à tous les niveaux, faire des plans et construire — la planche à dessin et le chantier — devront être étroitement liés. La pratique du chantier ne devra pas être ajoutée comme une expérience séparée, au terme d'une formation académique de plusieurs années. Elle devra être partie intégrante du programme d'études.

5° Au cours de la première année, la pratique fondamentale combinée du dessin et du travail manuel familiarisera les étudiants avec les éléments de la composition (*design*) — surface, volume, espace et couleur — et simultanément avec les éléments de construction et de « bâtiment » en poursuivant des exercices dans l'espace à 3 dimensions exécutés avec outils et matériaux. En même temps, un cours de composition, portant sur des problèmes réels, concentrera toute l'activité du groupe sur le but social d'améliorer la vie de la communauté. Les éléments de l'urbanisme doivent être inclus dans ces études d'ensemble initiales.

6° Au cours des deuxième et troisième années, l'atelier dessin-construction, complété par l'expérience pratique acquise pendant les vacances d'été et par les diverses activités du laboratoire, mettra en corrélation l'expérience supplémentaire avec la connaissance qui s'élargit. Le terme « expérience de chantier » ne se rapporte pas à un travail effectué dans un bureau, mais à une pratique effective sur le tas, comme assistant du contremaître ou du conducteur des travaux. Cette expérience de chantier — qui ne durera pas moins de 6 mois — devra être rendue obligatoire pour l'obtention de tout diplôme d'architecte. Elle devra également comprendre la prise de connaissance avec l'industrie du bâtiment.

7° La construction devra être enseignée comme une partie et un élément de la composition, dont elle est directement solidaire. On doit donner la même importance aux deux ; on ne doit pas faire passer un étudiant à un degré supérieur tant qu'il est déficient en une quelconque de ces parties. Les problèmes de composition et de construction doivent être liés à des conditions réelles de terrain et site, et à celles de l'utilisation de l'immeuble. On devra les considérer comme inséparables des problèmes intéressant la communauté, parmi lesquels les facteurs d'économie, importants entre tous.

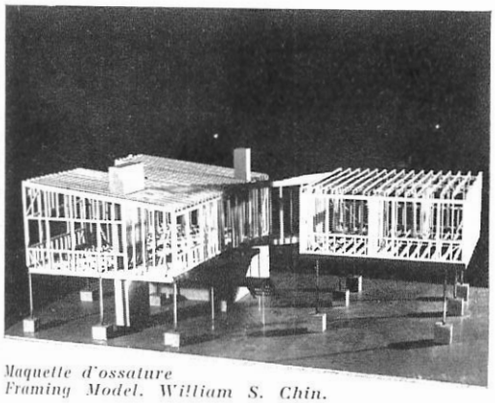
8° On devra entraîner les étudiants au travail en équipe — et également au travail en compagnie d'autres étudiants en techniques apparentées — afin d'apprendre les méthodes de collaboration. Cela les préparera à leur tâche vitale, qui sera de coordonner l'activité de nombreux individus engagés dans la conception et l'exécution des tâches de l'urbanisme et du bâtiment. La notion de travail d'équipe conduira les étudiants à l'architecture solide, « anonyme », plutôt que vers le « chiqué » superficiel.

9° L'étude de l'histoire de l'architecture devra débuter en troisième année plutôt qu'en première, afin d'éviter l'intimidation et l'imitation. Elle devra aider les étudiants mûrs à analyser l'origine des chefs-d'œuvre du passé, et leur montrer comment la conception architecturale d'une période révolue, comme en font foi les exemples qui subsistent, a résulté de sa religion, des conditions sociales qui y prévalaient, de ses moyens de production.

10° Les professeurs ne seront recrutés que parmi des hommes possédant une expérience personnelle suffisante, à la fois en matière de composition et de construction. La tendance qui consiste à engager comme professeurs des jeunes hommes qui viennent seulement de terminer leur éducation universitaire est nuisible. Car seuls des professeurs d'expérience étendue peuvent être capables de montrer l'esprit de ressource si nécessaire pour stimuler sans cesse l'étudiant d'une façon régulière. Ce que l'enseignement peut offrir de mieux est la stimulation. Car c'est elle qui donne à l'étudiant le désir de sa propre initiative. Tout professeur d'architecture et de construction devrait avoir le droit d'exercer à titre privé, car cela seul peut réapprovisionner sa faculté de ressource. Sans cette possibilité, il est voué à une dessication rapide, d'où il se retirera sur le terrain « autoritaire ».

11° Les écoles d'architecture à petits effectifs — disons celles qui comprennent de 100 à 150 étudiants — sont plus efficaces que les grandes. L'impondérable qui a le plus de valeur dans une école : une « atmosphère » intense, résulte de la participation mutuelle du corps enseignant et des étudiants à toutes les activités ; c'est ce qui se perd si facilement dans les écoles trop grandes, si peu favorables à l'effort intime du groupe.

12° L'efficacité de l'enseignement dépend du nombre d'élèves par professeur. L'instruction d'un architecte demande un enseignement individuel afin de venir en aide à l'étudiant suivant les conditions qui s'adaptent à son propre talent personnel et à son stade de développement. Un professeur surchargé sera perdu pour tous ses élèves. Le nombre désirable d'étudiants par professeur devra être de 12 à 16 au maximum.



