continues to develop naturally. The result is a growing gap between the need and the ability to be self-directing, and this produces tension, resistance, resentment, and often rebellion in the individual.