Maquette d'ossature
Framing Model. William S. Chin.

Blueprint for an architects training

by **WALTER GROPIUS**

In architectural education the teaching of a method of approach is more important than the teaching of skills. It should be a continuing process which must grow concentrically like the annular rings of a tree. In all its stages the scope should be all embracing instead of sectional, increasing slowly in intensity and detail in all fields of discipline simultaneously. The integration of the whole range of knowledge and *experience is of the greatest importance right from the start ; only then will the totality of aspect make sense in the student's mind. He will easily absorb all further details and place them where they belong if he progresses from the whole to the details, and not vice-versa.*

Such an educational approach would draw the student into a creative effort to integrate simultaneously design, construction and economy of any given task with its social ends. Obvious as this demand appears to be, from an intellectual point of view, educational experience has shown that it takes years to bring the student into the habit *of simultaneously conceiving all three —design, construction, and economy—as an inseparable and interdependent entity. The reason for the widespread sectional approach in architectural education seems to be the overemphasis on intellectual academic training and the resulting lack of opportunity for experience in field and workshop. I cannot see why knowledge alone should be made the primary object of education, when direct experience is just as indispensable as a basis for subsequent training. Paper has become too exclusive a medium of exchange. The book and the drafting-board cannot give that invaluable experience gained by trial and error in field and shop. Such experience should therefore be interwoven into the training right from the start, not added on later, after the academic part of learning has been already completed. For practical experience is the best means of guaranteeing a synthesis of all the emotional and intellectual factors in the student's mind ; it prevents him from rushing off into « precocious » design, not sufficiently weighted down by the know-how of the building process. No doubt the fatal separation between craftsmanship and academic learning during the development of the machine age has split architecture from building. The problem of how to coordinate both—scientific knowledge and field experience—is crucial in our educational system. I will try to outline, therefore, a plan which might help to correct these present deficiencies, starting off first with a suggestion for a more scientific approach in design.*

The general indolence of people towards the Arts and Architecture and the prevalent methods of education in design seem to be interdependent. Through improved education people should be encouraged to believe again in the basic importance of art and architecture for their daily lives. But so long as we consider the problems involved to be a matter of individual feelings which cannot be objectively defined as to standards of value, we cannot expect them to be recognized as basic for educational progress. The spiritual implications of art in society are to be redefined and, with the help of the scientists and using their methods of precision, the social and psychological components of art—not only the technical ones—are to be determined by a distinct order of values and meanings.

Basic order in design needs first of all a denominator common to all, derived from facts. A common language of visual communication will give the designer a foundation of solidarity for his spontaneous expression in art; it will free him from the sad isolation from which he is suffering at present since, in a socially disrupted world, we have lost the common key for understanding the visual arts.

In music a composer still uses a musical key to make his composition understood. Within the framework of only twelve tones the greatest music has been created. Limitation obviously makes the creative mind inventive.

In architecture the « golden mean », the « modules » of the Greeks, the « triangulation » of the Gothic builders give evidence that in the past also optical keys have existed, serving as common denominator for the working teams of early builders.

For a long period, however, no common denominator has guided our expression in the visual arts. But today, after a long, chaotic period of l'art pour l'art a new language of vision is slowly replacing individualistic terms like « taste » or « feeling » with terms of objective validity. Based on biological facts—both physical and psychological—it seeks to represent the impersonal cumulative experience of successive generations. Here roots true tradition.

In modern architecture and design there is a reawakening towards a language of vision. We are able today to feed the creative instinct of a designer with richer knowledge of visual facts, such as the phenomena of optical illusion, of the relation of solids and voids in space, of light and shade, of color and of scale; objective facts instead of arbitrary, subjective interpretation or formulas long since stale.

Order, of course, can never become a recipe for making art. Intellectual art is sterile, and no work of art can be greater than its creator. The intuitive directness, the short-cut of the brilliant mind, is ever needed to create profound art. But a language of vision will provide the impersonal basis as a prerequisite for general understanding; a key system of design will serve as the controlling agent within the creative act of the designer.

Yet before it can become common to all, it must be made valid through general education. This goal cannot be reached by theoretical knowledge alone; this must be combined with continuous practical experience.

During the industrial upheaval of our society, however, education has been narrowed by the over-valuation of the analytical mind, of book wisdom and of fact knowledge, while the importance of practical experience and of forming creative habits has been rather neglected. This is particularly evident in the arts. ..The belief that the sciences are of greater importance than the arts has impoverished culture. If the current civilization of expediency is to be succeeded by an indigenous culture, a correction of our educational system is needed which should give the arts as much weight as the sciences. Only then can both the emotional and intellectual powers of the human mind be correlated to act as one and to remain in balance.

Emotional faculties cannot be trained by analytical methods, but by creative disciplines as in music, poetry, and the visual arts. It is characteristic of the current trend that most influential educational plans published in recent years treat the visual arts rather casually, not at all as a discipline belonging to the central core of education. We are too over-confident of the benefits from intellectual training. The visual arts are being taught by historical and critical methods of « appreciation » and « information » instead of through direct participation in the techniques and processes of making things. *Aesthetic « ressentiment » has generally displaced a creative conception of art. But art, being the product of human desire and inspiration, transcends the realms of logic and reason. It is a field of interest common to every one, as beauty is a basic requirement for civilized life. Is it not then a fallacy to expect that historical and analytical approach alone can produce creative ability? Making is certainly not a mere auxiliary to thinking. It is a basic experience indispensable for the unity of purpose within the creative act. It is the only educational means which inter-relates our perceptive and inventive faculties. But today the work of imagination has become suspect and discreditable if it cannot be made subject to scientific reasoning. The trend of spiritual development in the past, however, has always been determined finally by the vision of the thinker, the poet, the artist. Today's education has bred split personalities whose « head is not more native to the heart »... (Hamlet). A disrupted world seems to be badly in need of the synthetic action of the artistic mind, of the man of vision.*

If we compare teaching the arts of design in the past with our present methods of training, the discrepancy becomes apparent at a glance. In the past, design was developed from apprenticeship in shops—today, from the platonic drafting-board. What used to be an auxiliary only for the maker of things—paper design—has become the central discipline of the designer. This shift of emphasis from learning by doing to intellectual discipline—or from the workshop to the classroom—is typical for the present educational methods in design. But can an architect become a master of his craft without previous experience with tools and materials, without the know-how of an illuminating experience in building and making? Should architectural education then be separated from its present academic framework? Many architects would agree with a decisive turn towards greater emphasis on practical experience. I, personally, have grave doubts as to whether the present bookish climate of universities can offer at all a healthy breeding ground for architects. The impact of industrialization on our profession has been so decisive that the young generation should be trained in close touch with the building industries and with their laboratories. As such a desirable change develops slowly, however, I shall attempt here to outline a transitional curriculum which, making use of existing academic facilities, aims at balancing academic learning by direct experiences in shop and field.

A continuous training of basic manual skill in experimental worksops combined with disciplines in the fundamentals of surface, volume and space, and of composition —derived from objective findings—must be developed on all levels of general and professional education. Both the reinstatement of shop practice and the introduction of scientific courses leading to a common language of visual communication are basic requirements for successfull teaching of the arts of design and especially of architecture.

This training should start with a general preliminary course aimed at coordinating the elements of hand-work and design. As the beginner does not yet know the relationship in which he stands to the world at large, it would be wrong to put the « trade » idea or any specialization at the beginning of his training. In his natural readiness to grasp life as a whole he should first get a comprehensive view of the vast field of possibilities for expression lying before him. The customary training in mere drawing is not sufficient as a preparation. Drawing and painting are certainly most valuable means of self-expression, but paper, pencil, brush and water color are not enough to develop the sense of space so necessary to freedom of expression. The student should be introduced first, therefore, to three-dimensional experiments; that is, to the elements of « Building », of composition in space with all sorts of experiments in materials. For example, observing the contrast between rough and smooth, hard and soft, tension and repose, will help the student to discover for himself by exercise of his hands the peculiarities of materials, their structure and textures. Working with materials, the student begins simultaneously to understand surface, volume, space and color. In addition to technical skill he develops his own form-language in order to be able to give visible expression to his ideas. After he has absorbed the elementary studies, he should then be ready to attempt compositions of his own invention.

The aim of such design work is to widen the personality rather than to provide professional skill. Its success will depend greatly on the qualities of the design teacher who, by encouraging and stimulating, must release the student's own imagination, must oppose with objectivity any reproduction or imitation of other people's conceptions, including his own. The student will then experience his own ability for making creative short-cuts which go beyond his preceding intellectual research.

Such a training develops and ripens intelligence, feeling and ideas, with the general object of evolving « the complete being » who, from his biological center, can approach his problems with instinctive certainty and will no longer be taken unawares by the convulsions of our mechanical age. It will give confidence and independence and will thus enhance the productiveness and speed of any subsequent professional training.

After such preliminary experience the professional designer can then start his specialized curriculum from solid ground. Still he will need the workshop and the

Un exemple type . . .

ETUDE ANALYTIQUE PRELIMINAIRE A LA CONSTRUCTION D'UN GRATTE-CIEL. — Walter Gropius, Dean Peabody, William Lyman Jr., critiques. Travail effectué en équipe par un groupe d'étudiants de Harvard. — Un site précis est envisagé dans la ville de Boston
1. Etude du prix de revient en fonction de la hauteur; 2. 3. Analyse de la structure : recherche du poids d'acier en fonction des travées adoptées; 4. Etude du contreventement; 5. Etude des communications verticales (ascenseurs, escaliers roulants et des incidences de leur emplacement sur une travée standard; 6. Etude de la manœuvre des camions en sous-sol et incidence sur les travées; 7. 8. Analyse des éléments architecturaux de l'ossature (suite page 65).

STUDENTS' WORK AT HARVARD UNIVERSITY. Research studies preparatory to the design of a multi-storied office building. Walter Gropius, Dean Peabody, William Lyman Jr., critics *(continued on page 75).*